#2

East Asia

Up to a million Tibetan antelopes once ranged across the Qinghai-Tibet plateau, China. Intense commercial demand for their shahtoosh (wool) in the 1980s caused the population to decline to 65 000 animals. Since then, effective legal protection has allowed recovery to around 100 000. Three-quarters of the antelope's range is now within protected areas.

Contents #2

List of figures 110
List of tables 110
List of boxes 110
List of abbreviations and acronyms 110

0 _ Executive summary 112

1 _ Background 116

1.1 Socio-economic setting 118
1.1.1 Political and administrative context 118
1.1.2 Population and livelihoods 120
1.1.3 Economy 122
1.2 Key biodiversity features 123
1.2.1 Geography and climate 123
1.2.2 Habitats and ecosystems 125
1.2.3 Species diversity, endemicity and extinction risk 127
1.2.4 Geographic priorities for conservation 130

2 _ Conservation challenges 134

2.1 Direct threats to biodiversity 136
2.1.1 Illegal and unsustainable harvesting of wild plants and animals 136
2.1.2 Residential, commercial and linear infrastructure 140
2.1.3 Dam building and water abstraction 142
2.1.4 Extractive industries 143
2.1.5 Agriculture and forestry 144
2.1.6 Pastoralism 144
2.1.7 Aquaculture 145
2.1.8 Pollution 145
2.1.9 Invasive species and disease 146
2.1.10 Climate change 147
2.2 Drivers of threats 149
2.2.1 Emphasis on economic development 149
2.2.2 Growing demand for natural resources, power and household and luxury goods 149
2.2.3 Weak governance 151

3 _ Ongoing conservation efforts 152

3.1 Government 154
3.1.1 Government institutions for conservation 154
3.1.2 Protected areas 156
3.1.3 National policies and legislation 162
3.1.4 International agreements 167
3.2 Government-community conservation programmes and eco-compensation 169
3.3 Universities and research institutes 170
3.4 Civil society 172
3.4.1 Domestic CSOs 172
3.4.2 International NGOs 173
3.5 Private sector 174
3.6 international agencies and donors 175

4 _ Lessons learned 180

4.1 Protected areas 182
4.2 Landscape conservation and green development 182
4.3 Species-focused interventions and habitat conservation 184
4.4 Illegal wildlife trade 184
4.5 Accessible data for improved decision-making 186

5 _ Strategic approaches 188

5.1 Priority geographies 190
5.1.1 Defining KLCs in East Asia 191
5.1.2 KLCs in East Asia 191
5.2 Strategic approaches to addressing the main pressures on biodiversity and ecosystems 198
5.2.1 Improve management and law enforcement in protected areas 198
5.2.2 Reduce the ecological footprint of economic development and further integrate the ecosystem values of natural landscapes and protected areas 203
5.2.3 Encourage regional cooperation on transboundary and international biodiversity threats 203
5.2.4 Support strong, consistent action against the illegal wildlife trade 203
5.2.5 Improve information gathering, management and dissemination in support of biodiversity conservation 206
5.3 Conclusion 207

List of figures

Figure 1.1	Land cover map of the East Asia region	119
Figure 1.2	Priority regions for conservation and Global 200 Ecoregions in East Asia	132
Figure 1.3	Priority regions for conservation and endemic bird areas in East Asia	132
Figure 5.1	Priority regions for conservation and key landscapes for conservation in East Asia	192
Figure 5.2	Priority regions for conservation, key landscapes for conservation and protected areas (IUCN categories I to IV) in East Asia	196

List of tables

Table 1.1	Population data for the East Asia region	120
Table 1.2	Total number of terrestrial and freshwater species and endemic species in the main taxonomic groups	128
Table 1.3	Number of terrestrial and freshwater threatened species, by major taxonomic group and country	129
Table 1.4	Number of terrestrial and freshwater threatened species in the countries of the region, by threat category	129
Table 2.1	Greenhouse gas emissions	148
Table 2.2	Corruption Perceptions Index scores, 2016	151
Table 3.1	Main national institutions involved in biodiversity conservation	155
Table 3.2	Protected areas in China	157
Table 3.3	Protected areas in legal categories that meet IUCN categories I to III*	158
Table 3.4	Number of sites designated under international agreements and conventions operating at site level	168
Table 3.5	Status of the biodiversity-related conventions in the region	168
Table 3.6	Net ODA disbursements to the East Asia region from DAC countries, 2011-2015	176
Table 3.7	Net ODA disbursements to the East Asia region, 2015, by donor	176
Table 5.1	Data sources for KLC identification in East Asia	192
Table 5.2	List of KLCs in East Asia	193
Table 5.3	Protected area coverage of KLCs in East Asia	196
Table 5.4	Examples of important protected areas in the KLC groups identified in East Asia	198

List of boxes

Box 1	The Amur/Chaingbaishan tiger landscape of north-east Asia (KLC 13)	197
Box 2	The Gobi Desert-Daurian Steppe Ecosystem (KLCs 1, 3 and 4)	200
Box 3	Northern Tibet-Qinghai plateau and the Himalaya range (KLC 6)	202
Box 4	Hengduan Mountains (KLC 5)	205

List of abbreviations and acronyms

ADB	Asian Development Bank
AIIB	Asian Infrastructure and Investment Bank
AMSL	above mean sea level
BIOFIN	Biodiversity Finance Initiative
BRI	Belt and Road Initiative
CBD	Convention on Biological Diversity
CCICED	China Council for International Cooperation and Development
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CSO	civil society organisation
DAC	Development Assistance Committee (OECD)
EAAF(P)	East Asian-Australasian Flyway (Partnership)
EBA	endemic bird area
EFCA	ecological function conservation areas
EIA	environmental impact assessment
EU	European Union
EUR	euro
G200	Global 200 Ecoregion
GDP	gross domestic product
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IAS	invasive alien species
IBA	important bird area
IUCN	International Union for Conservation of Nature
KLC	key landscape for conservation
KfW	German government-owned development bank
MAB	UNESCO Man and Biosphere programme
MoU	Memorandum of Understanding
$MtCO_2e$	megatonnes of carbon dioxide equivalent
NBSAP	National Biodiversity Strategy and Action Plan
NGO	non-governmental organisation
NR/NNR	Nature Reserve / National Nature Reserve
OBOR	One Belt One Road
ODA	Official Development Assistance
PA	protected area
PES	Payment for Ecosystem Services
PRC	priority region for conservation
Ramsar	Ramsar Convention on Wetlands of International Importance
RFE	Russian Far East
SDG	Sustainable Development Goal (UN)
SEA	strategic environmental impact assessment
SEE	Alxa SEE Ecological Association (NGO)
tCO_2e	tons of carbon dioxide equivalent
TNC	The Nature Conservancy
UK	United Kingdom
UN/UNDP/UNEP	United Nations/Development Programme/Environment Programme
UNEP-WCMC	UNEP World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	UN Framework Convention on Climate Change
USA	United States of America
WCS	Wildlife Conservation Society
WDPA	World Database on Protected Areas
WHS	UNESCO Natural World Heritage Site
WWF	World Wide Fund for Nature

0

Executive summary

All of the world's black-necked cranes breed on the high-altitude plateau of Qinghai-Tibet, China and Ladakh, India. The cranes are revered in Buddhist tradition, and protected by law. Their population has been reduced to around 10 000 by disturbance, grassland conversion and wetland drainage. Recent studies suggest that conservation efforts may have halted the decline.

Kanas nature reserve, in the Chinese Altai mountains, borders Kazakhstan, Russia and Mongolia. The Altai region is a transboundary centre of biological diversity and endemism. The scenic beauty of the area is the basis of a growing adventure-tourism industry.

0 _ Executive summary

This East Asia chapter of the Larger than Tigers report provides inputs to guide the EU's strategic approach to biodiversity conservation in China and Mongolia, with reference to parts of the Russian Far East where relevant. It describes the key features of biodiversity in the region, identifies the main threats to its survival, compiles lessons learned from past and present activities, identifies priority needs and proposes strategic approaches that could be supported by the EU and/or other donors.

China and Mongolia are home to about 1.4 billion people, just under a quarter of the global human population. The birth rate in China, currently the world's most populous country, is below the replacement rate, and the population is predicted to stabilise and start to fall before 2050. China has successfully pursued economic growth, becoming the world's second largest economy, but this has come at substantial cost to natural resources and ecosystems. However, there are signs the country is moving away from a focus on exclusively economic growth and towards a more balanced approach, emphasising green growth. Mongolia's economy is heavily dependent on mining, and has been vulnerable to shifts in global commodity markets as a result. Despite rapid development, neither country is free from the problems of poverty and the marginalisation of some parts of their populations; these are often the areas where people are most directly dependent on biodiversity for their livelihoods.

East Asia has a diverse range of ecosystems, including large numbers of endemic species and some of the most diverse temperate habitats on the planet. Mongolia and parts of western China are characterised by very large areas of steppe grassland and desert, some at high altitude. The large mammal species that inhabit these ecosystems survive by migrating over large areas in response to seasonal changes in weather and food. Conservation in these areas requires the integration of local livelihoods with the extensive management of large areas. In eastern and southern China, where economic development has been concentrated, natural habitats have been replaced in virtually all areas suitable for cultivation, and protected areas play a critical role in maintaining the remaining natural areas and the species that depend on them. Coastal habitats have been particularly affected by rapid industrial and urban growth.

The governments of the region have taken action to protect their wild species and habitats, with very significant areas set aside as protected areas. However, in some cases, lack of resources and complex institutional and legal arrangements have reduced the overall effectiveness of protected areas. Governments, civil society and, increasingly, the private sector are taking action to improve the effectiveness of protected areas, but the current level of effort is not yet stemming the loss of species' populations.

Based on an analysis of the threats and current conservation initiatives, the strategic approaches proposed in this chapter cover five broad areas, summarised below.

- For **protected areas** (PAs), priorities include boosting management effectiveness by addressing PA governance issues, strengthening institutions and management capacity in the field. There are opportunities to address conflicts and involve more stakeholders in the management of PAs, including collaboration with civil society organisations (CSOs). In the longer term, sustainable financing mechanisms will be needed to reduce donor-dependence. There are opportunities to increase revenue to PAs from ecosystem services and the substantial domestic tourism industry.
- At the level of **landscapes**, there is a need to build on recent improvements in mechanisms for planning and assessing the impact of proposed developments, which include the introduction of 'red lined' areas designated for low-impact development in China. There are opportunities to address biodiversity conservation through China's substantial payments for environmental services schemes, and through Mongolia's environmental impact regulations.
- The large scale of many of the region's important terrestrial and freshwater ecosystems means that many of them are **transboundary**. There are already many initiatives to encourage collaboration at the level of individual protected areas as well as whole ecoregions, and there are opportunities to enhance this collaboration. The private sector is increasingly international, and there is a need to ensure that environmental standards applied by companies working abroad are as good as or better than those required by their home governments.
- The region is one of the key markets and transit points for the global **illegal wildlife trade.** Action needed to address this problem includes intensifying existing efforts in investigation and enforcement, enhancing regional cooperation, providing greater support to the implementation of international agreements and building the capacity of the responsible authorities.
- Finally, there are strong traditions of **research and academic work** on environmental issues in the region. However, there is a lack of learning and communicating lessons from field experience, and a failure to apply new science to improve management practices.

1

Background

Desert landscape, Tibet. Temperatures on the Tibetan Plateau and the Taklimakan and Gobi deserts vary from -40° C in winter to +40° C in summer. Mongolian wild ass, Przewalski's horse and the critically endangered wild Bactrian camel survive here.

1 _ Background

Forest in Yunnan province, China. The mixed coniferous and broadleaved forests of the region are among the most biodiverse temperate ecosystems on earth.

This chapter covers China and Mongolia, and provides some information on the south-eastern parts of the Far East Federal District of Russia[1], which shares important ecosystems with the other two countries and has exceptionally important temperate forests (Figure 1.1).

1.1 Socio-economic setting

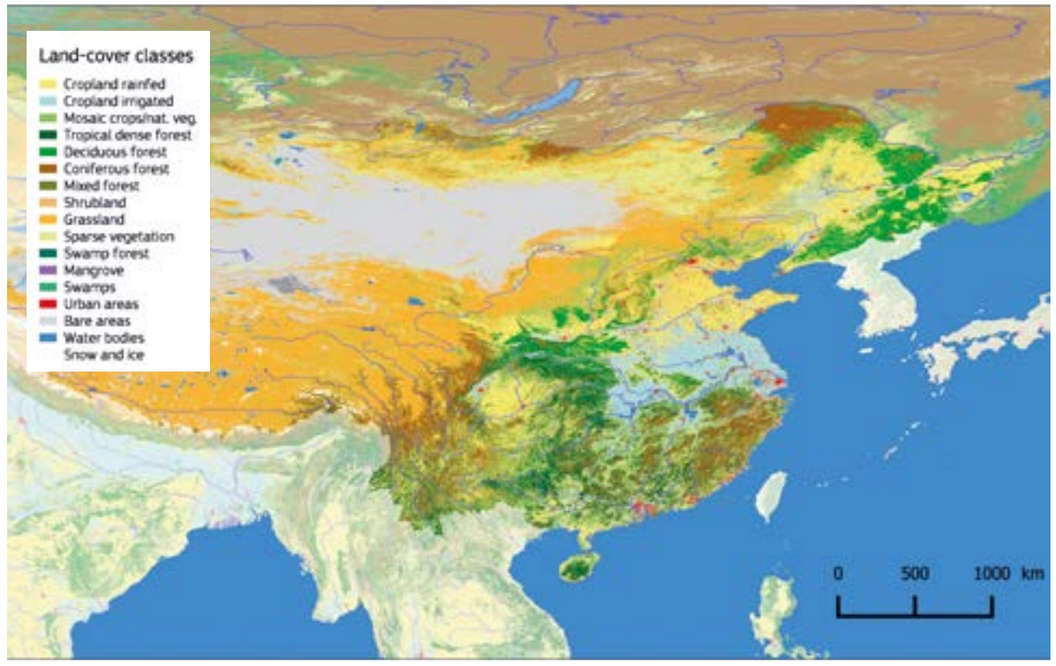
1.1.1 Political and administrative context

China is ruled by a single party, the Chinese Communist Party, with strong central authority but with considerable autonomy devolved to provincial governments. National judicial, legislative, executive, Party and military bodies are represented by subsidiary organisations at provincial, prefectural, municipal and county levels. Under this system each local agency is under the authority of the local leader and the leader of the corresponding department at the next higher level. National 5-year plans provide influential guidelines for social and economic development, reflected in similar plans or guidelines at provincial and subsidiary levels. There are elections at village level and above. The Party exercises considerable but not always unchallenged influence on the selection of candidates. Under the central government there can be some limitations on freedom of association and speech, often self-imposed, but there is increasing voluntary collective action, particularly in the case of the environment and biodiversity (see section 3.4.1). Hong Kong and Macao are Special Administrative Regions of China, with separate legislation, a high degree of autonomy and their own currencies, under agreements that are guaranteed until at least 2047.

Mongolia is a unicameral parliamentary democracy with a prime minister and members of parliament, and a president elected by popular vote. Political power is relatively centralised with provincial (aimag) budgets set centrally. Aimag governments have a fair amount of autonomy to make local regulations through decrees, but are financially limited in what they can do independently. Legislation allows the free operation of civil society organisation (CSOs).

The **Russian Federation** is a federal presidential republic with very strong powers residing in the president, who was elected for a fourth 6-year term in 2018. The prime minister is appointed by the president with the approval of the Duma (the lower house of parliament). The Russian Far East (RFE) Federal District enjoys a substantial amount of de facto autonomy simply because of the huge distance separating it from Moscow. Regulations on the activities of NGOs have tightened in recent years (see section 3.4).

Figure 1.1 Land cover map of the East Asia region



(1) The federal areas of the Far Eastern Federal District that share ecosystems with Mongolia and China are Amur Oblast, Jewish Autonomous Oblast and Primorsky Krai.

#1

‹
China's 1.4 billion people are concentrated in the southern and eastern half of the country. The area is the centre for agriculture and industry, with at least 15 cities of over 10 million people. Virtually all accessible land is used. Natural ecosystems are restricted to areas that are inaccessible or legally protected.

›
Orkhon Valley, Mongolia. Western China and Mongolia are dominated by mountains, high-altitude plateaus and deserts, with cold winters and little rainfall. Extensive livestock herding is the main traditional livelihood, and the average population density only 2 or 3 people per km².

Table 1.1 Population data for the East Asia region

Country or territory	Area (thousand km²)	Population (million) 2016	Population density (people/km²)	Population annual growth rate % 2011-2016	Fertility (number of children per woman)	Projected population in 2050 (million)
China	9 597	1 383	144	0.5	1.6	1 338
Mongolia	1 564	3	2	2.1	2.6	4
Primorsky Krai district, RFE	165	2	12	n/a	n/a	n/a

Source: For China and Mongolia, ADB Basic Statistics 2017, World Bank[2]; for Primorsky Krai, official census data, 2010.

1.1.2 Population and livelihoods

The combined human population of China, Mongolia and the RFE was estimated at 1 388 million in 2016[3], with 99.3 % of these people in China (Table 1.1). The total population for East Asia is projected to peak over the next 20 years, and to fall to 97 % of the 2015 level by 2050[4] and to 72 % of this level by 2100. Overall, the greatest long-term threat to the environment will come from the increased per capita consumption of resources, but there are significant regional differences in the patterns of population growth, migration and resource use.

China had a population of 1 383 million in 2016, with an overall population density of 144 people per km². Fertility (number of children per woman) has dropped below the replacement rate of 2.1 and the population is projected to start to fall between 2030 and 2050. There are huge variations in regional population densities across China, from 2.5 people per km² in Tibet, in the west, to 194 people per km² in Guangxi and 767 people per km² in Jiangsu, in the south and east. The differences in population density are correlated with marked differences in levels of economic activity and pressure on the environment. In general, in the western and northern third of the country (Inner Mongolia, Gansu, Qinghai, Xinjiang, Tibet), extensive areas of natural habitat remain, and there are important opportunities for both protection and sustainable use. In the south and east, rapid economic and industrial development have resulted in the degradation or disappearance of most natural habitats, and conservation requires more active interventions to protect what is left, as well as to restore habitats and ecosystem functions. Rural to urban migration remains an important determinant of local population density in China.

China has a working age population (15 to 64 years) of about 1 billion people, with those employed distributed approximately equally between agriculture, industry and services, and a labour surplus of about 150 million people, which is forecast to reduce to around zero within the next decade[5] as the population ages. Most agricultural production is in the eastern plains, which are cultivated on relatively small plots through labour-intensive methods, although mechanisation is increasing.

The population of **Mongolia** was 3 million in 2016[6], an average density of only 2 people/km². However, the population is very unevenly distributed, with 50 % of people living in the capital, Ulaanbaatar, and less than 30 % in rural areas. As a result, the population density in rural areas is only 0.4 to 1.5 people per km². With a fertility rate of 2.68, the Mongolian population is increasing rapidly, and is projected to reach 4 million by 2050, a 33 % increase.

Mongolia has a high level of unemployment in the cities and provincial (aimag) centres, and yet substantial rural-urban migration continues as people struggle to make a living from traditional transhumant[7] pastoralism. One third of Mongolians still live in poverty. The economy remains highly dependent on mining and has not been diversified to provide employment for the growing population, even though government policy supports the conversion of grassland to agriculture in the eastern part of the country.

The **Russian Far East** also has a very sparse population; according to the 2010 census[8], there are some 6.3 million people in the entire Federal District, slightly less than one person per square kilometre, making this one of the most sparsely populated areas in the world. However, the population density of the Primorsky Krai region, which is the focus of this chapter and includes the city of Vladivostok, is much higher (Table 1.1). The population of the Russian Far East has declined rapidly since the dissolution of the Soviet Union, dropping by 14 % between 2000 and 2015. In response, the Russian Government has been discussing a range of re-population programmes. Limited investment in village economies has encouraged rural-urban migration, with employment rates and per capita income higher in cities than in villages across the region.

(2) Population, population density, population and fertility data from Asian Development Bank, Basic Statistics 2017, available at www.adb.org/sites/default/files/publication/298061/basic-statistics-2017.xlsx, accessed 31 October 2017. Projected population 2050 from World Bank databank, available at http://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics:-population-estimates-and-projections, accessed 31 October 2017
(3) http://databank.worldbank.org/data/reports.aspx?source=2&country=CHN, accessed 25 April 2017.
(4) http://unstats.un.org/unsd/demographic/products/vitstats/serATab2.pdf
(5) http://www.georgemagnus.com/china-from-surplus-labour-and-unemployment-risk-to-labour-shortages-in-a-decade/
(6) http://data.worldbank.org/country/mongolia?view=chart, accessed 25 April 2017.
(7) Transhumance is the seasonal movement of people with their livestock between fixed summer and winter pastures. In montane regions (vertical transhumance), it implies movement between higher pastures in summer and lower valleys in winter.
(8) https://en.wikipedia.org/wiki/Russian_Census_(2010)

^

Solar energy farm, Shanghai. Solar, wind and hydro power provide over a quarter of China's energy. However, demand is burgeoning with urbanisation, and even though the share of renewables is growing, coal remains the main source of energy. The country's 13th 5-year plan emphasises green development and energy efficiency.

^

Yurt homes on the outskirts of Ulaanbaatar, Mongolia. Half of Mongolia's 3 million people now live in the city, putting demands on limited urban infrastructure, and intense pressure on the surrounding countryside for fuelwood.

1.1.3 Economy

China is the world's second largest economy, but its per capita income is still relatively low. The country has seen rapid industrialisation and construction, with an emphasis on coal-based power generation, although this is now being replaced with other forms of energy. Rapid economic growth has led to large inequalities in wealth and high levels of pollution. The recently approved 13th Five-Year Plan (2016-2020) highlights green development and includes targets to reduce pollution, increase energy efficiency, improve access to education and healthcare, and expand social protection. Under this plan the annual growth target for gross domestic product (GDP) is around 6.5 %, a slight reduction from around 7 % in the previous Five-Year Plan and a significant reduction from the actual mean annual GDP growth rate of 9.82 % since 1989. The contribution of agriculture to GDP has been declining, making up 9.1 % of GDP in 2015[9], while the service industry increased to over 50 % of GDP[10].

For most **Mongolians**, the basis of the economy has long been extensive livestock herding, supplemented by grain cultivation. However, it is mining that now accounts for over 50 % of GDP and 94 % of the nation's exports. Mining drove the growth of the economy for 15 years until 2013, but that effect has weakened and annual GDP growth dropped from 17.5 % in 2011 to 1 % in 2016, although there were signs of an up-turn in 2017[11]. Mongolia is the world's second-largest producer of raw cashmere (after China), and accounts for approximately 20 % of global supply. This sector has grown rapidly over the past 25 years, with most cashmere still being exported to China for processing, despite a growing in-country clothes manufacturing industry.

The Russian Far East contributes 4 % of Russian GDP, through industrial manufacturing, gold, iron-ore and coal mining, some oil drilling and refining, agriculture, and substantial salmon and other fishing enterprises, notably in and near Sakhalin, Kamchatka and the Bering Sea. Industrial production has dropped since the break-up of the Soviet Union. People in the remote villages of the region are highly reliant on small-scale (and often illegal) extraction of natural resources, including timber, fish and wildlife resources. While agricultural production has been increasing, people are still largely dependent on imported food and home products.

The region was not connected with the rest of Russia via domestic highways until 2010. Railways are better developed, with the Trans-Siberian Railway and Baikal-Amur Mainline providing connectivity with Siberia (and the rest of the country). For many remote localities aviation is the main mode of transportation, but the infrastructure is often poor. Maritime transport is also important for delivering supplies to localities on the Pacific and Arctic coasts.

Trade agreements and outward foreign direct investment

Mongolia, Russia and China have joined a trilateral trade agreement, which may have major implications for land-use intensity in the region. The agreement, signed in 2016, consists of 32 proposed projects and is currently focused on improving roads and other forms of transportation in the region, but may extend to agriculture, tourism, emergency preparedness and more[12]. There have also been trilateral consultations on regional economic development, in particular on dams, mining and transport, connected to initiatives such as Mongolia's Steppe Road, and Russia's Eurasian Economic Union. China has a new foreign direct investment and cooperation programme, the 'Silk Road Economic Belt and 21st Century Maritime Silk Road' programme, referred to as the One Belt One Road (OBOR) or the Belt and Road Initiative (BRI). This is financed through the Silk Road Fund[13] under the recently established (2014) Asian Infrastructure and Investment Bank (AIIB), which describes itself as being 'built on respect for the environment'. BRI/OBOR projects are being initiated in conjunction with other major lenders such as the Asian Development Bank (ADB), for example for three transport infrastructure projects in Central Asia and Pakistan, and it is envisaged that the AIIB will fund major infrastructure projects on its own under BRI. The Silk Road, and South-South Fund investments will support large infrastructure developments in Central Asia, South Asia and South-East Asia[14]. China is also investing in agriculture, with potential environmental impacts in many different countries[15].

1.2 Key biodiversity features

1.2.1 Geography and climate

China and Mongolia together cover 11.16 million km^2, extending over 5 500 km north to south (from 4 °N to 53 °N), and 5 200 km west to east (from longitude 73 °E to 135 °E), and from one of the lowest points on earth, the Turpan Depression (154 m below mean sea level) to the top of Mt Everest (called Sagarmatha in Nepal and Chomolungma in China) at 8 848 m above mean sea level. As a result, the region's ecosystems range from permanent ice and glaciers to tropical lowland forests. Many

(9) National data (in Chinese): http://data.stats.gov.cn/search.htm?s=GDP
(10) Yang Z. (2013). Demographic Changes in China's Farmers: The Future of Farming in China. See http://www.ccsenet.org/journal/index.php/ass/article/viewFile/27938/16858
(11) Mongolia: Economy, in Asian Development Bank 2017 outlook. Available at. https://www.adb.org/countries/mongolia/economy, accessed 15 December 2017.
(12) http://thediplomat.com/2016/06/china-russia-mongolia-sign-long-awaited-economic-partnership-agreement/-
(13) http://www.voanews.com/content/ap-china-southeast-asian-leaders-seek-greater-cooperation/3250705.html
(14) http://www.xinhuanet.com/english/2015-09/26/c_134663349.htm
(15) http://www.latimes.com/world/asia/la-fg-china-foreign-farmland-20140329-story.html

Guangxi province, China. The fertile, sub-tropical areas of southern China support intensive agriculture and rugged limestone karst hills.

The glaciers and snowfields of the Himalayas and the Tibetan Plateau are the source of many of the largest rivers in Asia, including the Brahmaputra/Jamuna, Indus, Mekong, Salween, Yangtze and Yellow rivers.

The 'wish forest' in the Zhangjiajie National Forest, Hunan, China. The forests, rivers and caves of this mountainous region are rich in unique species. The area is also a major tourist destination. History, culture and nature are often interconnected in East Asia, and this presents opportunities to engage people with conservation.

ecosystems have been greatly modified by human activity over thousands of years. The rivers of the region either flow through South and South-East Asia, or to the Pacific, the Arctic or to extensive inland basins and salt lakes with no outlets.

The west of the region has a continental climate with widespread local snow in winter and permanent ice cover at altitude. The dominant feature is the Tibetan plateau, which has an area of 2.5 million km^2 and is the highest plateau in the world, lying between 3 500 and 5 000 m above sea level. To the south the plateau is bordered by the Himalayas, with numerous peaks over 7 000 m. Several of Asia's great rivers, including the Indus, Brahmaputra, Salween, Mekong (Lancang in China), Yangtze and Yellow, rise in Tibet.

To the north of the Tibetan plateau between the various mountain ranges lie a number of depressions, or basins, with sandy and stony deserts that tend to be moister and grassier in the east. North-west China is characterised by these low-lying deserts, 500 to 1 500 m above sea level. Precipitation is generally very low, ranging from less than 100 mm to 400 mm per year.

Most of Mongolia lies between altitudes of 1 000 and 1 800 m above mean sea level (AMSL), but it rises to over 4 300 m in the Altai Mountains of the west, and 3 400 m in the Sayan Mountains on the Russian border in the north. Ulaanbaatar has a mean annual temperature range from minus 33 °C (mean minimum in January) to plus 27 °C (mean maximum in July).

To the east of the Tibetan plateau the land falls away through the forested highlands of Sichuan, Yunnan and Gansu to the plains of eastern monsoon China, the valleys of the Yellow and Yangtze rivers and various smaller mountain ranges. Eastern monsoon China comprises 45 % of the country, and has over 90 % of the population. The area was once forested, but almost all the accessible land has been converted to agriculture, and most of the remaining natural vegetation modified. Nevertheless, the highlands retain extensive forests, including tropical forests in the far south, evergreen broadleaf and deciduous forests in the south-west, sub-alpine coniferous forests on the eastern edge of the Tibetan plateau, and temperate mixed and coniferous forests in the north-east.

In the sub-tropical area of the south of the region, temperatures and precipitation are higher. Hainan, for example, has both humid subtropical and tropical monsoon climates, with mean annual precipitation ranging from 900 mm to 2 400 mm, and mean maximum daily temperatures of between 16 °C (in January) and 29 °C (in July and August).

The southern portion of the Russian Far East is dominated by the Sikhote-Alin Mountain Range, which extends for more than 1 000 km along the west coast of the Sea of Japan. The mountains reach a maximum height of 1 850 m, with an average elevation of around 1 000 m. The major rivers include the Ussuri and Amur, which form the border between Russia and China. This region endures long, cold winters (January mean temperatures ranging from -15 to -20 °C) and has mild summers, with a mean annual precipitation of 800-1 000 mm. During the summer and autumn, a monsoonal influence brings tropical storms and typhoons from the south-east, resulting in substantial rainfall. The driest parts of the year are from April to June and September to October, and these seasons are associated with the greatest forest fire risk.

1.2.2 Habitats and ecosystems

Freshwater

China's freshwater systems include 2 800 lakes (waterbodies >1 km^2). The Tibetan plateau is dotted with hundreds of lakes, mainly small and many saline, fed by the diminishing melt of the numerous glaciers that remain on the highest peaks. China's largest lake, Lake Qinghai, lies at 3 200 m AMSL in a depression in the north-east part of the plateau, adjacent to the Qaidam Basin depression (2 600 m AMSL) with saline lakes and desert. China's approximately 1 500 rivers include 15 major transboundary rivers, among them the headwaters of the Mekong, Brahmaputra, Red and Salween rivers. China also hosts the largest glacier system in Asia, covering an area of 6 000 km^2, mainly in the Pamir, Kunlun, Nianqing Tanggula and Himalaya mountain ranges, and Changtang in Tibet Autonomous region. Among them, the Pamir Mountains are transboundary with Central Asian states, and the Himalaya glaciers are transboundary with the South Asian states.

Mongolia's rivers drain into the Arctic Ocean, the Pacific Ocean and into Central Asian Internal Basins, such as the Great Lake Basin of western Mongolia. The Selenge river system is the largest in Mongolia and drains much of the north of the country. The river system includes the Uur and Eg rivers, and drains the deep, ancient Lake Hovsgol, the 19th largest lake in the world by volume. The Selenge river flows into Lake Baikal in Russia. The Pacific Ocean catchments of Mongolia form the headwaters of the Amur Basin and are vital for conservation efforts in the three-country basin. Lake Buir, on the eastern border, is shared with China and has been the site of a productive fishery. The Central Asian Internal Basin catchment is the largest of the three regions, occupying 65 % of the country. Despite low annual rainfall and a high evaporation rate, the basin contains several large lakes, including Khargas Nuur and Uvs Nuur.

Lake Khanka, the largest lake in north-east Asia, straddles the border between Primorsky Krai, Russia, and Heilongjiang province, north-east China. The surface area of the lake varies from 5 010 km^2 to 3 940 km^2, depending on climatic conditions. The lake's drainage basin covers 16 890 km^2, 97 % of it in Russia, with 24 rivers flowing into the lake and only one, the Songacha, draining it. The lake is a Ramsar site, and is covered by the Khanka Nature Reserve on the Russian side and the Sinkai-Hu Reserve in China, jointly protected under a Chinese-Russian agreement.

Cold desert and steppe

The vegetation of Mongolia is characterised by desert, grassland steppe, forest steppe and taiga[16], with grassland steppe dominating in the eastern third of the country. Although it is estimated that up to 80 % of Mongolian grasslands have been degraded to some extent[17], fragmentation rather than degradation of grasslands and steppe habitats is a more important consideration in assessing priorities for conserving the region's large ungulates.[18]

([16]) Also known as boreal forest or snow forest, taiga is a biome characterised by coniferous forests consisting mostly of pine, spruce and larch.
([17]) http://link.springer.com/chapter/10.1007/978-4-431-54052-6_10#page-1
([18]) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2486290/
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2486312/
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3577783/

‹

The Uvs Lake Basin, in Mongolia and Russia, is one of the most intact examples of Asian steppe, and is a UNESCO World Heritage Site. Despite its extreme climate, the region supports snow leopard, argali and a nomadic human population dependent on traditional herding.

^

Amur tiger, Russian Far East. Driven to the brink of extinction by hunting in the 1930s, the population has recovered to several hundred individuals and has expanded into north-east China. Tigers continue to be threatened by hunting, lack of prey and perhaps also by genetic weaknesses, as they are all descended from a small population.

The largest and harshest desert in the region is the remote Taklimakan (327 000 km^2), which lies in the Tarim Basin to the north of the Kunlun and Altun mountains and consists largely of sand dunes with sparse vegetation, including *Tamarix* spp. and ancient forests of *Populus babylonica*. The cooler, slightly wetter and more vegetated Dzungarian basin desert to the north is sandwiched between the Tien Shan and the Altai Shan ranges[19], which rise sharply from the arid lowlands to glaciated peaks that reach over 7 400 m and 4 500 m respectively. To the east, a number of smaller desert areas such as the Alxa and Ordos are expanding despite efforts to halt creeping desertification, and the huge Gobi Desert extends further north and east inside Mongolia.

From northern Mongolia and north-east China northwards much of the region is permafrost.

Forests

The steppes of Mongolia and the Chinese Autonomous Region of Inner Mongolia merge to the north-east into temperate forest habitats that extend across the Amur river into the RFE and the Korean peninsula. Coniferous forest (taiga[20]) in the north merges into mixed coniferous-broadleaved forests, the most biologically diverse ecosystems of the RFE, at lower altitudes and latitudes.

The Salween (Nujiang), Mekong (Lancang) and Yangtze rivers pass through forested mountains in northern Yunnan in a spectacular area that has been named the most biologically diverse temperate region on earth[21]. The lost or degraded proportions of each are hard to calculate meaningfully, but in the mountains of south-west China, forest cover has been reduced from 30 % to 15 %, while the catchments of the tributaries of the Yangtze have lost 85 % of their original old-growth forest cover[22].

The tropical forest zone extends around the southern coast of mainland China, Hainan Island, the extreme southern tip of the forested island of Taiwan, south-west Yunnan and south-east Tibet.

Karst

Limestone caves in the karst formations of southern China and neighbouring countries are both extensive (over 500 000 km^2 in China alone) and complex, with numerous caves and many unique biodiversity features.

Coastal habitats

Along the coastline of China, particularly that of the East China Sea (including the Yellow Sea, which in turn includes Bohai Bay and Korea Bay), the remaining intact portions of the intertidal zone provide essential habitat for migratory waterbirds that winter there or pass through en route between wintering sites in Australasia and South and South-East Asia, and breeding sites in the RFE and Alaska. The coastal wetlands there are the most important migratory waterbird staging areas in the East Asian-Australasian Flyway (EAAF)[23].

The Yellow Sea coastal wetlands are being rapidly lost and damaged, especially through conversion to industrial and agricultural uses. Analysis indicates that in the last 50 years between 50 % and 80 % of the tidal flats have been lost[24]. Massive urban expansion in the Pearl River Delta resulted in the loss of 26 % or 1 518 km^2 of the natural habitat and 42 % or 760 km^2 of the local wetlands over the period 1992-2012.

Agricultural biodiversity

This chapter covers wild biodiversity, and does not discuss the conservation of domesticated species and varieties. However, the conservation of wild and domesticated biodiversity is closely linked: first, because the forests, wetlands and grasslands of the region hold the wild relatives and genetic origins of many of the domesticated plants and animals that humans depend upon today, and secondly because traditional multi-functional land-use systems are important for both wild and domestic biodiversity – and both are equally threatened by the uncontrolled spread of homogenous, capital-intensive, industrial agriculture and by conversion to non-agricultural land use. In situ conservation of these genes within traditional agro-ecosystems is recognised as an essential compliment to ex situ conservation (gene banks, etc[25].), and there may be close links between maintaining agricultural diversity and maintaining natural diversity within landscapes.

1.2.3 Species diversity, endemicity and extinction risk

The region spans two of the eight great biogeographic realms – the Palaearctic and Oriental, with China being one of the 17 megadiverse countries in the world[26]. China has more than 10 % of the world's known species, including over 31 000 species of vascular plants (ca. 10 300 endemic) and around 6 000 species of vertebrates (over 500 endemic). Mongolia has a lower species diversity, but is unique in that its ecosystems are relatively intact, with large ungulate herds still found in the vast grassland and steppe habitats (and also on the Tibetan plateau in China) (Table 1.2).

The southern RFE region has a unique mix of species and high diversity indices for a northern temperate forest. The province of Primorsky Krai is home to 100 terrestrial endangered species, meaning that 30 % of all endangered species in Russia are concentrated in only 1 % of the country's vast territory. Up to 48 of these species (15 % of all endangered species in Russia) occur nowhere else. Nearly all of Primorsky Krai is covered with temperate mixed conifer-broadleaved forest, one of the most productive and diverse temperate forests in the world. The region is also notable for having the last large tract of habitat for the critically endangered Amur tiger and Amur leopard.

Pockets of relict species have survived in the mountains of south-west China and the Altai, and in relict lakes such as Hovsgol[27]. Mountains form islands in the surrounding landscape and those that have been isolated for a long time, like Fanjingshan in Guizhou Province, have distinct fauna and flora.

Freshwater and land invertebrates are particularly diverse in China, with enormous numbers of endemic taxa, including 5 endemic genera and 132 endemic species of land snails, and 6 endemic genera and 26 endemic species of freshwater bivalves. Species are still being discovered in the region at a rapid rate, particularly invertebrates. In 1996, it was estimated that probably no more than 5 % of the total Chinese myriapod species had been discovered[28].

(19) Shan means mountain in Chinese languages, so Altai Shan means Altai Mountains.
(20) http://www.blueplanetbiomes.org/taiga.htm
(21) http://whc.unesco.org/en/list/1083
(22) CEPF (2002). Ecosystem Profile: Mountains of Southwest China. Downloaded from https://www.cepf.net/sites/default/files/final.china_southwestchina.ep_.pdf, 22 February 2018
(23) http://www.eaaflyway.net
(24) Murray N.J., Z. Ma and R.A. Fuller (2015). Tidal flats of the Yellow Sea: A review of ecosystem status and anthropogenic threats. Austral Ecology (2015) 40, pp. 472-481. DOI:10.1111/aec.12211

(25) Food and Agricultural Organisation. Commission of Genetic Resources for Food and Agriculture. See http://www.fao.org/nr/cgrfa/cthemes/plants/en/, accessed 16 August 2016.
(26) One of 17 'megadiverse' countries in the world. See http://www.biodiversitya-z.org/content/megadiverse-countries
(27) http://link.springer.com/article/10.1007%2Fs10750-006-0310-1#page-1
(28) Wang D.Q. and J.P. Mauriès (1996). Review and perspective of study on Myriapodology of China. Mémoires du Muséum national d`Histoire naturelle, 169, pp. 81-99.

The Yunnan snub-nosed monkey lives in high-altitude forests in south-west China. Fewer than 2 000 individuals remain, in 15 groups. Eleven of these groups are within protected areas, but hunting remains an important threat to the species, including accidental trapping in snares set for deer.

Mongolian marmots were once common in grasslands in Mongolia, and parts of China and Russia. Increased hunting for skins and meat, helped by improved road access, has caused a dramatic population decline. A quota system introduced to manage hunting is reported to be ineffective.

Table 1.2 Total number of terrestrial and freshwater species and endemic species in the main taxonomic groups

	China		Mongolia		RFE	
Taxonomic group	Species	Endemic species	Species	Endemic species	Species	Endemic species
Vascular plants	31 000	10 000	3 127	153	2 800	~900
Mammals	556	109	137	0	90	~19
Birds	1 240	54	354	0	400	~ 56
Reptile	478	26	30			
Amphibians	332	216	6	0	23	>10
Freshwater fish	1 575	124	81	4	>100	
Total	35 181	10 529	3 735	157	>3 413	>985

Note: The total number of species and endemics, and especially the numbers of threatened species, are liable to change with improvements in knowledge.

The combination of exceptional biological diversity, high levels of population pressure on resources and rapid economic development means that the region also has a large number of species classified as threatened with extinction by IUCN (Table 1.3 and 1.4). Many more species may be threatened, but cannot be properly assessed because of lack of data. Some species have already become extinct. Since 1995, large taxa such as the Yangtze river dolphin, the Chinese paddlefish and the south China subspecies of the tiger have been lost, and the white-cheeked gibbon and white-handed gibbon are now presumed extinct in the region[29].

Table 1.3 Number of terrestrial and freshwater threatened species, by major taxonomic group and country[i]

Taxonomic group	China	Mongolia
Mammals	69	10
Birds	89	24
Reptiles	44	0
Amphibians	90	0
Freshwater fish	75	2
Invertebrates	59	3
Plants	563	0
Total	989	39

(i) Sub-national figures for the RFE are not available.

Table 1.4 Number of terrestrial and freshwater threatened species in the countries of the region, by threat category[i]

Threat category	China	Mongolia
Critically endangered	177	4
Endangered	364	12
Vulnerable	448	23
Total	989	39

Source: IUCN Red List, accessed 21 September 2017.
(i) Sub-national figures for the RFE are not available.

(29) Fan, P (2016). The past, present and future of gibbons in China. Biological Conservation 210, pp. 29-39. http://dx.doi.org/10.1016/j.biocon.2016.02.024 and Fan, P., H. Fei and A. Luo (2013). Ecological extinction of the Critically Endangered northern white-cheeked gibbon Nomascus leucogenys in China. Oryx 48(1), pp. 52-55.

Crested ibis, China. This once widespread species was reduced to a few individuals and a small captive population in the 1980s. The establishment of the Shaanxi Nature Reserve, protection and habitat management have enabled the population to recover to over 500 birds.

Yading nature reserve, Sichuan, China. This area of high-altitude forests and alpine vegetation is part of the Mountains of South-west China global biodiversity hotspot.

1.2.4 Geographic priorities for conservation

There is one **biodiversity hotspot**[30] entirely within the area covered by this chapter, and parts of 3 others. The Mountains of South-West China Hotspot (260 000 km²) covers the temperate to alpine mountains between the eastern edge of the Tibetan plateau and the western edge of the Sichuan Basin. It lies completely within China[31]. The following hotspots are described in more detail in other reports in the series: The Mountains of Central Asia Hotspot consists of two of Asia's major mountain ranges, the Pamir and the Tien Shan, and covers 860 000 km², including parts of north-west China as well as most of Kyrgyzstan and Tajikistan, and parts of Kazakhstan, Uzbekistan, Afghanistan and Turkmenistan[32]. The Indo-Burma Hotspot covers 2.3 million km², most of it in the Greater Mekong region; only 10 % of this area lies within China[33]. The Himalayan Hotspot covers 740 000 km² of northern Pakistan, Nepal, Bhutan and India, stretching 3 000 km along the Chinese border, with small areas inside China[34].

There are 12 **endemic bird areas**[35] (EBAs) and 3 secondary areas within China and Mongolia. Three of the EBAs are shared with countries to the south. The 12 EBAs cover about 1 800 000 km² of China, concentrated along the southern border and central mountains, with a large area in the Shanxi Mountains that is not prioritised by other global assessments (Figure 1.3).

Centres of plant diversity[36] in the region are the Altai Mountains, the Central Asian Mountains, the forests of southern RFE on the border with Heilongjiang and North Korea, the mountains of northern Myanmar and Yunnan, the Chukotka Peninsula of the RFE, and various smaller sites in the mountains of south-west China, Hainan and Guangzhou. It is striking how these centres of plant richness and endemism are distributed around the international borders of China.

There are 7 **Global 200 Ecoregions**[37] (G200s) solely within China, 2 shared between Mongolia and China, and 3 that are only in the RFE. In addition, there are 5 freshwater G200 Ecoregions (Figure 1.2).

The RFE has 6 **tiger conservation landscapes**[38] of 42 in the world.

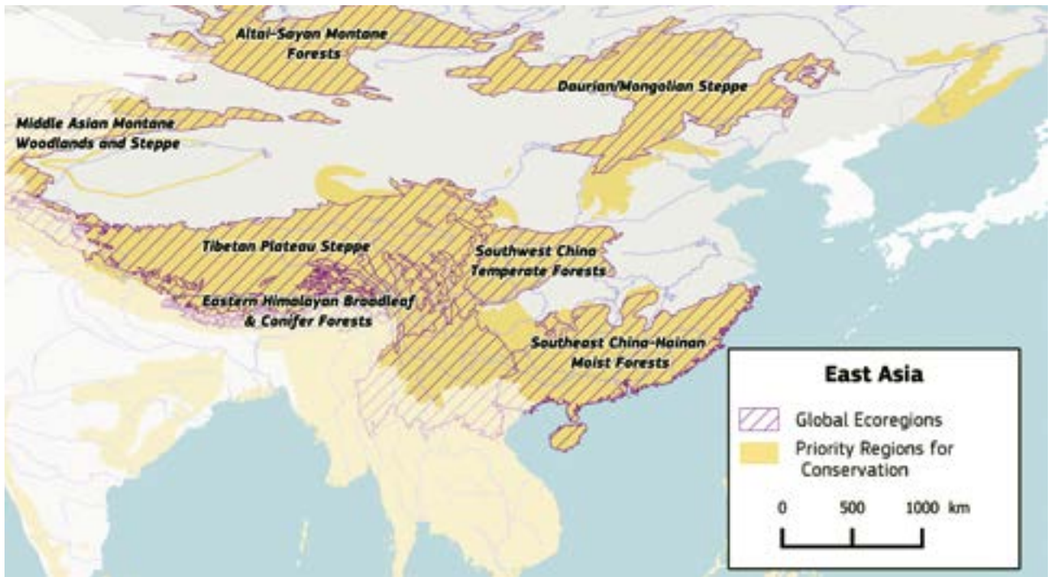
There are 512 **important bird areas**[39] (IBAs) in China (31 of them marine), 70 in Mongolia, while Primorsky Krai has a handful of the 181 IBAs in Asian Russia. A 2016 study[40] identified a further 136 sites of conservation significance for waterbirds in China.

The main global geographic priority-setting approaches are combined for this chapter to define 'priority regions of conservation' (PRC), which are regions that have been identified as a priority by at least one of the major global priority setting analyses. Maps 1.2 and 1.3 show how the PRCs overlap with endemic bird areas and the Global 200 Ecoregions.

(30) http://www.conservation.org/How/Pages/Hotspots.aspx
(31) CEPF (2002). Ecosystem Profile: Mountains of Southwest China Biodiversity Hotspot. Available at: https://www.cepf.net/sites/default/files/final.china_.southwestchina.ep_.pdf, downloaded 22 February 2018
(32) CEPF (2017). Ecosystem Profile: Mountains of Central Asia Biodiversity Hotspot. Available at: https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-eng.pdf, downloaded 22 February 2018
(33) CEPF (2012). Ecosystem Profile: Indo-Burma Biodiversity Hotspot. 2011 Update. Available at: https://www.cepf.net/sites/default/files/final.indoburma_indochina.ep_.pdf. Downloaded 22 February 2018
(34) CEPF (2005). Ecosystem Profile: Eastern Himalayas Region. Available at: https://www.cepf.net/sites/default/files/final.ehimalayas.ep_.pdf, downloaded 22 February 2018
(35) http://www.birdlife.org/datazone/eba

(36) http://www.unep-wcmc.org/resources-and-data/centres-of-plant-diversity
(37) http://www.worldwildlife.org/publications/global-200
(38) Dinerstein E., C. Loucks, A. Heydlauff, E. Wikramanayake, G. Bryja, J. Forrest, J. Ginsberg, S. Klenzendorf, P. Leimgruber, T. O'Brien, E. Sanderson, J. Seidensticker and M. Songer (2006). Setting priorities for conservation and recovery of wild tigers: 2005-2015 A users' guide. WWF, WCS, Smithsonian, and NFWF-STF, Washington, DC, New York. http://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Studie_Wild_Tigers_0706_01.pdf
(39) http://www.birdlife.org/datazone/site
(40) Carried out by the China Academy of Sciences, BirdLife International, The International Crane Foundation, the Hong Kong Birdwatching Society and others, see Zhang L., X. Wang, J. Zhang and Z. Ouyang (2017). Formulating a list of sites of waterbird conservation significance to contribute to China's Ecological Protection Red Line. Bird Conservation International 27(2), pp. 153-166. DOI: https://doi.org/10.1017/S095927091700003X

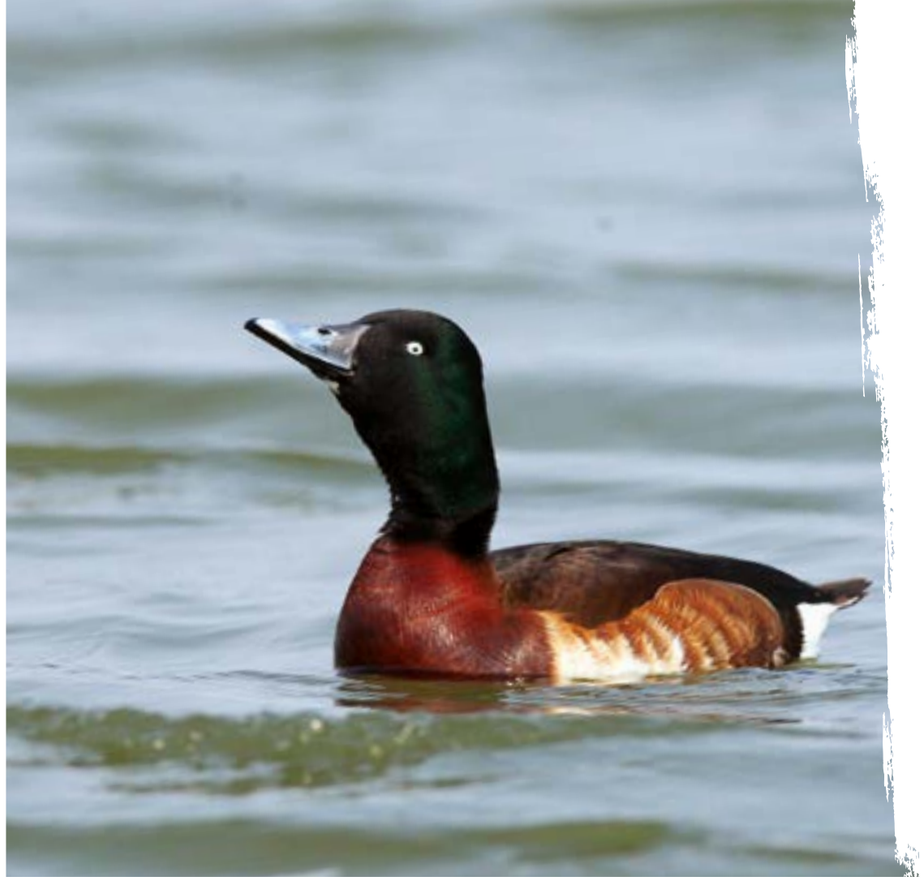
Figure 1.2 Priority regions for conservation and Global 200 Ecoregions in East Asia



Not all G200 Ecoregions are labelled on the map. A full list is in Annex 1.

Figure 1.3 Priority regions for conservation and endemic bird areas in East Asia

Not all EBAs are labelled on the map. A full list is in Annex 1.



#1

Baer's pochard breeds in northern China and spends the winter in the south-east. Less than 1 000 individuals survive, a result wetland drainage and pollution, hunting and disturbance. Protection needs to be extended to all the sites used by the duck to prevent its extinction.

National-level priority setting

In China, the State Forestry Administration and the Institute of Geographic Sciences and Natural Resources Research, with the support of the Paulson Institute, have identified further sites for coastal wetland and bird conservation in their Coastal Blueprint Project[41] (2015). The three long stretches of coastal/marine priority areas in the National Biodiversity Strategy and Action Plan (NBSAP) include most of the coastline. The Yellow Sea (northernmost of the three) and the Jiangsu Coastline (the northern part of the central section) include most of the priority sites for the conservation of shorebirds that use intertidal mudflats.

In Mongolia, the result of the Ministry of Environment and Tourism/The Nature Conservancy (TNC) Conservation Blueprint work is a portfolio of 215 conservation priority sites that if protected alongside the State's special protected areas will conserve the biodiversity of Mongolia. The Mongolian Government has adopted this portfolio and about 24 % of the area identified (147 000 km^2) has received new local or national protection. Each priority site has been mapped and described in detail, and has a file of basic geographic, biological and socio-economic data associated with it, which is available on the internet. There is no clear geographical concentration of these priority sites because Mongolia's ecosystems are still more or less intact, and its predominantly open habitats are home to highly mobile species with large ranges.

A Conservation Action Plan for the Russian Far East Ecoregion Complex[42] provides a comprehensive analysis of biodiversity priorities and actions needed to protect the Amur river basin, wetlands, forest ecosystems and focal species. This conservation action plan has been the basis for the creation of protected areas and conservation agendas over the past 14 years in the southern Russian Far East.

([41]) http://www.paulsoninstitute.org/wp-content/uploads/2015/10/Conclusions-and-Recommendations-Coastal-Blueprint-Project-2015October.pdf
([42]) Darman Y., V. Karakin, A. Martynenko and L. Williams (2003). Conservation Action Plan for the Russian Far East: Part 1: Biodiversity and Socio-economic assessment.

2

Conservation challenges

At 1 m long, the Chinese giant salamander is the world's largest amphibian. Very few remain in the wild, a result of hunting for food, water pollution and disruption of river flow from dam building. Some are bred, but the majority of those consumed are thought to come from the wild (photo of captive salamander).

2 _ Conservation challenges

Natural habitats in East Asia, mainly in China, have suffered from widespread destruction[43]. Many of East Asia's wild species are decreasing in numbers, geographical ranges are contracting and populations are becoming increasingly fragmented into isolated groups that seldom have the chance to interbreed.

2.1 Direct threats to biodiversity

2.1.1 Illegal and unsustainable harvesting of wild plants and animals

Exploitation of biodiversity is an essential element of many rural livelihoods, but the rapid expansion of communications and transport networks has linked the most remote ecosystems with the markets supplying the mega-cities of Asia, as well as to Europe and the United States of America. Large numbers of animals and plants are collected, both for home consumption and for trade across the region. Plants, fungi and animals are collected or hunted for food, fuel, fibre and traditional medicine, and legal and illegal logging and firewood collection are widespread in forested regions. When this exploitation is unsustainable, forests and grasslands are depleted. Although protocols have been established for sustainable harvests of various species of animals and plants in Russia, and of medicinal plants in China, recommended procedures are not always followed and there is no process to monitor the impacts of harvest on populations. As a result, long-term sustainability is still problematic, partly because of the high demands of large human populations[44].

Hunting and fishing

Wildlife is hunted for food, medicine or the pet trade, either for home consumption or for domestic and international trade, and some species have suffered massive declines as a result. In China, protected animals and animal parts are sold on a large scale, in physical markets as well as online, despite being protected under Chinese law[45].

An example of the power of market demand is the decline of yellow-breasted bunting,[46] reputed to have special nutritional value, since the 1980s. In season, 100 000 might be delivered to restaurants every day, each sold for the equivalent of up to EUR 11[47]. The species was once one of the most abundant songbirds, but the population declined by around 90 % between 1980 and 2013. The hunting of yellow-breasted buntings was banned in China in 1997 but many were still being killed for food and sold on the black market as late as 2013.[48]

Catching birds using mist-nets for food and the pet trade is widespread in China, particularly along the coastlines in the south[49]. The Hong Kong Bird Watching Society reported 1 500 nets found in 5 days in November 2013 and estimated that at least 8 000 birds were being killed per day in 33 km of nets.[50] The trade poses a major threat to migratory shorebirds (including the globally threatened spoon-billed sandpiper) and larger species such as swans, cranes and geese.

Wild harvests of fish and shellfish in China and Russia are often unsustainable, with widespread use of poison, electricity and explosives in China, although all are prohibited[51]. The collection of kaluga and Amur sturgeon fry from both the Russian and Chinese sides of the Amur river has contributed to the collapse of both species' populations. The fry are destined for fish farms in southern China where sturgeons are raised for sale. Seven species of salmon still spawn in rivers of the Russian Far East, but overharvest in the southern portions has driven salmon to ecological and/or functional extinction in many rivers.

Heavy hunting contributed to a 92 % decline in the Chinese musk deer population (and suspected similar declines in the other five musk deer species in China) between 1970 and 2010.[52] Siberian musk deer pods are smuggled into China from Mongolia and the RFE, where musk deer are also declining due to the high demand for their scent glands.

(43) https://prezi.com/i_ayxkwt82dr/habitat-destruction-in-china/
(44) https://cmjournal.biomedcentral.com/articles/10.1186/s13020-016-0108-7
(45) However, the Law of China Wildlife Protection does not protect all wild species.
(46) http://www.iucnredlist.org/details/22720966/0
(47) https://www.chinadialogue.net/article/show/single/en/5506-Eating-habits-in-south-China-driving-endangered-animals-to-extinction-
(48) http://www.birdlife.org/asia/news/yellow-breasted-bunting-declined-90
(49) MaMing R., T. Zhang, D. Blank, P. Ding and X. Zhao (2012). Geese and ducks killed by poison and analysis of poaching cases in China. Goose Bulletin 15. IUCN and Wetlands International.
(50) Martinez J. and R. Lewthwaite (2013). Rampant shorebird trapping threatens Spoon-billed Sandpiper Eurynorhynchus pygmaeus in south-west Guangdong, China. BirdingASIA 19, pp. 26-30. See also http://www.chinesecurrents.com/baohuniaolei.html
(51) http://www.npc.gov.cn/englishnpc/Law/2007-12/12/content_1383934.htm
(52) http://d2ouvy59p0dg6k.cloudfront.net/downloads/living_planet_report_china_2015_fin.pdf

Yellow-breasted buntings were once common across temperate Asia, but have declined by 99 % since the 1980s. The decline is a result of trapping on their wintering grounds, and perhaps agricultural intensification. The birds are a delicacy in China, Nepal and Cambodia.

Asiatic black bears have become increasingly rare as a result of hunting and habitat loss. Bear bile is a medicinal product in East and South-East Asia, and bears are killed or captured for farms, where bile is extracted from live animals.

Many species of animals once commonly seen in Mongolia are now hard to find[53]. Decreases of 75 % to 90 % in the populations of Mongolian saiga, red deer, two species of marmots and argali in the 5 to 10 years prior to 2006 were attributed largely to hunting, and saker falcons lost 30 % of their population in 5 years. Anecdotal evidence suggested that the same was happening to other wildlife species for which either limited or no direct population data is available.

Mongolia's wildlife trade economy was estimated at more than EUR 76 million annually in 2006, focused on Siberian marmot, Corsac fox, red fox, Mongolian gazelle, roe deer and red squirrel. Although low in value per unit compared to some traded species (such as snow leopard, grey wolf and musk deer), these species were all hunted in large volumes by thousands of hunters across the country. There was near unanimous agreement in 2006 among hunters, traders and biologists in Mongolia that continued wildlife trade at the volumes reported was unsustainable.

The high demand in China for pangolin for their scales and meat threatens the remaining Chinese pangolin in China, as well as other species in Asia (3 species) and Africa (4 species).[54] The Chinese pangolin is present but very rare in the border areas of Guangxi and Yunnan provinces. The Sunda pangolin and the Indian pangolin, which were once (and may still be) present in China, were commercially extinct in the country by around 1995. China permits some pangolin consumption for use in traditional Chinese medicine, and has an annual pangolin scale quota of approximately 26 600 kg.[55] This is equivalent to more than 25 000 pangolins, which cannot be supplied from a native wild population that may total only 50 000, and therefore implicitly encourages imports, even though this is banned under the Convention on International Trade in Endangered Species (CITES).

In Russia, hunting and trapping of some species is legal, but limits are often ignored, resulting in greatly reduced populations of mammals hunted for fur (e.g. sable, Siberian weasel, racoon dog) and valuable plant species (e.g. ginseng).

(53) The great extent of the hunting and collection of wild species in Mongolia was documented in The Silent Steppe (2006), which is currently being updated (N. Conaby pers. comm., 2016).
(54) Gomez L., B.T.C. Leupen and T.K. Hwa (2016). The trade in African Pangolins to Asia: a brief case study of Pangolin shipments from Nigeria. TRAFFIC Bulletin 28(1), pp. 3-5.
(55) According to the Chinese State Food and Drug Administration, licences have been issued to 209 companies to produce 66 products containing pangolin. See China Biodiversity Conservation and Green Development Foundation Endangered Species Fund (2016). Overview of pangolin data: when will rampant utilisation stop?, quoted in Environmental Investigation Agency (2016). EIA Briefing for CITES CoP17: Other key agenda items, 29 July 2016, available at https://eia-international.org/wp-content/uploads/Part-IV_EIA-Briefing-on-Other-Agenda-Items-for-CITES-COP17_Jul-29-2016.pdf

^ *Yangtze river dolphin, or Baiji, in captivity. The last captive animal died in 2002, and the species became extinct in the wild in 2006, a result of drowning in fishing nets, pollution and boat disturbance. The Yangtze finless porpoise, Yangtze sturgeon, Chinese paddlefish, Chinese alligator and the Yangtze giant softshell turtle are all critically endangered.*

< *Snow leopard, which is considered sacred by herders on the Tibet-Qinghai plateau. Nevertheless, the big cat is hunted and poisoned because it is perceived to be a threat to livestock.*

^ *Oak, pine and birch logs illegally felled in the Russian Far East are transported in large quantities to China for processing into products such as flooring and furniture, which are exported to markets around the world. Logging of hardwoods outstrips quotas and sustainable limits, and is threatening diverse forest ecosystems.*

Farming wildlife

The farming of wild species has become increasingly widespread in the region (as in the Greater Mekong) in response to market demand. In China, there are now farms rearing turtles, snakes, birds, crocodiles and mammals, including tiger, bear and deer. Even those facilities that breed the animals can represent a pressure on the wild population, as they require stock from the wild, or may be used to 'launder' wild-caught animals as farmed ones. Regulation and monitoring of these businesses falls far short of what would be required to ensure that they make a positive contribution to the conservation of wild populations of endangered species.

Tigers are bred in large numbers on numerous farms in China, with far more tigers now living on farms (over 5 000) than in the wild. Trade in skins is licensed, and legal, but Chinese farms also earn money from selling body parts, which is illegal, and from tourism that involves tiger shows. No tigers have been reintroduced to their native habitats. It is claimed that such farms reduce the pressure of illegal hunting of the wild populations but little evidence is available to support this, and the illegal sales of tiger body parts from farms provides an avenue for processing and selling remains of wild tigers.[56]

A rapidly growing industry to farm the endemic and critically threatened Chinese giant salamander has developed throughout much of China, centred on the Qinling mountain region of Shaanxi Province. Although farming of the salamander has the potential to be a positive development for conservation, by supplying market demand with farmed animals, it is currently more likely to be a threat, with continued overexploitation and the potential added impacts of infectious disease and genetic pollution arising from farming practices, such as the movement of animals across the country, and the release of untreated farm wastewater and farmed salamanders to the wild.[57]

Killing of 'problem' wildlife

In some cases, the hunting and killing of wildlife is justified by actual or perceived 'pest' problems. Examples include the use of mist-nets at Chinese airports to control birds[58]; the poisoning of native small mammals that live on grasslands in the mistaken belief that they cause grassland[59] degradation; and the use of high levels of chemicals to control Eclipopheps grasshoppers, which swarm periodically and consume vast amounts of grass[60], and Gypsy moth and Siberian moth, both regarded as forest pests. Carnivores (wolf, bear, fox, lynx) are often targeted because they are perceived to be a threat to livestock, and tiger and bear (both brown and Asian black) are occasionally killed as a result of conflicts with farmers and herders in the Russian Far East. An exception to this pattern is the snow leopard, which is considered sacred[61] by herders on the Tibet-Quinghai plateau, giving it some protection from persecution.

Wild plant collection

Plants and fungi are collected from the wild for medicinal purposes, for food and for fuel, both for domestic use and for sale. About 5 000 of China's approximately 31 000 plants have identified medicinal properties. Of these, 1 000 are used regularly, with only 100 to 250 of them cultivated. Collecting wild specimens threatens the species and damages the habitats where they live. The sheer volume of plants traded for medicinal purposes makes harvests from the wild a potent threat alongside habitat destruction. As an example, more than 50 % of the 78 Chinese species of Dendrobium orchids are used in traditional Chinese medicine, with as much as 600 000 kg fresh weight traded annually in the 1980s and 1990s, all wild gathered. However, trade volume decreased in the 2000s and wild Dendrobium plants now come mainly from neighbouring Vietnam and Lao PDR, where populations are being reduced as a result[62]. Ginseng is overharvested in both China and Russia, and probably nearly extinct in the wild in China, while extremely rare in Russia.

There is a considerable export of products from wild species to other countries in Asia, Europe and North America. Despite robust fines imposed on both collectors and purchasers, yew trees over wide areas of Yunnan have been felled or de-barked to feed the demand for a key drug in the fight against breast, ovarian and lung cancer[63]. The bark of 6 trees is required to manufacture a single dose of the drug. Thousands of tons of pine nuts are harvested from the Korean pine tree, *Pinus koraiensis*, in the Russian Far East and north-east China whenever good production occurs (on average, once every 4 years), with most processing occurring in China. Such intensive harvest is thought to reduce forage resources for the many animal species (from Siberian chipmunk to brown bear) that rely on this nutrient rich nut, consequently reducing carrying capacity for those species that rely on nuts as an overwinter food resource.

Logging

Extensive logging of natural forests has had devastating impacts on biodiversity in the region, through habitat destruction, changes in burning patterns, changes in drainage leading to downstream impacts on water regimes, and the opening up of new areas for settlement. After the destruction of 85 % of old-growth natural forests in eastern China up to the 1990s[64], controls on domestic logging were gradually tightened, beginning in 2000 with the Natural Forest Protection Programme. In 2015, the Chinese Central Government announced (as part of the 13th Five-Year National Plan) that all commercial logging in natural forest would be forbidden, with a demonstration of implementing the policy starting in Heilongjiang in early 2015. Analysis of satellite imagery[65] shows that between 2000 and 2010, tree cover increased by 20 % or more in roughly 1.6 % of China's territories, while less than 0.5 % of territories have seen tree loss.

(56) Kirkpatrick R.C. and L. Emerton (2010). Killing Tigers to Save Them: Fallacies of the Farming Argument. Conserv Biol. 24(3), pp. 655-659. DOI: 10.1111/j.1523-1739.2010.01468.x. Epub 2010, 12 March. http://www.ncbi.nlm.nih.gov/pubmed/20337676#

(57) Cunningham A.A. (2016). Development of the Chinese giant salamander Andrias davidianus farming industry in Shaanxi Province, China: conservation threats and opportunities. Oryx 50(2), pp. 265-273. DOI: http://dx.doi.org/10.1017/S0030605314000842

(58) It has been estimated that China's 300 airports have at least 36 000 nets (each one about 20 m long) operating every day of the year, and that at least 13 million birds are killed per year. See https://birdingbeijing.com/2016/03/02/the-invisible-killer-mist-nets-at-chinese-airports/

(59) Some years, up to EUR 76 million is allocated for this kind of work in China, often under agricultural development and nature reserve management projects funded by international donors, including the European Union.

(60) Anon (2009). The Altai Mountains Biodiversity Conservation Strategy. http://panorama.solutions/sites/default/files/Altai_Mountains_Biodiversity_Conservation_Strategy_English_-_Small.pdf

(61) http://zoomorphic.net/2015/05/in-search-of-the-mountain-ghost/

(62) Liu H., Y. Luo, J. Heinen, M. Bhat and Z. Liu (2014). Eat your orchid and have it too: a potentially new conservation formula for Chinese epiphytic medicinal orchids. Biodiversity and Conservation 23, pp. 1215-1228. DOI 10.1007/s10531-014-0661-2

(63) See endnote #46, p 189 in McBeath, G. A. and T. Leng (2006). Governance of biodiversity conservation in China and Taiwan. UK: MPG books. Available at https://books.google.co.uk/books?id=VI6u50B05J4C

(64) CEPF (2002). Ecosystem Profile: Mountains of Southwest China. Downloaded from https://www.cepf.net/sites/default/files/final.china_.southwestchina.ep_.pdf, 22 February 2018

(65) Viña A., W.J. McConnell, H. Yang, Z. Xu and J. Liu (2016). Effects of conservation policy on China's forest recovery. Science Advances 2(3), e1500965. http://advances.sciencemag.org/content/2/3/e1500965.full

Mongolian gazelle entangled in a railway fence. This and other Asian steppe species, such as saiga antelope and khulan, migrate to escape harsh weather and find fresh grazing. Poorly designed roads, railways and pipelines may obstruct their movements and cause the deaths of thousands of animals.

China's logging ban has alleviated pressure on Chinese natural forests and plantations but is leading to increases in imports of timber, particularly hardwoods, from Vietnam, Thailand, Myanmar, Lao PDR and Russia. Some of the end-users are in Europe and North America, highlighting that the demand chain and the drivers often lie beyond China.

Mongolia's forest harvest is estimated to be around 750 000 m^3 as timber and another 3 million m^3 as fuelwood, with around a third of each legally sourced. A timber export ban has been in place since 1999 and no roundwood or sawn timbers are recorded as imports. Although unrecorded imports and exports from China and Russia are probable, it seems likely that all domestically consumed timber is sourced within the country[66]. Mongolia has only 7 % of its forest area allocated to licensed extraction, and sustainability has not been unequivocally determined[67]. Unsustainable impacts on biodiversity are clear in some areas, and excessive removals diminish local ecosystem services[68].

Commercialised illegal logging for timber and fuelwood has negative impacts on both forest cover and biodiversity in Russia[69]. Russia has extensive logging in boreal forests at rates that far outstrip legal limits and sustainable levels[70]. Most of this appears to be illegal and to be destined for China or beyond. Comparative analysis conducted in the Russian Far East showed that from 2004 to 2011 the volume of Mongolian oak, the most valuable hardwood species, logged for export to China exceeded authorized logging volumes by two to four times[71]. Much of this illegal logging takes place in the habitats of the Amur tiger.

2.1.2. Residential, commercial and linear infrastructure

Tourism

Much of the tourism infrastructure in the region is inadequate to deal with the numbers of visitors, particularly in or near protected areas and natural sites, and this poses moderate to severe threats to biodiversity through loss of habitat, human disturbance and illegal activity, and poor management of sewage and other waste. Hovsgol Lake in Mongolia, long affected by tourism-related pollution and disturbance, is now suffering even greater damage as a result of the building of a highway, which cuts travel time from the capital considerably and has led to a massive influx of visitors to an area that has inadequate tourist infrastructure. In China, the Fanjingshan Nature Reserve in Guizhou receives 300 000 paying visitors per year, and around 400 000 per year visit Dafeng and Yancheng Nature Reserves on the Yellow Sea Coast. Cable cars have been built in some nature reserves, such as at Fanjingshan, cutting a path through the unique beech forests, and at Xishuangbanna in tropical forest. The increasing popularity of quad motorbikes in protected areas, roads built to cater for enormous coaches and noise pollution are all having impacts. Ecotourism has been promoted as an alternative livelihood aimed at reducing grazing pressure in the Chinese Altai, but the negative impact of roads, hotels and supporting infrastructures has not been assessed or monitored adequately. Also, local capacity to handle these threats has not been built[72].

Linear infrastructure

Railways, roads, power lines, and gas and oil pipelines can threaten biodiversity, both through opening up previously remote areas to exploitation, and through fragmenting habitat and disrupting the migration of species with large annual ranges. There are major highways across China, and more highways and rail links are planned, particularly to open up areas in the remote far west and to link with neighbouring countries. Highways are a significant threat to migratory large mammals, such as the Tibetan antelope[73]. There is evidence that the railways built more recently are more likely to accommodate environmental concerns in their design and have less impact on migratory large mammals than roads[74].

Several major paved roads and railways are being planned and built in Mongolia, including new links to Russia[75], and many of them are associated with mining development. Asiatic wild ass, Mongolian gazelle and goitered gazelle are affected. The decades-old Trans Mongolian Railway from Russia to China, which is fenced on both sides, has already almost eliminated movements of large wildlife between the east and west of that line, and causes the death of thousands of animals who get trapped and starve as a result of poor fence design[76]. Fences along the international borders have also prevented Mongolian gazelle from using their full ranges. Rangeland management initiatives that include fencing of winter grazing areas were introduced in many places on the Tibetan plateau, even within Chang Tang Nature Reserve, where migrations of tens of thousands of Tibetan antelope and Tibetan gazelle are still relatively intact.[77]

In Mongolia, unimproved tracks develop into wide multi-tracks as vehicles deviate to avoid getting stuck in mud, and to find quicker routes. Multi-tracking has damaging impacts on steppe and desert ecosystems and puts more pressure on the protected areas.[78] Vegetation loss, erosion and degradation of such large swaths of land also spurs the onset of desertification.[79] The Mongolian road network has about 45 000 km of dirt roads, and the extent of vegetation and soil degradation as a result of multi-tracking is at least 3 260 km^2 and may be as much as 7 000 km^2 .[80]

Power lines can be the source of direct mortality. Fourteen large bird species have been recorded killed as a result of electrocution on power lines, with between 5 and 8 carcasses found per 10 km of power line.[81] This problem threatens the largest population of the saker falcon.

In 2003, a proposed gas pipeline was successfully repositioned to avoid degradation of the highly endangered Amur leopard in the Russian Far East. Pipelines since then have been buried and pose little threat to wildlife. However, an extensive network of poorly managed logging roads in the Russian Far East provide access for local people to engage in illegal logging and poaching of wildlife resources across the region. In one county, the length of forest roads increased 27 times between 1984 and 2014. Along with increased numbers of vehicles, the access provided by unmanaged forest roads makes it much more difficult to adequately protect wildlife.

Inter-tidal land claim

Massive drainage projects are underway around the coasts of China, with sea wall construction resulting in the drying of intertidal mudflats of huge significance for biodiversity and local livelihoods. Between 2000 and 2010, 60 % of the intertidal zone of Jiangsu Province was lost to coastal land claim for aquaculture, agriculture and industry.[82] The Jiangsu provincial reclamation plan for 2010 to 2020 calls for claiming another 1 800 km^2 of salt marsh and intertidal mud flats, and similar projects are

(66) http://www.mn.undp.org/content/dam/mongolia/Publications/Environment/UNREDD/Mongolia%20Forest%20Sector%20Valuation%20Report%20Final.pdf
(67) http://www.fao.org/3/a-am616e.pdf
(68) See this 10-year-old report for examples, some still extant. http://documents.worldbank.org/curated/en/2006/08/13792734/wood-supply-mongolia-legal-illegal-economies
(69) http://eia-global.org/campaigns/forests-campaign/liquidating-the-forests/
(70) http://www.worldwildlife.org/publications/illegal-logging-in-the-russian-far-east-global-demand-and-taiga-destruction
(71) Smirnov D.Y. (Ed.), A.G. Kabanets, B.J. Milakovsky, E.A. Lepeshkin and D.V. Sychikov (2013). Illegal logging in the Russian Far East: global demand and taiga destruction. WWF, Moscow, 39 pp.
(72) GEF project. CBPF-MSL: Strengthening the Management Effectiveness of the Protected Area Landscape in Altai Mountains and Wetlands.

(73) Xia L., Q. Yang, Z. Li, Y. Wu and Z. Feng (2007). The effect of the Qinghai-Tibet railway on the migration of Tibetan antelope Pantholops hodgsonii in Hoh-xil National Nature Reserve, China. Oryx 41(3), pp. 352-357. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=1383724
(74) For example, Yang, Q. and L. Xia (2008). Tibetan wildlife is getting used to the railway. Nature 452, pp. 810-811. http://www.nature.com/nature/journal/v452/n7189/full/452810c.html
(75) Onon, R. (2009). Mongolia: Current Status of road distination [sic] connected to Asian highway network. Powerpoint presentation, available at: https://www.carecprogram.org/ru/uploads/events/2009/8th-TSCC/Session1-Progress-Report-MON-Roads.pdf. Downloaded 22 February 2018.
(76) During the 2015-2016 winter more than 4 000 individual gazelles were documented to have perished along the Trans Mongolian Railway. B. Lhagvasuren (2016) pers. comm. Many of the Mongolian gazelles killed within the fences had their horns removed for the wildlife trade.
(77) Fox J., K. Dhondup and T. Dorji (2009). Tibetan antelope (Pantholops hodgsonii) conservation and new rangeland management policies in the western Chang Tang Nature Reserve, Tibet: is fencing creating an impasse? Oryx 43(2), pp. 183-190. http://journals.cambridge.org/action/displayJournal?jid=ORX
(78) Keshkamat S.S., N-E. Tsendbazar, M.H.P. Zuidgeest, A. van der Veen and J. de Leeuw (2012). The Environmental Impact of not Having Paved Roads in Arid Regions: An Example from Mongolia. Ambio 2012 Mar, 41(2), pp. 202-205. DOI: 10.1007/s13280-011-0155-3
(79) Li S-G., M. Tsujimura, A. Sugimoto, G. Davaa and M. Sugita (2006). Natural recovery of steppe vegetation on vehicle tracks in central Mongolia. Journal of Biosciences 31, pp. 85-93. DOI: 10.1007/BF02705239
(80) Batjargal Z., J. Dulam and Y.S. Chung (2006). Dust storms are an indication of an unhealthy environment in East Asia. Environmental Monitoring and Assessment 114, pp. 447-460. DOI: 10.1007/s10661-006-5032-3 http://link.springer.com/article/10.1007%2Fs10661-006-5032-3
(81) Dixon A., R. Maming, A. Gunga, G. Purev-Ochir and N. Batbayar (2013). The problem of raptor electrocution in Asia: case studies from Mongolia and China. Bird Conservation International 23, pp. 520-529. DOI: 10.1017/S0959270913000300
(82) MacKinnon J., Y.I. Verkuil and N. Murray (2012). IUCN situation analysis on East and Southeast Asian intertidal habitats, with particular reference to the Yellow Sea (including the Bohai Sea). Occasional Paper of the IUCN Species Survival Commission No 47. IUCN, Gland, Switzerland and Cambridge, UK. ii + 70 pp. http://data iucn.org/dbtw-wpd/edocs/SSC-OP-047.pdf (in English). http://data.iucn.org/dbtw-wpd/edocs/SSC-OP-047-Zh.pdf (in Chinese).

The Selenge river flows from Mongolia into Lake Baikal in Russia. Mongolian proposals to dam the river threaten a World Heritage Site and Ramsar site on the Russian side. International cooperation over the management of other transboundary rivers, such as the Mekong and Amur, is also challenging.

Mining in the core zone of the Konglong River Nature Reserve, Yunnan province, apparently in contravention of Chinese law. The reserve is an important habitat for the endangered green peafowl. The reserve is also affected by the construction of access roads for a hydro-power plant.

under way around the Yellow Sea coast. Further south in the Yangtze Estuary, the total area of tidal flats has decreased by 36 % over the past three decades; claimed land now totals 1 077 km^2, more than the area of the remaining tidal flats.

2.1.3. Dam building and water abstraction

Dams

China has an estimated 85 000 major dams[83] and almost all the large rivers have been dammed in multiple locations[84]. The Three Gorges Dam and other dams have affected flows and connections with large lakes in the Central Yangtze, and created impassable barriers. There are 177 endemic species of fish in the Yangtze, many of them migratory and at risk from dams.[85] The Chinese paddlefish may have gone extinct as a result, and many other fish species are in decline. There is evidence that fish passages constructed to mitigate dam impacts are inadequate in most cases, and even harmful.[86]

In Mongolia, only two middle-sized (>10 megawatt) hydropower plants have been built to date, at Durgun (in Khovd Aimag) and Taishir (in Zavkhan Aimag). The Durgun Dam in western Mongolia has prevented endemic fish spawning, reduced reed-bed habitats and increased ice cover on the Chono-Hairah river.[87] Mongolia has developed plans for over 20 hydroelectric dams[88], although most of these are not feasible in the near future.

Dams result in reduced sediment transport to the coast, reducing the accretion that forms mudflats and so adding to the problems caused by land claim in inter-tidal areas (see section 2.1.2).

Transboundary effects of dams

The impacts of Chinese-constructed dams go well beyond the country's borders. Dams built on rivers in China affect the biodiversity (and people) in countries downstream, most recently in India through the Zangmu Hydropower Facility on the River Brahmatputra[89], but also on the Mekong.

Mongolia is planning to build several dams for hydropower in the Selenge river basin, which, if completed, would pose a threat to the freshwater ecosystems of the Lake Baikal World Heritage Site, especially in the delta of the Selenge river, an internationally important wetland protected by the Ramsar Convention[90]. Russia opposed Mongolia's plan to dam the Selenge river[91] because of anticipated impacts on Lake Baikal[92], and work has now been shelved as the World Bank[93] and a Chinese bank have withdrawn funding. Russia's dam building may also have negative impacts on biodiversity: the Irkutsk Dam, one of the four dams on the Angara river which flows out of the lake, has raised water levels in Lake Baikal.

Plans are being developed to dam several tributaries of the Amur river, or Heilong river (Heilong Jiang), which is one of the last large free-flowing rivers in the region and which maintains important wetlands and their biodiversity in both China and Russia. Large hydroelectric dams have already[94] been built on some tributaries of the Amur (for example by Russia on the Zeya and Bureya rivers) and these have led to the destruction of large areas of forests and marshes, disrupted the migration of fish and reduced populations of other fauna, partly through large temperature fluctuations. China has built many dykes to control flooding, interrupting the natural cycle of floods, including in areas important for biodiversity. It has also led Russia to complain that the north side of the river (left bank) is experiencing additional flooding because of the channelling effect of the dykes on the southern (right) side.[95]

Chinese companies and Chinese banks are now the biggest builders and financiers of global dam building, involved in 330 dams in 74 countries, including Lao PDR, Cambodia, Malaysia, Myanmar and Sudan[96].

River diversions

The region also has numerous diversions of rivers and further projects are proposed, including a massive diversion of the Kherlen river (a tributary of the Amur) to the Gobi where the mining industry is a major user of water[97].

China's south-north water transfer[98] is a multi-decade project already under implementation. Ultimately it aims to channel 44.8 billion m^3 of fresh water annually from the Yangtze in southern China to the more arid and industrialised north. When finished, the work will link China's four main river systems – the Yangtze, Yellow, Huai and Hai – resulting in widespread environmental impacts through changes in flow, and an increasing concentration of pollutants as the result of reduced water flow.

2.1.4 Extractive industries

Industrial mining is widespread in China and is the mainstay of the economy of Mongolia. Environmental impacts include pollution of ground and surface water, air pollution, direct habitat loss, new road and rail links, pipelines and power lines. The influx of people into mining areas also creates social and environmental challenges.[99] Mining uses large volumes of water and the diversion of rivers has impacts both upstream and downstream. Some types of operation, for example coal washing, are particularly polluting.

In China, mines in the Muli coalfield were reported to be in violation of nature reserve regulations and to be polluting the Yellow river[100,101]. Although efforts to enforce laws appear to be

(83) An estimated 50 000 dams on the Yangtze alone.
(84) https://www.internationalrivers.org/resources/spreadsheet-of-major-dams-in-china-7743
(85) Fu C., J. Wu, J. Chen, Q. Wu and G. Lei (2003). Freshwater fish biodiversity in the Yangtze river basin of China: patterns, threats and conservation. Biodiversity and Conservation 12, p. 1649. DOI: 10.1023/A:1023697714517
(86) http://science.sciencemag.org/content/351/6269/128
(87) https://www.google.co.uk/search?client=safari&rls=en&q=DURGUN+DAM+MONGOLIA+RIVERS+INTERNATIONAL&ie=UTF-8&oe=UTF-8&gfe_rd=cr&ei=ngHAV8XNHIeDaITArLAP#
(88) Included as the official response to greening development after the 2015 Paris climate change summit.
(89) http://www.rediff.com/news/column/china-dams-the-brahmaputra-why-india-should-worry/20151021.htm
(90) http://www.transrivers.org/asian-rivers-spatial-information-system/selenga-river-basin-threatened-with-dams/
(91) For example, http://www.bloomberg.com/news/articles/2015-03-23/mongolia-seeks-828-million-from-china-for-largest-hydro-project
(92) http://www.transrivers.org/2015/1511/
(93) http://siberiantimes.com/ecology/casestudy/news/n0675-key-victory-in-campaign-to-save-lake-baikal-from-mongolian-eco-threat/
(94) https://www.internationalrivers.org/blogs/331-3
(95) http://amur-heilong.net/aic/en/1/01_climate_waters/0128DykesAmur/
(96) https://www.internationalrivers.org/campaigns/china-s-global-role-in-dam-building
(97) http://www.transrivers.org/2013/962/
(98) http://www.water-technology.net/projects/south_north/
(99) Farrington J.D. (2005). The Impact of mining activities on Mongolia's protected areas: A status report with policy recommendations. J Integr Environ Assess Manag 1(3), pp. 283-289. http://dx.doi.org/10.1897/2004-008R.1
(100) https://www.theguardian.com/environment/2014/aug/07/illegal-coal-mine-nature-reserve-china
(101) Greenpeace (2014) Exposed: Coal mining at the source of China's yellow river. Available at: https://www.greenpeace.org/archive-international/en/news/features/Exposed-Coal-mining-at-the-source-of-Chinas-Yellow-River/. Downloaded 22 February 2018.(

improving, protected areas continue to be altered to accommodate the industry's needs – the Kalamaili Ungulate Nature Reserve, for example, was reduced in size 6 times in 10 years to accommodate mining, although mining operations were suspended and some local officials received prison sentences[102] for allowing the mining to be extended.

Artisanal mining

Artisanal and small-scale gold mining by unlicensed individuals and groups is widespread throughout the region and provides an income to people who have few other options. However, the washing of gravel and ore, and the use of chemicals such as sodium cyanide and mercury to extract gold causes water and soil pollution, resulting in serious impacts on both wildlife and people.[103] Artisanal mining is largely unregulated, although progress is being made in formalising the industry. Quarrying for road or construction stone, particularly in China, much of it unregulated, also destroys habitat through landslides and pollution.

2.1.5 Agriculture and forestry

In China, Mongolia and Russia, most suitable land has already been cultivated.[104] However, some land is still being opened up, and apart from the actual loss of habitat, there are impacts from cultivating on steep slopes, or in arid areas where soils are fragile and wind erosion high. In Mongolia, targets have been set to increase the area of cultivation, sometimes supported by foreign direct investment and associated with the establishment of major agricultural machinery dealerships[105]. Extensive cultivation in the past led to the degradation of grasslands through erosion, and large-scale projects may end in the same way. No-till agriculture may reduce breaking the soil, but repeated cultivation can still lead to wind erosion on fragile soils such as those found in western China and Mongolia, and the seeds are highly dependent on herbicides. Agrochemical use is particularly high in China, and constitutes a threat to biodiversity through water pollution. Irrigation in arid areas can quickly lead to overuse of water and consequent lowering of the water level in local wells, and to salinisation in the irrigated areas. As a result, even after cultivation has been abandoned, grazing land for wild species can be lost.

In China, unchecked land clearance for agriculture by local people has been reduced, particularly on steep slopes. Some swidden agriculture persists in parts of Yunnan. However, conversion of land for large plantations, including for rubber and biofuels, has increased and these have significant impacts on biodiversity.[106]

In the Russian Far East, the amount of land under cultivation declined after the collapse of the Soviet Union, but has grown again in the past 10 years, although it has still not reached the Soviet-era levels.

Tree plantations

Following heavy logging and the clearance of forests for agriculture, extensive reforestation and afforestation schemes have restored some of China's forest cover but have also established forest in areas that had not previously been forested. The economic and environmental results are mixed, with damage to hydrology and wild biodiversity, especially where plantations are established in arid areas.[107,108]

Plantation forestry is often associated with fire suppression, which also affects natural forests, leading to changes in species composition and to very hot and damaging fires when suppression efforts fail.

Although reforestation is required under Russian forestry codes, most nurseries in the Russian Far East have fallen into disrepair or have been abandoned, making planting and reforestation especially difficult.

2.1.6 Pastoralism

Overstocking of livestock poses threats to biodiversity through competition with wild species for grazing or browsing, through the degradation of rangeland as a result of overgrazing and/or trampling, and through run-off from grazing grounds. This results in organic pollution and the eutrophication of rivers, lakes and other surface waters[109].

(102) Shi Yi (2016). China's mining industry damages 'wildlife paradise'. https://www.chinadialogue.net/article/show/single/en/8950-China-s-mining-industry-damages-wildlife-paradise-
(103) Mongolia: A Review of Environmental and Social Impacts in the Mining Sector. May 2006. The International Bank for Reconstruction and Development, The World Bank. http://siteresources.worldbank.org/INTMONGOLIA/Resources/Mongolia-Mining.pdf
(104) See http://www.2052.info
(105) See http://un-csam.org/ppta/201410wuhan/5MN.pdf
(106) Li H., Y. Ma, W. Liu and W. Liu (2009). Clearance and fragmentation of tropical rain forest in Xishuangbanna, SW, China. Biodiversity and Conservation 18, pp. 3421-3440. DOI 10.1007/s10531-009-9651-1 https://www.scribd.com/document/263575907/Clearance-and-fragmentation-of-tropical-rain-forest-in-Xishuangbanna-SW-China
(107) Cao S., T. Tian, L. Chen, X. Dong, X. Yu and G. Wang (2010). Damage Caused to the Environment by Reforestation Policies in Arid and Semi-Arid Areas of China. Ambio 39(4), pp. 279-283. DOI: 10.1007/s13280-010-0038-z; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3357704/pdf/13280_2010_Article_38.pdf
(108) Shixiong C., L. Chen and X. Yu (2009). Impact of China's Grain for Green Project on the Landscape of Vulnerable Arid and Semi-Arid Agricultural Regions: A Case Study in Northern Shaanxi Province. Journal of Applied Ecology 46(3), pp. 536-543. http://www.jstor.org/stable/27695984?seq=1#page_scan_tab_contents
(109) Shinneman A.L.C., J.E. Almendinger, C.E. Umbanhower and S. Nergui (2009). Paleolimnologic Evidence for Recent Eutrophication in the Valley of the Great Lakes (Mongolia). Ecosystems 12(6), pp. 944-960. https://www.jstor.org/stable/40296384?seq=1#page_scan_tab_contents

Open-pit coal mines, Yellow river, China. Coal processing plants discharge large amounts of waste into the river and the air. Disposal of industrial waste is a major cause of air, water and soil pollution in the rapidly industrialising parts of the region.

In Mongolia, livestock herding is transhumant, with herders moving seasonally between pastures. Livestock numbers have increased enormously in Mongolia in recent years, with official figures for the whole country reaching 52 million in 2014. Lower proportions of females giving birth and a lower proportion of young animals in the population indicate falling livestock productivity and nutritional stress.[110] According to Mongolia's National Biodiversity Programme 2015-2025, 70 % of pastureland in Mongolia was classified as degraded.[111] Overgrazing leads herders to take their herds into new areas, expanding the impacts and affecting predators such as snow leopard through disturbance and conflict with herders[112].

In China, fencing is more often used to restrict livestock movements, and in some areas stall-feeding has replaced annual movements of livestock. There are, however, still movements of herds between lowland winter pasture and mountain summer pastures in Altai, Tien Shan and on the Tibetan plateau. There have been reductions in stock numbers is some areas, but local overgrazing continues. Chronic overgrazing on the Tibetan plateau led to the degradation of pastures to such an extent that huge areas were denuded of all vegetation and sand dunes were formed in Gansu and Sichuan provinces, and elsewhere[113,114].

In the Russian Far East, the small-scale grazing of livestock is an important source of income and food for family economics, but there are only a few large-scale livestock initiatives.

2.1.7 Aquaculture

China is the world leader in aquaculture production. Aquaculture affects biodiversity through habitat loss, pollution from chemicals used in production systems, invasive species and genetic changes through fish escapes. Numerous species of mollusc and fish, most of them exotic, are raised in both freshwater and marine environments. Many aquaculture ponds are in the intertidal zone, where they reduce habitat for wild birds and are a source of disturbance. Waste is discharged into the sea, including the chemicals used to control disease in the species raised. In addition, wild species are harvested as feed for fish or prawns.[115,116]

2.1.8 Pollution

Sewage, agricultural run-off, aquaculture, shipping discharges, industrial chemicals and hospital waste all contribute to extremely high levels of pollution and eutrophication in both marine and freshwater environments[117]. In the Yangtze river, this has been exacerbated by the submergence of whole towns for the Three Gorges Dam and the subsequent contamination from industrial and domestic buildings, equipment and waste. The Mekong is heavily polluted, more so in the lower reaches and the delta, but concentrations of some heavy metals are higher in the Upper Mekong (Lancang) than in the lower Mekong, indicating that dams retain some of the pollution originating in China[118].

(110) Honhold N. (1995). Livestock population and productivity and the human population of Mongolia 1930 to 1994. Ministry of Food and Agriculture of Mongolia and ULG Consultants, Ulaanbaatar.
(111) This figure is often disputed, with some data indicating that merely 20 % of rangelands, mostly centred around population centres, are severely degraded. See https://www.cbd.int/doc/world/mn/mn-nbsap-v2-en.pdf
(112) Johansson Ö., T. McCarthy, G. Samelius, H. Andrén, L. Tumursukh and C. Mishra (2015). Snow leopard predation in a livestock dominated landscape in Mongolia Biological Conservation, 04/2015, pp. 184. DOI: 10.1016/j.biocon.2015.02.003
(113) Farrington J.D. (Ed.) (2009). Impacts of Climate Change on the Yangtze Source Region and Adjacent Areas. WWF China, Lhasa Programme Office Beijing.
(114) Liu H. and J. Zhang (2001). Study on the current situation, problems and sustainable development of wetland resources in west China. Sichuan Environment 20(4), pp. 47-50.
(115) http://dx.doi.org/10.1071/MU15045
(116) Yanga H., B. Chene, T. Piersmac, Z. Zhang and C. Ding (2016). Molluscs of an intertidal soft-sediment area in China: Does overfishing explain a high density but a low diversity community that benefits staging shorebirds. Journal of Sea Research 109, pp. 20-28. http://www.sciencedirect.com/science/journal/13851101/109/supp/C
(117) http://en.people.cn/n/2014/0605/c90882-8737287.html
(118) http://link.springer.com/article/10.1007/s11442-012-0969-3

Saunders's gull lives on saltmarshes and mudflats in eastern China. The species has declined because of conversion of inter-tidal areas for building and aquaculture. Its remaining habitat is being degraded by the spread of smooth cordgrass, an invasive plant introduced to control erosion.

The use of high levels of pesticides, fertilisers and antibiotics in agriculture damages ecosystems and species, including within protected areas, as well as harming consumers and farmers. The use of banned pesticides is common, although agrochemical use is decreasing in some areas[119]. The whole of the Yellow Sea coast suffers from contamination, particularly the Bohai Sea. High concentrations of metals, antibiotics and persistent organic pollutants, such as dichlorodiphenyltrichloroethane (DDT), and organophosphate flame-retardants and perfluoroalkyl acids are substantial threats to marine biodiversity.[120,121] Threats are exacerbated by the location of many chemical plants on newly reclaimed coastal sites.[122]

Industrial or transport accidents or malpractice in China can lead to serious incidents of pollution.[123] Mining is the source of high levels of pollution[124], particularly for rare earth minerals, including those with radioactive materials[125]. Soil pollution in some areas is so bad that cultivation is unsafe: some townships have been dubbed 'cancer towns' for example, as a result of the severe pollution from local mining. The production of asbestos and neodymium (a mineral with important deposits in China, which is used around the world in 'green' technology for wind turbine batteries), in particular, constitute threats to both local and downstream biodiversity, as well as to human health and livelihoods.[126]

2.1.9 Invasive species and disease

The wide range of habitats and environmental conditions in the region render it susceptible to introduced species that find suitable conditions to spread widely and become invasive. At least 488 invasive alien species (IAS) have been recorded in China's terrestrial habitats, inland waters and marine ecosystems, including 171 animals, 265 plants and 26 fungi.[127,128] Most invasive species have some impact on biodiversity, for example invasive plants may bring about dramatic changes in habitat quality.

Many introductions are deliberate. Smooth cordgrass was introduced from the USA to help stabilise banks and control soil erosion, but its colonisation of mudflats is now a major threat to intertidal habitats and the nesting grounds of rare species such as Saunders's gull.

Aquatic ecosystems are especially vulnerable to invasive species. The introduction of ornamental fish, or fish for fish farms, has been extremely damaging to native fish fauna through escapes, leading to hybridisation or competitive exclusion and disease in wild species. Water hyacinth and alligator weed form dense mats of vegetation in wetlands, reducing water flow and causing the death of fish, invertebrates and native plants. Invasive animal species include the Louisiana crayfish, which displaces native crayfish and contributes to the destruction of dykes and banks through its burrowing activities. It is a popular food, and is therefore unlikely to be eradicated because it is farmed in semi-wild environments.

Much attention has been paid to the international introduction of non-native species, but in a country as large and diverse as China, the domestic transfer of species to locations where they do not naturally occur is just as much of a danger.[129]

Disease

Wildlife health has received increasing recognition over the past few decades as an important component of biodiversity conservation. Human-induced changes in the environment and the global movement of people and animals have increased the opportunities for the spread of disease within and between species. Examples include the transmission of Nipah virus from fruit bats, to pigs, to people in Malaysia as a consequence of changing land-use, and the emergence of Severe Acute Respiratory Syndrome (SARS) corona virus along the wildlife trade chain in China. Disease is a particular threat to species that are already endangered by habitat loss or over-hunting. Mongolian gazelles are known to suffer, and sometimes die, from foot-and-mouth disease spread from livestock as a result of the movement of people and vehicles, including across international borders[130]. Amur tiger and leopard have been confirmed to contract canine distemper, with a local decline in tiger numbers likely related to such an outbreak[131]. The response to disease in domestic animals may also pose a threat to wildlife, for example when a wildlife cull is proposed as part of livestock and poultry disease control measures[132].

2.1.10 Climate change

Global climate change is leading to increased mean annual temperatures in the region, resulting in glacier melt, increased run-off[133] and impacts on the hydrology of rivers such as the Yangtze. Degrading permafrost leads to a lowering of the water table, causing grasslands to dry where grassroots no longer reach the groundwater table, and denying vital water flow to the northern taiga forest ecosystems.

In Mongolia permafrost has warmed[134] and precipitation has increased in intensity[135]. Predictions for western Mongolia show rises in temperature but no decrease in precipitation in the Altai. Predicted changes in net primary production indicate major shifts in vegetative types by 2050, with increases in desert steppe and mountain taiga habitat types.

Reduced rainfall has been recorded in the mountains of south-west China over the last 50 years[136], and this has implications for the habitat of 'flagship' species such as the giant panda.

In the RFE, average annual temperatures are increasing and 'southern' species (such as sika deer) are expanding rapidly to the north, as more boreal species (moose, red deer) retreat northward. Low human population densities and the absence of major barriers to migration mean that this northward shift would not have major consequences in this region. However, changes in rainfall patterns and a drier climate could have catastrophic impacts on the forest ecosystem, which is not well adapted to fire.

Sea levels are forecast to rise considerably as a result of global warming, and this poses a threat to intertidal mudflats (and the shorebirds dependent on them) that is likely to be multiplied by an increase in sea-wall defences.

The direct impacts of climate change on biodiversity will include changes in the physical environment and ecosystem processes, which will impact differently on each species, depending on its ecological niche and ability to tolerate changed conditions. Most species will experience a change in the environment for breeding, migrating and feeding, and will be exposed to new competitors, diseases and parasites. For some, the 'envelope' of environmental factors within which they can live will shift, to a higher altitude or higher latitude. If the species is sufficiently mobile, the shift is not too fast, and there is suitable habitat along the way, then theoretically it could follow the shift to

(119) https://www.giz.de/expertise/downloads/giz2011-en-agrobiodiversity-china.pdf
(120) Melville D.S., Y. Chen and Z. Ma (2016). Shorebirds along the Yellow Sea coast of China face an uncertain future – a review of threats. Emu 116(2), pp. 100-110 Review. http://dx.doi.org/10.1071/MU15045
(121) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1867999/
(122) Melville D.S. (2015). Tianjin's tragic explosions highlight risks to the coastal environment from China's expanding chemical industries. Wader Study 122, pp. 85-86.
(123) http://energydesk.greenpeace.org/2015/08/13/tianjin-latest-chinese-chemical-plant-explosion-risks-massive-health-impacts/
(124) Xu X., H. Cai, D. Sun, L. Hu and K.E. Banson (2016). Impacts of Mining and Urbanization on the Qin-Ba Mountainous Environment, China. Sustainability 8, p. 488.
(125) http://www.theguardian.com/sustainable-business/rare-earth-mining-china-social-environmental-costs
(126) http://www.dailymail.co.uk/home/moslive/article-1350811/In-China-true-cost-Britains-clean-green-wind-power-experiment-Pollution-disastrous-scale.html
(127) http://neobiota.pensoft.net/articles.php?id=1236
(128) Xu H., S. Qiang, P. Genovesi, H. Ding, J. Wu, L. Meng, Z. Han, J. Miao, B. Hu, J. Guo, H. Sun, C. Huang, J. Lei, Z. Le, X Zhang, S. He, Y. Wu, Z Zheng, L. Chen, V. Jarošík and P. Pyšek (2012). An inventory of invasive alien species in China. NeoBiota 15, pp. 1-26. DOI: 10.3897/neobiota.15.3575
(129) Lin Y., Z. Gao and A. Zhan (2015). Introduction and use of non-native species for aquaculture in China: status, risks and management solutions. Reviews in Aquaculture 7, pp. 28-58.
(130) http://www.ncbi.nlm.nih.gov/pubmed/22247371
(131) Gilbert M., D.G. Miquelle, J.M. Goodrich, R. Reeve, S. Cleaveland, L. Matthews and D.O. Joly (2014). Estimating the Potential Impact of Canine Distemper Virus on the Amur Tiger Population (Panthera tigris altaica) in Russia. PLoS ONE 9: e110811. Journal Article, Public Library of Science. DOI: 10.1371/journal.pone.0110811
(132) Takekawa J.Y. (2010). Migration of Waterfowl in the East Asian Flyway and Spatial Relationship to HPAI H5N1 Outbreaks. Avian Diseases 54, pp. 466-476. http://www.fao.org/avianflu/documents/eastasianflywayspatialrelationh5n1_aviandis1.pdf
(133) Laurie A., J. Jamsranjav, O. van den Heuvel and E. Nyamjav (2010). Biodiversity conservation and the ecological limits to development options in the Mongolian Altai: formulation of a strategy and discussion of priorities. Central Asian Survey 29(3), pp. 321-343. DOI: 10.1080/02634937.2010.528188
(134) Zhao L., Q.B. Wu, S.S. Marchenko and N. Sharkhuu (2010). Thermal state of permafrost and active layer in Central Asia during the International Polar Year. Permafrost and Periglacial Processes 21(2), pp. 198-207.
(135) Batima P., L. Natsagdorj, P. Gombluudev and B. Erdenetsetseg (2005). Observed Climate Change in Mongolia. AIACC working paper 12. http://www.start.org/Projects/AIACC_Project/working_papers/Working%20Papers/AIACC_WP_No013.pdf
(136) Bi Y., J. Xu, A. Gebrekirstos, L. Guo, M. Zhao, E. Liang and X. Yang (2015). Assessing drought variability since 1650 AD from tree-rings in the Jade Dragon Snow Mountain, southwest China. International Journal of Climatology 35(14), pp. 4057-4065.

China's rapid economic growth has benefitted millions of people, but caused loss of species and degradation of ecosystems. The population is expected to peak by 2030, but the demand for food, water, waste processing and energy will continue to grow with an increasingly urban, affluent population.

occupy a new range. However, for many species, their environmental envelope will cease to exist, or the conditions that would allow them to shift with it will not be present, resulting in local extinction.

In addition to the direct effects, biodiversity will be impacted as a result of human responses to climate change. These will include changing agricultural practices and shifting populations inland, away from eroding coastlines.

China is one of the world's major emitters of greenhouse gases, producing over 11 billion tons of CO_2 equivalent (tCO_2e) in 2013 (Table 2.1). Despite the country's large population, its per capita emissions are 8.4 tCO_2e, on a similar level to Indonesia and much higher than India. The land-use sector was a net absorber of carbon, however. Mongolia, by contrast, had emissions of only 63 $MtCO_2e$ (megatonnes of CO_2 equivalent), but because of its far smaller population this amounted to over 22 tCO_2e per person. Slightly over a third of Mongolia's net emissions are from land-use change and forestry sources.

Table 2.1 Greenhouse gas emissions

Country	Total net greenhouse gas emissions 2013 (all sources) ($MtCO_2e$)	Net greenhouse gas emissions from land-use change and forestry 2013 ($MtCO_2e$)	Net greenhouse gas emissions 2013 (tCO_2e per capita)
China	11 423	-312	8
Mongolia	63	25	22

Note: no figure is given for the Russian Far East as national level figures are not representative of the area.
Source: World Resources Institute.[137]

([137]) CAIT Climate Data Explorer (2015). World Resources Institute, Washington, DC. Available online at: http://cait.wri.org, accessed 3 May 2017.

Mongolian herder with her cashmere goats. The number of cashmere goats has grown in response to the lucrative market in China. Grazing pressure from goats, combined with fluctuations in rainfall (associated with climate change), is blamed for widespread degradation of grasslands in Mongolia.

2.2 Drivers of threats

2.2.1 Emphasis on economic development

The governments of East Asian countries, as with most other governments in the world, emphasise economic development and growth in gross national product. China in particular has put an overwhelming emphasis on short-term economic growth[138], both in the public and private sectors. This has achieved rapid growth in industry and manufacturing, but at the cost of damage to biodiversity and human health as a result of pollution and habitat conversion. Growing purchasing power has increased demand for natural resources, and China's natural capital of biodiversity has been depleted significantly.

China is trying to transition to a greener economy (see section 3.1.3), but the process of incorporating ecosystem services and biodiversity into decision-making and shifting to a green economy is slow, with changes that involve little cost in terms of economic impact currently the most feasible. The system still allows perverse incentives – for example profitable investments in 'eco-tourism' ventures can be classified as positive for biodiversity conservation despite actual damaging effects to ecosystems[139].

In Mongolia, the failure to value wild biodiversity and ecosystem services is also a problem. Many see the destruction of biodiversity as a necessary cost that must be borne to develop the country, and that development is incompatible with biodiversity conservation. For example, damming the Tuul river is seen by many decision-makers as a positive thing, emphasising the benefits for flood control and water security, as well as the creation of outdoor recreational opportunities, while the long-term losses and risks are downplayed. A similar lack of concern for long-term impacts affects planned developments for roads, railways, dams for hydropower and river diversions.

Over-emphasis on economic development is interwoven with policies and political priorities that are entrenched, despite evidence of long-term damage. For example, in Mongolia, politicians are unlikely to support a reduction in the stocking density of livestock because it goes against the national ethos of encouraging a herding lifestyle, despite the fact that increasing livestock numbers are contributing to land degradation and have impacts on endangered species. Conversely, in China, a belief that herders should be settled where possible has been difficult to counter because of the nature of political decision-making in China and the inherent difficulties in taking a stance independent of government.

2.2.2 Growing demand for natural resources, power and household and luxury goods

Demand for natural resources, including wildlife products, from an increasingly wealthy population of over 1.4 billion, is growing. As incomes have risen, tastes have changed, for example with an increase in the consumption of meat, which has a high 'ecological footprint' and drives land-use change[140]. Increasingly wealthy populations also require more energy and water, driving the expansion of coal-fired power stations, hydroelectric dams and water abstraction.

This demand drives overharvesting, both within East Asia and elsewhere in Asia and the world. An urban market for traditional medicines or prestige items gives incentives to rural people to supply middlemen, and the expanding infrastructure of the region has allowed trade chains to develop, linking urban markets with remote areas. In Mongolia, herders who once killed a

([138]) For some years the official policy was economic development 'at all costs': http://fortune.com/2013/01/28/chinas-environment-an-economic-death-sentence/
([139]) Access roads, cable cars, hotels, etc.
([140]) On the other hand, in Mongolia it is interesting to note that there is a widely shared and growing enthusiasm for vegetarianism and veganism, among the young in particular.

The Three Gorges Dam, China, spans the Yangtze river. It facilitates shipping on the river, and limits flooding and sediment deposition downstream. An area of 630 km² was flooded by the lake behind the dam, inundating richly diverse ecosystems and forcing 1.3 million people to relocate.

few marmots for home consumption were engaged in a massive offtake for the export to China (with some re-export to Russia). The Siberian marmot disappeared from most of the eastern steppes of Mongolia in the 2000s and marmot populations in other areas of Mongolia were severely depleted.[141]

The Chinese demand for timber for its own building boom, as well as to supply markets globally, has driven a resurgence in illegal logging in Russia and South-East Asia, despite efforts by many countries to curb the destructive trade[142]. Chinese demand also drives the ivory trade, though there is debate about the extent to which the most influential actors are ordinary consumers, speculators hoarding raw ivory or investors purchasing large ivory pieces. There is some evidence of a drop in the raw ivory price in 2015, but it is unclear what the impact of China's ban on the domestic trade, announced in 2016 with implementation started in 2017, will be. The demand for helmeted hornbill 'ivory', from the birds' casques, has grown rapidly. It is favoured by ivory[143] carvers, as it is softer than elephant ivory, and probably regarded by customers as more 'exclusive'. The helmeted hornbill is native to South-East Asia and most of the demand for its casques is in China[144].

(141) Townsend S. and P. Zahler (2006). Mongolian Marmot Crisis: Status of the Siberian Marmot in the Eastern Steppe. Mongolian Journal of Biological Sciences 4(1), pp. 37-44.
(142) https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20141210IllegalTimberChinaWellesley.pdf
(143) http://news.nationalgeographic.com/2016/03/160316-helmeted-hornbill-trafficking-smuggling-red-ivory/
(144) http://alert-conservation.org/issues-research-highlights/2015/8/18/not-just-rhinos-hornbill-horns-fetch-stunning-prices-in-illegal-wildlife-trade

2.2.3. Weak governance

Corruption is significant at several different levels in all countries of the region. Russia is 131st, Mongolia 87th and China 79th out of 168 countries ranked by Transparency International in their 2016 Corruption Perception Index[145]. In Mongolia, many people expect to have to pay bribes for services that should be provided free of charge including, for example, environmental inspections. Corruption and lack of certainty have contributed to the decline in Mongolia's mining industry in recent years.

A crackdown on corruption began in China in 2012 and has resulted in the prosecution of many officials.[146] However bribery and abuse of power have led to decisions that are damaging to biodiversity. Bribery in arrangements for environmental impact assessments (EIAs), permits and licences, for access to land and resources, and for contracts for environmental studies, and elite involvement in the illegal wildlife trade and illegal logging all serve to undermine good environmental governance. Public anger at projects with inadequate safeguards has increased[148] and the government has acted to tighten the implementation of the EIA procedures. The enormous sums allocated for aerial spraying of small mammals or the fencing of pasture on the grassland ecosystems of western China create opportunities for rent-seeking, which may contribute to the persistence of the practice, despite evidence that it is ineffective.

Table 2.2 Corruption Perceptions Index scores, 2016

Country	Corruption perception score 2016 0: very corrupt 100: very clean	Ranking of countries 2016 1: least corrupt 168: most corrupt
China	40	79
Mongolia	38	87
Russia	29	131

Source: Transparency International Corruption Perceptions Index, 2016.[147]

(145) http://www.transparency.org/news/feature/corruption_perceptions_index_2016
(146) https://en.wikipedia.org/wiki/Officials_implicated_by_the_anti-corruption_campaign_in_China_since_2012
(147) http://www.transparency.org/news/feature/corruption_perceptions_index_2016#table, accessed 28 April 2017.
(148) http://www.guardian.co.uk/environment/2011/sep/15/shennongjia-china-water-development/print

3

Ongoing conservation efforts

Jiuzhaigou Nature Reserve, Sichuan, China, is a World Heritage Site and a Biosphere Reserve. Large networks of conservation areas have been established in East Asia. They make a critical contribution to sustainable development, helping to maintain ecosystem services and to protect biodiversity from the impacts of rapid industrialisation and urbanisation.

3 _ Ongoing conservation efforts

3.1 Government

3.1.1 Government institutions for conservation

All the countries in the region have established institutions with responsibility for protection of the environment and biodiversity conservation. Table 3.1 summarises the principal institutions.

Gobi desert protected area, Mongolia. The countries of the region have created a large number of protected areas, some of them very large. Planning and management of this vast area remains a challenge, and ongoing efforts to improve management need to be supported and scaled-up.

Table 3.1 Main national institutions involved in biodiversity conservation

Country/agency	Mandate
China	
Ministry of Environmental Protection (MEP) (formerly State Environmental Protection Administration, SEPA)	Environmental policy, including land-use zoning, creation and management of nature reserves, scenic areas and forest parks, pollution and climate change policy.
Department of Ecology and Nature Conservation, MEP	Policies and plans for conservation, joint Convention on Biological Diversity (CBD) focal point.
Department of Climate Change (National Development and Reform Commission)	Leads implementation of China's commitments under the United National Framework Convention on Climate Change (UNFCCC), coordinates climate change-related activities.
Ministry of Land and Resources	Planning and regulation of land, mineral and marine resources (except marine fisheries).
Ministry of Water Resources	Water resource management and protection, including transboundary water-sharing relationships.
State Forestry Administration	Forest resources policy development, coordination of reforestation programmes, creation, planning and supervision of national level reserves, conservation of state forests, conservation of wetlands and wildlife, wildlife trade control.
Endangered Species Import and Export Management Authority, State Forestry Administration	Monitoring and licensing trade in wildlife, management authority for CITES, coordination of national and provincial multi-agency task forces on illegal wildlife trade.
Ministry of Finance	Operational and technical focal point for the Global Environment Facility (GEF).
Chinese Academy of Sciences (CAS), National Environment Monitoring Centre	Research and monitoring of environmental systems and issues, including the Chinese ecosystem research network and Shenyang Institute of Applied Ecology. Do not have a policy-making role, but provide technical support to MEP. CAS is the scientific authority for CITES.
Mongolia	
Ministry of Environment and Tourism	Development and enforcement of environmental and natural resource policies. Environmental policy coordination, provision of information and advice.
Special Protected Areas Administration, MET	Creation and management of protected areas, including management of national parks and special protected areas.
Tourism Department, MET	Responsible for national tourism regulation and development, including within protected areas.
Environmental Protection Agency	Enforcement of environmental rules and decisions.
Land Affairs, Geodesy and Cartography Administration	Land management and zoning.
National Agency for Meteorology and Environment Monitoring	Hydrological and ecological monitoring.
General Agency for Specialized Investigation	Enforcement and control of environmental regulations.
Mongolian Academy of Sciences	Provision of technical and scientific advice for policy and programme development.
Russia	
Ministry of Natural Resources and the Environment of the Russian Federation (MPR)	Management and policy for natural resources.
RosPrirodNazor – The Federal Service for Supervision of Natural Resources	Control of agencies working in the sphere of environmental protection.
Federal Forestry Agency, MPR	Forestry management.
Wildlife Management Department, MRP	Control of hunting and protection of endangered species.

Alpine musk deer in the Sanjiangyuan National Nature Reserve. In September 2017, China unveiled plans to pilot the country's first national parks, combining ecological protection and sustainable development. The Sanjiangyuan region, source of China's three major rivers, will be one pilot location.

3.1.2 Protected areas

Legal and policy framework for protected areas

Protected areas in **China** are established under the 1994 Regulation on Nature Reserves, and subsequent ministerial and provincial regulations and guidelines for the establishment of scenic areas, forest parks, wetlands and geo-parks. However, the law does not allow for some important categories of PA, including 'national park'. Under the regulation, the Ministry of Environmental Protection is responsible for policy and oversight of protected areas, but in practice China's protected areas are declared and managed by seven different institutions. The State Forest Administration runs 76 % of nature reserves, as well as wetland parks and forest parks. Nature reserves are also managed by the Ministry of Environmental Protection, Ministry of Agriculture, Ministry of Housing and Urban and Rural Construction, Ministry of Water Resources, and the Ministry of Land and Resources. The State Oceanic Administration manages a small number of nature reserves as well as marine protected areas. There are also geo-parks, water conservancy scenic spots, scenic areas and agricultural wild plant reserves under various departments. In addition to these official parks, there has been a proliferation of many types of legally undefined 'parks' as a result of the desire of local authorities to avoid the limitations imposed by the categories in the 1994 Nature Reserve regulation.

Nature reserves in China often overlie pre-existing community use of forests, wetlands and rangelands, resulting in considerable conflict between perceived traditional land-use rights and protected status. Finding solutions to this inherent inconsistency remains a key challenge.

Recently China put into effect a high-level directive to establish a new category of protected area, the national park. Pilot projects in nine areas focusing on different ecosystems and species are being planned, and will be implemented by provincial governments in collaboration with the National Development and Reform Commission, with other pilots implemented by the Ministry of Environmental Protection and the State Forest Administration. It is not yet clear how well this rapid roll-out of a new concept will address the existing challenges for nature reserves, which include the need for clarification of legal and institutional arrangements, improved information management, the establishment of common standards to lay the basis for professional management of sites, and coordination of the protected area network.

In **Mongolia**, the legal basis for protected areas is clear, but downgrading does occur. Although downgrading leaves protected areas with a much-reduced legal status, they are still protected legally against mining exploration and mining.

The **RFE** has 21 of the country's 101 wilderness areas[149] and 7 of the 48 national parks. In addition, the Russian Federal or regional governments can declare refuges (zakazniks), where temporary or permanent limitations are placed upon certain on-site economic activities, such as logging, mining, grazing and hunting (IUCN category IV or VI). Many zakazniks have traditionally been managed as game reserves. They range in size from 0.5 ha to 60 000 km^2. Nature parks and national monuments are designated at the provincial level and have the lowest level of legal protection.

PA coverage

Overall, about 17 % of the region is under the protection of one of the large number of different categories of protected area. Not all of the region's protected areas correspond with IUCN standard protected area categories, or have been classified using this system, and this contributes to widely varying figures on PA coverage.

Information on the number and area of PAs in **China** is published by different authorities. Although totals vary, it is estimated that China has 10 000 protected areas, in 8 different categories (Table 3.2). Of these, 2 740 are nature reserves, including 446 national-level reserves, which provide the strongest legal protection (meeting the criteria for IUCN category 1a). Combined, nature reserves cover 1.47 million km^2, or about 15.3 % of the land area of China.

Despite the very significant coverage of nature reserves, China's protected areas system does not have adequate representation of all the country's globally important ecosystems. The protected areas network has developed ad hoc, without reference to landscape connectivity or resilience to climate change, with many protected areas created in response to the opportunity to re-classify former timber production areas following the logging ban of 1997 (an exception is the giant panda protected area network, which was developed on the basis of a systematic plan[150]). The result is an unbalanced system with many gaps and overlaps.[151,152] Half of China's nature reserve coverage is accounted for by just 3 nature reserves (NRs) on the Tibetan plateau in the west, Qiangtang, Kekexili and Sanjianyaun NRs, which form a contiguous block of about 700 000 km^2. Many of the nature reserves in the eastern half of the country are smaller and more isolated, yet lie in areas of high biodiversity. There are no corridors between these reserves. Marine and coastal areas are also under-represented, and those that exist do not generally take account of the future shifting of important tidal areas as a consequence of siltation, land creation and a rise in sea level.

As a first step in addressing the gaps in the network of PAs, 32 terrestrial priority conservation areas with an area of 2.32 million km^2 (24.2 % of total land area) have been proposed in the

Table 3.2 Protected areas in China

Type	Total number	National level
Nature reserve	2 740	446
Scenic area	962	225
Forest park	3 234	826
Geo-park	485	240
Wetland park	979	705[i]
Water conservancy scenic spots	2 500	719
Desert park	55	55[i]
Ocean park	33	33
Total	10 988	3 249

Source: National Eco-Tourism Development Plan, 2016-2025, National Development and Reform Commission and National Tourism Administration.

(i) Including pilot sites.

(149) Wilderness area is used here to refer to zapovedniks, a protected area which should be 'forever wild' and is strictly protected (IUCN category I).
(150) See http://wildpro.twycrosszoo.org/000ADOBES/Bears/Bears_IUCN_ActionPlan/bearsAP_chapter13.pdf
(151) Sung W. and J. MacKinnon (Eds.) (1997). Conserving China's Biodiversity. Reports of the Biodiversity Working Group, CCICED Beijing.
(152) Xie Y., S. Wang and P Schei (Eds.) (2004). China's Protected Areas. Tsinghua University Press, Beijing.

Table 3.3 Protected areas in legal categories that meet IUCN categories I to III

Type	IUCN categories	Number of areas	Area (km²)	% of territory
China				
Nature reserves (terrestrial only)	Ia	2 740	1 470 000	15.3
Mongolia				
Strictly protected areas	Ia, Ib	20	124 110	
National parks	II	32	117 118	
Nature reserves	III	33	29 581	
National monuments	III	14	1 268	
Total: National protected areas	33	99	272 077	17.4
Local protected areas	10 988	>1 000	163 000	10
Sub-regional total		>3 839	1 905 077	17

Sources: China: http://news.xinhuanet.com/english/2016-05/22/c_135379386.htm (2015 figures); Mongolia: Ministry of Environment and Tourism of the Government of Mongolia (2015) Mongolia's Protected Area Network. Ulaanbaatar

China National Biodiversity Conservation Strategy and Action Plan[153]. The plan is ambitious and has the potential to strengthen the PA system, especially if it is extended to ensure adequate consideration of riverine, coastal and marine biodiversity, and the potential impacts of climate change.

Mongolia has 272 077 km² of state-level protected areas (17.4 % of the country), and a target of establishing 30 % of its terrain as protected areas. This follows a historic proposal made in 1992 at the Rio Conference on Environment and Development: that the whole country be designated as a biosphere reserve. National special protected areas include strictly protected areas and national parks (funded by central government), and nature reserves and natural and historical monuments (funded by local governments). There are also forest protection categories (strict zone and protected zone) that afford some protection to biodiversity although their objectives are not explicitly stated as such[154]. There are proposals for several more state-level protected areas, totalling 20 000 km².

Over 1 000 local protected areas, ranging in size from less than 0.01 km² to nearly 10 000 km² but totalling 163 000 km² (10 % of the country), have been established in Mongolia by local governments.[155] They can be established to provide protection from mining under local government regulations, and some have been classified and developed as 'managed resource protected areas'[156].

Protected areas in Mongolia tend to be concentrated in border and mountainous areas, with lowland areas under-represented, and the distribution of PAs to some extent based on land availability and avoiding conflicts. An analysis of gaps (see section 5.1) proposes priority additions to the existing protected area network.

([153]) China National Biodiversity Conservation Strategy and Action Plan (CNBSAP), 2011, China Environmental Sciences Press.
([154]) http://iufro-archive.boku.ac.at/taskforce/tfscipol/chennai-papers/ftsogtbaatar.pdf
([155]) Management regimes and security of designation of Mongolian LPAs do not (as of 2016) qualify for inclusion in protected area coverage under the relevant Aichi target.
([156]) http://www.mn.undp.org/content/mongolia/en/home/operations/projects/environment_and_energy/MRPA.html

Animal images carved in rocks 5 000-15 000 years ago, Mongolian Altai region. Many landscapes were used by people long before they became protected areas. Working with local populations to address livelihood and conservation issues is one key to protected area effectiveness.

PA funding

National nature reserves in China are financed by central government, with other reserves funded either locally or by the province. China spends significant funds on protected area and species management, but revenue distribution is unequal, and in many cases operational budgets for PAs are low, so that in some cases PA managers pursue commercial opportunities to raise funds to cover operational costs, despite these activities being in conflict with their protection mandate[157]. Often these involve excessive tourism, but even in these cases, the bulk of tourist revenue is captured by tourism operators, not the PA. International donor assistance makes an insignificant contribution to the budget of protected area management, but is more important in terms of contributing ideas.

In Mongolia, the central government provides EUR 2.7 million for 52 protected areas, equivalent to about EUR 0.12 per hectare, while local government funds the two other categories of state special protected area. The grants from international donors are significant in comparison with the national budgets – for example, KfW has a 5-year project with the Protected Area Administration that has an annual budget equivalent to 70 % of the central government's annual protected areas allocation. The United Nations Development Programme's (UNDP) 2008 Financial Scorecard concluded that Mongolia requires about EUR 7.7 million per year for optimum management of its PA network, and requirements have grown since then.[158]

In the RFE, the majority of protected areas (most wilderness areas and national parks) are funded federally through the Ministry of Natural Resources. Refuges can be either federal or provincial with funding coming via either administrative sector. Overall, funding of protected areas has increased significantly since 2010, with attendant increases in effectiveness of protection. Wilderness areas tend to be better funded and most have a long history of support, while newer national parks suffer from inadequate funding, without clear mechanisms for generating funding from alternative sources.

PA management effectiveness

In **China**, an assessment of protected areas' capacity and financial needs using the Management Effectiveness Tracking Tool[159] estimated that less than 2 % of the country was under effective protection, a fraction of the 15 % legally declared as protected areas[160]. Case studies appear to support this conclusion: the rate of conversion of intertidal estuaries in the Yellow Sea is the same inside and outside protected areas[161], for example, and the Yancheng Nature Reserve has been repeatedly reduced in size.

The causes of ineffective management of protected areas include the complex and overlapping institutional arrangements described above. In addition, local and provincial governments that are responsible for many protected areas frequently have little awareness of the real value of services provided by these areas, and little incentive to take action for them.

Staff capacity is closely related to PA effectiveness. Although staff numbers in Chinese PAs may be quite high, the number available and qualified to work in the field on protected area

([157]) For example, work on national parks in Yunnan by TNC under the EU-China Biodiversity Programme indicated that tourism revenues can be high but at a cost to the environment.
([158]) UNDP (2009). Project Document: Strengthening of the Protected Areas Network in Mongolia (SPAN), available at http://www.undp.org/content/dam/mongolia/Publications/prodocs/env/SPAN%20Prodoc%20-%20Web%20version%20-%2010%20MAR%20011.pdf
([159]) Carried out by WWF in 2007.
([160]) Schuerholz G., N. Batnasan, D. Sanjmyatav and B Sergelen (2007). Capacity and Financial Need Assessment of Protected Areas located in the Altai Sayan Region of Mongolia. World Wide Fund for Nature, Mongolia and Ministry of Nature and Environment, Ulaanbaatar.
([161]) Murray N.J., R.S. Clemens, S.R. Phinn, H.P. Possingham and R.A. Fuller (2014). Tracking the rapid loss of tidal wetlands in the Yellow Sea. Front. Ecol. Environ. 12, pp 267-272.

Mogoit river, Altai Tavn Bodg Special Protected Area, Mongolia. Transboundary cooperation for conservation in the Altai mountains, which are shared by China, Kazakhstan, Mongolia and Russia, has been proposed based on existing Biosphere Reserves and World Heritage Sites. The region is a global centre of plant diversity.

Visitors throng a popular location in Jiuzhaigou nature reserve, China. Tourism can generate funds and increase support for biodiversity conservation. However it needs to be well managed to avoid damage to sites and deterioration of the visitors' experience.

management is often limited. Salaries are typically low, and protected areas have difficulties in retaining good staff. A 2009 survey also identified education as a constraint, with 57.5 % of protected area staff only educated to high school level or lower.[162] National protected areas are typically better staffed than provincial and county-level reserves.

Although technical capacity among PA staff and local decision-makers is increasing, it remains a constraint in many cases. The capacity to produce and evaluate PA management plans, which are the basis for the release of funding from state or provincial agencies, is often limited. As a result, plans often fail to elaborate objectives fully, and show a bias towards interventions in rare species management (captive breeding, feeding wild animals, provision of shelter), and building of infrastructure, particularly related to tourism, without adequate consideration of costs and benefits. This problem is compounded when the plans are prepared by consultants who are not necessarily concerned about the feasibility of implementation. Planning is incomplete in some cases, with no management zoning developed.

The lack of adequate legal force behind PA designation, management planning and zonation means that competing agencies and agendas operate within the PA, with the manager only able to exert reasonable control in core zones. In the absence of mechanisms for coordination between agencies across the PA landscape, even the core zones are often affected by uncoordinated and independent decisions on, for example, water management on neighbouring land. All kinds of activities, including the fencing of natural pastures, mining (legal and illegal), and the construction of roads, railways, pipelines, canals, pylons, dams and water diversions, as well as pollution from industrial plants, grazing and fish farming, take place within protected areas[163].

China is participating in the pilot phase of the IUCN green list process. The green list establishes an independently audited standard for the effectiveness of PAs, and participation is voluntary. Six protected areas in China are part of the scheme.[164]

When new protected areas in **Mongolia** are zoned, conflict and negative impacts are usually avoided by defining the restrictive 'core zones' only in areas not already used by livestock herders, without taking into account the ecological needs in relation to the objectives of the protected area. The grazing of livestock within protected areas is a well-established practice but inadequately controlled. Charges are made for grazing within permitted zones but they are very low and applied per herder rather than per head of livestock. During adverse weather, parks may be opened up to grazing, sometimes under local political pressure which PA managers find difficult to resist, especially if PA rangers are also herders.

Staff numbers are generally low in Mongolian PAs. As in China, many protected areas have no permanent on-site staff, and rely for oversight and management on regional offices that look after all protected areas in their regions and are themselves under-staffed. These offices frequently lack the institutional capacity to oversee multiple PAs, make sound operational decisions, manage budgets, deploy staff and monitor performance for effective PA management.

In China and Mongolia, many staff lack the capacity to perform their required functions, although capacity is increasing, with some extremely able and experienced staff both at national and local levels. Nevertheless, more assistance is needed with capacity, and no systems of competence standards[165] or needs-based training are in place. Training is frequently a component of donor projects, but is typically one-off, without institutionalisation, and as a result, successive projects repeat training courses on the same theme.

There are problems with the recruitment and incentives for staff in both China and Mongolia, with protected area managers sometimes appointed without reference to the standards of experience required, or without attention to the candidates' professional qualifications and experience. Forestry bureau staff alternate between job placements in nature reserves and in production forestry, with no specific training in PA management, no clear career structure for protected area staff and frequent relocation hampering the development of local knowledge and relationships. Job standards have been adopted in some provinces, such as Yunnan, but are not always applied.

Government action

In response to the need for capacity strengthening for PA staff, programmes for the development of future conservation staff have been started (e.g. online, and in dedicated universities in Mongolia), and there are online college and university courses in ecology and protected area management. The skills and qualifications received by students need to be better recognised in recruitment and reward processes.

Transboundary protected area initiatives

Boundary areas are generally important for biodiversity conservation, and ecosystems often extend across international borders. In some cases, protection is enhanced because these areas are within restricted border zones, but elsewhere border fences and roads are an obstacle to the migration of large mammals, for example on the Chinese-Mongolian border. There are many examples where cross-border coordination would improve the protection of biodiversity inside and outside PAs.

Important transboundary conservation priorities include:

- Altai Mountains (Mongolia, Russia, Kazakhstan and China);
- Mongol Daguur, Dalai Nuur, Torrey Lakes, 'Daurian International Protected Area' (Mongolia, Russia, China);
- Nomrog, Xilingol, Khingan (Mongolia, China);
- Sino-Vietnam Karst and Western Guangxi Mountains (Vietnam, China);
- Mekong Headwaters and Xishuangbanna (Lao PDR and China);
- Gaoligong and Hengduan Mountains (Myanmar and China);
- South-East Himalayas (China, Bhutan, India and Nepal);

(162) Liu W.J., J. Bai, J. Ma, W.M. Song, J.L. Xu and Z. Li (2011). Current status of management capability of nature reserves in China. Journal of Beijing Forestry University 33(suppl.2), pp. 49-53.
(163) For example, Yueyang (population 5 million) in Hunan province's Dongting NR.
(164) The Green List of PAs in China can be found at https://www.iucn.org/theme/protected-areas/our-work/iucn-green-list/3-green-list-areas.
(165) Generic PA competency standards for South-East Asia have been developed, by ACB: http://www.arcbc.org.ph/arcbcweb/pdf/competence_standards.pdf

‹
Zhangjiajie National Forest Park, Hunan, China, is in the Wulingyuan World Heritage Site and is a UNESCO-recognised Geopark. The Chinese Government has acted to reduce the impact of several million visitors each year, removing illegal tourist facilities and improving management of visitor pressure.

- Tien Shan (Kazakhstan, Kyrgyzstan and China);
- Pamirs (Tajikistan, Kyrgyzstan and China);
- Changbaishan (China, Russia and North Korea);
- Amur river basin, Daxing'anlingshan, Xiaoxing'anlingshan and Sanjiang Plains (China and Russia);
- Uvs Lake Depression (Russia and Mongolia);
- Yellow Sea intertidal flats (South Korea, North Korea and China).

There are already several initiatives for cross-border cooperation on conservation, including the Daurian Protected Area of north-east Mongolia, Russia and China, and collaboration between China and Vietnam on the cross-border conservation of primates, which has taken place since the early 2000s[166]. These initiatives often lack funding, however, and are dependent on donor support. There are proposals to create transboundary World Heritage Sites (WHSs) for the Yellow Sea and in the Altai Mountains.

3.1.3 National policies and legislation

The governments in the region have specific policies to protect biodiversity, including protected areas (see section 3.1.2) and legislation to protect wild species. The importance of biodiversity for sustainable development is widely and explicitly recognised.

China

Legislation

China practices a unified, multilevel legislative system.[167] The system includes the Constitution and other laws, administrative regulations, local statutes and regulations. Currently, there are more than 20 laws and regulations issued by government agencies at national level that have articles related to biodiversity.

The Constitution, which is the highest legal authority, specifies that natural resources are owned by the State, representing the people, with the exception of areas owned by collectives. It also specifies that the State ensures the rational use of natural resources and protects rare animals and plants, and prohibits appropriation or damage to natural resources. Furthermore, Article 26 of the constitution states that, 'The State protects and improves the environment in which people live and the ecological environment. It prevents and controls pollution and other public hazards.'

The 1988 Wildlife Protection Law[168] was reviewed in 2016, with the changes taking effect in 2017. The review process involved a wide range of stakeholders, including conservation professionals both inside and outside China[169]. The law focuses on species and their habitats, and the revision emphasises for the first time the importance of protecting wildlife habitat[170], and bans online or offline commercial trade platforms from selling or buying protected wildlife and wildlife products. It also emphasises the strict management of breeding protected animals in captivity. However, Article 28 lays down that national government will develop a list of nationally protected wild fauna which are captive bred[171], allowing trade under an annual volume limit, certified by provincial level governments. There is concern that this article is a loophole that can be exploited, given the lack of transparency of certification and tracking systems, and the lack of capacity to either monitor the performance of provincial authorities or enforce the law. Article 5 of the law encourages public and private sector engagement with conservation through donations and volunteer support; and Article 8 encourages public education and media support. However, transparency and provision of public information on the effectiveness of conservation actions is not addressed. The implementation of this law will depend on subsidiary regulations, which need to be either developed or revised accordingly.

The most important regulations for the protection of habitats and ecosystems are the 1994 Nature Reserve Management Regulations[172] and the 2006 Scenic Area Management Regulation. In addition, the Marine Environment Protection Law, Forest Law, Grassland Law and Fishery Law have articles related to habitat protection. The 1996 Wild Plant Protection Regulations are also important parts of the regulatory framework.[173]

In 2015, revisions to China's 1989 Environmental Protection Law came into force, with substantial improvements. These include an enhanced role for civil society in environmental protection for the first time, requirements for environmental information disclosure, provisions for increased penalties (including daily penalties for non-compliance) and greater regulatory specificity aimed at some damaging local government practices. Chinese government officials now have to be audited on their natural resource capital performance when they leave their posts, and accountability systems are being designed.

In 2002, Environmental Impact Assessment Laws were passed in China, and were due to take effect in September 2016. Only prequalified agencies may undertake EIAs, and all government or private sector industrial, mining and transport-related projects are expected to undergo these assessments. This law focuses more on the procedures for EIAs than previous regulations. Previously, most EIAs focused on mitigation rather than alternatives. Independent, parallel studies have often reached different conclusions from those of the official EIA, and there is a general problem that the implementation of an EIA is superficial and falls far short of what is provided for in the legislation. The new EIA law does not emphasise the importance of biodiversity, so it is not clear to what extent it will benefit biodiversity conservation.

A strategic environmental assessment is described as 'Plan EIA' under the Chinese EIA Law. Compulsory ecological impact assessment guidelines have been in effect since 1997 and have now been strengthened to overcome inconsistent implementation of EIA legislation with light penalties for non-compliance. Progress has been made in developing biodiversity guidelines for different sectors. This was demonstrated by the EU China Biodiversity Programme in Chongqing in 2010 when biodiversity conservation considerations were introduced into the conditions for receipt of loans for agricultural development in and near Daba Mountain Nature Reserve.

National policies

The Master Plan of Ecological Civilization Institutional Reform issued by the Central Committee of the Chinese Communist

(166) Fauna & Flora International (2011). Transboundary conservation of the Cao Vit Gibbon. Available at: http://www.fauna-flora.org/wp-content/uploads/CVG-project-profile-May-2011.pdf
(167) http://english.gov.cn/archive/china_abc/2014/08/23/content_281474982987230.htm
(168) This law is specifically for wild fauna (animal species) and does not cover flora.
(169) http://news.nationalgeographic.com/2016/02/160201-China-wildlife-protection-law-conservation/
(170) http://www.loc.gov/law/foreign-news/article/china-new-wildlife-protection-law/
(171) These lists had not been published in mid-2017, and so it is not known whether species threatened by illegal trade, such as tiger, pangolin, elephant and rhino, willbe included.
(172) http://www.asianlii.org/cn/legis/cen/laws/ronr333/
(173) http://en.pkulaw.cn/display.aspx?cgid=15408&lib=law

Open-pit coal mining close to the source of the Yellow River. China has adopted a policy of ecological 'red lines' to identify and protect critical ecosystems and services from poorly planned and unsustainable development.

There may be fewer than 100 Cao Vit gibbons left in the world. They inhabit a small area in southern China and north-east Vietnam, and are critically endangered because of habitat loss and hunting. Conservation efforts focus on community engagement, protection and cross-border cooperation.

Party and the Chinese State Council in 2015 provides important policy guidelines with respect to biodiversity conservation.[174]

Ecological function conservation areas (EFCA), where economic development projects are limited to those with a lower impact on ecosystem services including biodiversity, were first proposed in 2000.[175] In June 2010, the State Council approved the National Main Functional Area Planning, which divides the country into function zones[176]: further high-quality development, further development, restricted development and no development zones. Four classes of EFCA – water conservation, soil and water conservation, windbreak and sand-fixation, and biodiversity maintenance – have been established, and biodiversity has been given greater recognition in long-term government planning.

The Chinese 12th Five-Year Plan (2011-2015) was the first to specifically state that biodiversity should be preserved, and in 2013 economic and social reforms were published in the Third Plenum Document, which urged local governments to abandon the 'pursuit of economic growth at all costs', through changes to annual performance evaluations of officials and of government work units, to shift emphasis from GDP to environmental criteria such as water quality, and to increase penalties for polluters. The document urged that 'ecological red lines' be set to exclude development from certain areas and to protect the environment and delivery of key ecological services through zoning and a system of eco-compensation funds. It is possible that more than 30 % of the land area of China could be designated as 'ecologically red-lined', in either no development or restricted development zones. Even where biodiversity protection is not the aim of 'red lining', the expected improvements in resource management, reductions in pollution and improvements to EIA procedures will benefit biodiversity.[177] However, contradictions remain between the 'red line' policy and development policies; for example, the large-scale conversion projects proposed may threaten the 'red line' of conserving 0.5 million km^2 of wetlands in China by 2020.[178]

The 13th Five-Year Plan (2016-2020) was finalised in early 2016 and the trend towards a consideration of green development and biodiversity issues has continued as part of the move towards an 'ecological civilisation'. This is a promising sign for biodiversity conservation in China, but now needs to be translated into workable policies. Ecological civilisation is a national concept being implemented by various agencies, including the Ministry of Environmental Protection, which has stepped up its inspection regime, the State Forestry Administration and the Ministry of Finance.

Committees have been established at provincial, prefectural, municipality and county levels to consider biodiversity in different economic sectors. Some of these are coordination committees within local Environment Protection Bureaus, which have the authority to ensure multi-sectoral coordination; others are truly multi-sectoral committees headed by senior government figures such as vice mayors. Provinces vary in their response, but the Government of Hainan has declared a strategy of establishing Hainan as 'an ecological province'.

Another important effort in China is the development of ecological compensation mechanisms and systems, started by the central government in 2005. In May 2016, based on pilot programmes, the State Council Office produced a policy document to provide direction to compensation work[179]. This listed priorities for different ecosystems, including forest, grassland, wetland, desert, ocean, water drainage and farmland, and indicated that central government will put more investment into basic facilities and public service development for important ecological function areas. It also emphasises the compensation investment for no-development zones within different PAs, and has a major component for pilot national park development projects.

China's overseas investment policies

China's industries impact countries on several continents. Guidelines on avoiding environmental damage from the Ministry of Commerce apply to Chinese enterprises embarking on foreign direct investment[180], but the content of the guidelines could be stronger, and their adoption is voluntary. Chinese operations in neighbouring countries pose a risk of negative impacts in China, and Chinese banks and industry are starting to take account of this. As an example, EXIMBANK, a Chinese lending bank, withdrew from financing the Mongolian Government's River Hydro Project that would have reduced flow to Lake Baikal[181]. Further afield, in 2016, 12 Chinese forestry companies managing about 50 000 km^2 of forest concessions in Gabon committed to responsibly manage their operations in line with the Guide on

(174) http://environmental-partnership.org/news/china-released-integrated-reform-plan-for-promoting-ecological-civilization/; http://www.mof.gov.cn/zhengwuxinxi/zhengcefabu/201509/t20150923_1472456.htm (in Chinese)

(175) First EFCA plan was published by the Ministry of Environmental Protection in 2008 and revised in 2015. See Yiqiu L., L. Chunxia, D. Ou and C. Panpan (2015) Ecological Characteristics of China's Key Ecological Function Areas. J. Resour. Ecol. 6(6), pp. 427-433. DOI:10.5814/j.issn.1674-764x.2015.06.011 http://www.jorae.cn/fileup/PDF/2015-6-427.pdf

(176) Weng, X., Z. Dong, Q. Wu and Y. Qin (2015) China's path to a green economy. Decoding China's green economy concepts and policies. IIED Country Report. IIED, London. Available at: http://pubs.iied.org/pdfs/16582IIED.pdf?, downloaded 22 February 2018

(177) Changxin Z., L. Wang and J. Liu (2015). Classification and management of ecological protection red lines in China. Biodiversity Science 23(6), pp. 716-724. DOI 10.17520/biods.2015140; http://www.biodiversity-science.net/EN/abstract/abstract10093.shtml

(178) The Coastal Blueprint Project: http://www.paulsoninstitute.org/news/2015/10/19/paulson-institute-and-chinese-partners-publish-blueprint-of-coastal-wetland conservation-and-management-in-china/

(179) http://www.gov.cn/zhengce/content/2016-05/13/content_5073049.htm (in Chinese)

(180) http://english.mofcom.gov.cn/article/policyrelease/bbb/201303/20130300043226.shtml. Article 15 states that: Enterprises shall carefully consider the ecological function orientation of the area where the project is located, and they may, with the coordination of the government of the host country and the community, have priority to take such measures as in-place and nearby conservation of animal and plant resources that worth[y] conservation and may be affected, to reduce adverse impacts on local biodiversity. For ecological impacts caused by investment activities, enterprises are encouraged to carry out ecological restoration in accordance with requirements of laws and regulations of the host country or common practices in the industry.

(181) http://www.minis.mn/mn

Sustainable Management and Utilization of Overseas Forests by Chinese Enterprises.[182]

Eco-compensation mechanism and investment

Central government considers the eco-compensation mechanism to be a critical policy to support the move towards 'ecological civilisation'. China announced the principle for compensation in 2005: 'those who do development projects will be responsible for protection; those who profit will compensate those who lose'. Transfer payment measures for key ecological function areas from the Minister of Finance were announced in 2008, and in 2010, ecological compensation was listed in the legislative plan (see section 3.2 for details of the schemes). In 2012, the total national eco-compensation investment was EUR 8.5 billion. The current major challenges for eco-compensation include 1) compensation investment cannot meet the needs; 2) besides financial compensation, there is a lack of capacity to make compensation payments more effective; 3) land ownership is not clear in many areas and provincial zoning exercises have not been developed sufficiently to support compensation plans; 4) there is currently no system to value ecological services, no ecological monitoring system, and no tool to standardise the calculation of eco-compensation payments. The State Council's reports on the results of the compensation work[183] are important for the development of strategic approaches.

Mongolia

Mongolia has one of the world's longest traditions of environmental protection, dating back to 13th century laws that gave protection to water and soil, established closed seasons for hunting, and led to effective customary practices that are now often ignored in the modern market economy. The Mongolian Constitution (1992) states that all land, subsoil, forests, water, fauna and flora and other natural resources are subject to people's power and State protection, and a large body of legislation has been built up on this basis.

There is extensive legislation related to the environment, including the Law on Fauna (1994), the Law on Plants (1995) and the Law on Special Protected Areas (1994). Many of these laws were revised in 2012, particularly in relation to safeguards, EIAs and the Law on Pastureland. Strong legislation is now available to limit damage to biodiversity from mining (see below); the 1998 Mongolian Law on Environmental Impact Assessment required biodiversity offsets for all mines[184]. Mongolia published its Green Development Policy in 2014[185], which includes the intention to 'develop environmentally sound infrastructure and transportation networks with no adverse impacts on human health and biodiversity'. At the beginning of 2016, the Parliament of Mongolia approved the Concept of the Long-term Sustainable Development of Mongolia for 2016-2030, which included the objective: 'Preserve the natural landscape and biodiversity, and ensure sustainability of the ecosystem services'. The Comprehensive National Development Strategy of Mongolia[186], which is based on the Millennium Development Goals, includes a chapter on environmental policy, but the environment is not integrated into all government sectors in the strategy.

Conservation projects, including those aimed at increasing populations of wild species or arresting declines, tend to be exempt from an environmental assessment. This is a problem because technical advice is not always based on the evidence, or may be influenced by commercial pressures, leading to damaging management interventions. An example is the proposal to boost the Mongolian taimen population by establishing hatcheries and through egg and fry protection, which was not subject to comprehensive assessment of likely impacts on both taimen and other species[187].

Projects that aim to introduce fish or other alien species are also expected to go through an EIA, but there is generally a poor understanding of the possible risks of ecological and economic damage from the release or escape of alien species (notably fish, Crustacea and plants).

Mongolia undertook a progressive revision of a suite of environmental legislation in 2012, including the Law on Environmental Protection (introducing the 'polluter pays' principle, and the concept of environmental audit); the EIA Law (strengthening the requirements for public participation, for reporting on environmental management plans, providing for stricter sanctions for non-compliance, holding financiers to account, and requiring companies to evaluate impacts on areas identified in the 'conservation blueprint' approach); and various laws and regulations regarding water use, and water pollution and water use fees.

The Law on Prohibiting Mineral Exploration and Extraction Near Water Sources, Protected Areas and Forests (2009) has proved to be an important safeguard against mining damage, even though it has been difficult and controversial to implement. It provides effective safeguards that are being taken up by local governments and CSOs.

Russian Far East

Russian legislation on protected areas and wildlife includes the Environment Protection Act (2002), the Wildlife Act (1995), the Law on Natural Special Protected Areas (1995) and a Hunting Act (2009)[188]. Russian wildlife legislation concerning ownership of wildlife trophies has been improved, but concerns remain among those involved in biodiversity conservation that the Hunting Act weakens public involvement and does not address habitat protection. At local levels, such as in the Russian Far East and Siberia, some specific regulations and customary practices override federal legislation.

Biodiversity strategies and action plans

Updated National Biodiversity Strategies and Action Plans (NBSAPs) have been published for China (2011-2030), Mongolia (2015-2025) and the Russian Federation (2014). In all of these plans there is an emphasis on sustainable use, as well as conservation, of biodiversity and ecosystem services. The Mongolian NBSAP stresses the importance of increased knowledge among decision-makers and the general public, and an improved use of science in policy and practice. The Chinese plan emphasises the need for cross-sectoral coordination and action. Both these plans, if their objectives are achieved, will contribute substantially to biodiversity conservation by their completion dates. However, a weakness of both is that they are declarative in nature without timetables or budgets. A programme to integrate them into development plans in China (5-yearly) and Mongolia (4-yearly) would bring biodiversity to the attention of many sectors of government and to the private sector.

Construction of a coal-processing plant, Mongolia. The country strengthened its legislation on EIA and safeguards, including with respect to mining, in 2012. Biodiversity off-sets are now required to compensate for the damage done by mining.

3.1.4 International agreements

Global agreements

China, Mongolia and Russia are parties to the major multilateral conventions affecting biodiversity, such as the CBD, the Ramsar Convention on Wetlands of International Importance, the World Heritage Convention, CITES, the UN Convention to Combat Desertification and the UNFCCC. Table 3.4 shows the numbers of sites established under various global and regional frameworks. The far-reaching and ambitious Aichi Biodiversity Targets[189] have been subscribed to under the CBD by all three countries.

All three countries are members of the IUCN whose various commissions set standards for protected area management and coordinate species conservation. These international designations, plus Global Geoparks[190], enjoy high esteem in China, and a great deal of effort goes into getting new Ramsar sites listed and new World Heritage Sites declared. There is often an overlap in designation. Jiuzhaigou, for example, is listed as a national nature reserve, a national level scenic spot, a national forest park, a Global Geopark and a Natural World Heritage Site. Some sites are under the management of multiple agencies.

World Heritage Sites are highly respected in Mongolia, but to date only two have been declared.

(182) http://www.wwf-congobasin.org/?271391/12-Chinese-Forestry-Companies-Commit-to-Responsible-Forest-Management-in-Gabon
(183) Available at www.npc.gov.cn – in Chinese.
(184) http://en.mongolianminingjournal.com/content/34726.shtml
(185) http://covermongolia.blogspot.co.uk/2014/06/green-development-policy-of-mongolia.html
(186) http://siteresources.worldbank.org/INTMONGOLIA/Resources/NDS_DRAFT_ENG.pdf
(187) http://scholarworks.umt.edu/cgi/viewcontent.cgi?article=1222&context=etd

(188) This replaces the first Hunting Act (1892), which was rescinded in 1917.
(189) https://www.cbd.int/sp/targets/
(190) http://www.globalgeopark.org/aboutGGN/list/index.htm. There are 33 Global Geoparks in China and many of them have biodiversity values.

Table 3.4 Number of sites designated under international agreements and conventions operating at site level

Country	Ramsar	MAB	WHS (natural)	EAAFP	NE Asian Crane Network site
China	49	31	16	19	10
Mongolia	11	5	2	6	3
Russian Far East	9	6	5	3	0
Total	69	42	23	28	13

Key to conventions and agreements: Ramsar: the convention on wetlands; MAB: UNESCO Man and Biosphere programme; WHS: UNESCO Natural World Heritage Sites under the World Heritage Convention; EAAFP: East Asian-Australasian Flyway Partnership. This is a partnership affiliated with the Convention on Migratory Species (CMS), with national governments and other organisations joining as partners.

Table 3.5 Status of the biodiversity-related conventions in the region

Country	CITES	CMS	CBD	UNFCCC
China	Party	Non-party[i]	Party	Party
Mongolia	Party	Party	Party	Party
Russian Federation	Party	Non-party[i]	Party	Party

Key to conventions and agreements: CITES: convention on international trade in endangered species; CMS: convention on migratory species; CBD: Convention on Biological Diversity; UNFCCC: United Nations Framework Convention on Climate Change

(i) China and Russia are not party to the convention but have signed a MoU under the convention on the Siberian crane. Russia has also signed the saiga antelope MoU.

Regional and bilateral agreements and transboundary reserves

The countries of the region collaborate through the mechanisms of international agreements. Under the Convention on Migratory Species (CMS), there is a Memorandum of Understanding (MoU) with a recently updated programme of work[191] for the conservation of saiga, involving Mongolia, Russia and the three other range states, and a MoU on the Siberian crane[192] involving 11 range states, including China, Mongolia and Russia. Species management plans, for tiger, snow leopard and Amur leopard for example, involve the cooperation of regional governments. A proposal for a transboundary World Heritage Site covering the Yellow Sea intertidal zone including the coasts of China, South Korea and North Korea is in preparation, and would contribute to the protection of the Yellow Sea wetlands of China from Bohai Bay south to Shanghai, and the western coast of the Korean peninsula, which are important stopover sites for large numbers of migratory shorebirds. There have also been consultations between all four Altai nations[193] to develop a proposal for an Altai transboundary Biosphere Reserve, a transboundary extension of the Golden Mountains of the Altai World Heritage Site in Russia and the Highlands of Mongol Altai World Heritage Site in Mongolia (currently on the 'tentative' list) [194].

China, Russia and Mongolia are all partners of the East Asian-Australasian Flyway Partnership[195], a voluntary initiative that includes governments, NGOs and businesses; and another multi-stakeholder group, the North-East Asian Crane Network[196]. Russia is a member, and China an observer, of the Arctic Council and the Arctic Migratory Bird Initiative of the Council's Conservation of Arctic Flora and Fauna working group.

(191) http://www.cms.int/en/document/medium-term-international-work-programme-saiga-antelope-2016-2020
(192) http://www.cms.int/en/legalinstrument/siberian-crane
(193) Russia, Mongolia, China and Kazakhstan.
(194) http://whc.unesco.org/en/tentativelists/5955/
(195) http://www.eaaflyway.net/about/the-partnership/partners/

Afforestation in Yunnan, China, under the conversion of cropland to forest programme. China's huge eco-compensation programmes encourage farmers to plant trees on sloping or arid lands. One estimate is that 146 000 km² of cropland were converted to forest between 1999 and 2010.

Mongolia, China and Russia have bilateral and trilateral conservation agreements between themselves and with other neighbours. A tripartite agreement on the Daurian International Nature Protection Area between Russia, China and Mongolia was agreed in February 1994, and agreements at central government level concern protection and use of border waters, general environmental management and specific nature reserve management, for example in the Amur Basin[197]. Agreements for information exchange and consultation between protected area authorities and local governments are common, in the Altai Mountains and the Amur Basin for example, and there is a range of agreements on the Uvs Lake Basin, which is Asia's only transnational Biosphere Reserve. Government agencies cooperate across borders on surveys, research and law enforcement in several cases[198]. Separate, local-level initiatives to link protected areas between Russia and China are also in progress.

Chinese government agencies work with counterparts in Lao PDR, Vietnam, Myanmar and Mongolia on the establishment and management of transboundary protected areas for biodiversity conservation and climate adaptation, with support from international agencies[199] and NGOs. Administrative barriers are being addressed, but in some places, particularly in the north, elaborate Chinese border fences frustrate attempts to improve effective cross-border collaboration on biodiversity conservation. At the provincial level, a formal MoU between Kwangsi (China) and Cao Bang (Vietnam) has been adopted for the conservation of the Cao Vit gibbon. Cross-border collaboration appears to be improving in that area.

3.2 Government-community conservation programmes and eco-compensation

China

There are community-managed protected areas in Sichuan, Guizhou, Qinghai, Hunan, Yunnan, Fujian and Jiangxi provinces, usually established on sacred forest or collective land and protected by local culture, beliefs and religion. Guangxi now has over 100 such protected areas. Other local conservation areas have been established to protect threatened species, sometimes in return for incentive payments. In Bangliang, Guangxi province, local people have established an area for protection of the threatened Cao Vit crested gibbon and the Chongzuo white-headed langur national nature reserve has been established on collective land with the support of local people.

(196) Chan S. (2006). The North East Asian Crane Site Network. In Boere G.C., C.A. Galbraith and D.A. Stroud (Eds.) Waterbirds around the world. The Stationery Office, Edinburgh, UK, pp. 320-323. http://jncc.defra.gov.uk/PDF/pub07_waterbirds_part3.6.3.pdf, accessed 19 July 2017.
(197) http://amur-heilong.net/http/09_int_argeements/0903rus_china_agreement.html
(198) Snow leopard and argali surveys, for example.
(199) For example, http://www.adb.org/projects/44323-012/main#project-pds

Anabasis brevifolia is found in desert and arid areas of Mongolia and China, where it is a sign of good quality grazing. It is one of the main food plants for the saiga antelope. Understanding the complex relationships between threatened species and their environment is essential for successful conservation.

Volunteers in Hong Kong removing rubbish and an invasive cordgrass from mudflats used by the critically endangered spoon-billed sandpiper. Interest in environmental issues is growing, as is civil society involvement in biodiversity conservation.

The Chinese Government has invested massively in incentivising sustainable land use, with payments transferred and scheduled under such programmes amounting to nearly EUR 70 billion. Eco-compensation payments started in 2008, and are made across a network of National Key Ecological Function Areas in five different classes, including 'biodiversity maintenance'[200]. In addition, six major forestry programmes pay people to plant and maintain tree cover. The Sloping Land Conversion Programme is a programme to retire and rehabilitate farmland that has been degraded as a result of soil erosion. It is the largest land-retirement programme in the developing world, converting 146 000 km^2 of cropland to forests between 1999 and 2010[201]. The Forest Responsibility Programme allocates forest management rights to communities, in return for patrolling and monitoring, while the Natural Forests Protection Programme limits logging. Other programmes are the Beijing and Tianjin Sandstorm Source Control Project, the 'Three North' Protection Forest Project, Wildlife Protection and Nature Reserve Construction, and Key Area Fast-growing Timber Forests Construction[202]. Under a separate grassland law people have been allocated individual plots of grazing ground for their own management – often linked with the settling of transhumant herders.

Mongolia

Mongolia has moved towards community-based natural resource management through the creation of community co-operatives that are given conditional user rights[203], mainly to forest. Various initiatives encourage people to plan the use of natural resources, especially pasture, collectively, often under the auspices of donor-funded projects[204]. One approach piloted was to establish user rights to four-season pasture with the aim of reducing overgrazing.[205]

Mongolia has also introduced a 'Pastures, Conservation and Climate Action, Mongolia' project as a 4-year (2015-2019) pilot, which focuses on community-owned approaches to carbon sequestration, improved livelihoods and biodiversity conservation. The scheme uses a payment for ecosystem services (PES) approach, under the Plan Vivo standard.[206]

3.3 Universities and research institutes

Throughout the region, universities and research institutes are involved in biodiversity conservation, at the field level (e.g. ecological survey and research, protected area management, monitoring of mining impacts) and at the policy, planning and priority setting levels (e.g. analyses of environmental impacts of projects and programmes, gap analyses of key areas for conservation, and strategic environmental assessments). In China, the level of expertise is high, and collaboration between academic and conservation institutions (including CSOs – see immediately below) both inside and outside the country is common. Some scientists provide vital, high-quality support to government programmes, with national and provincial governments retaining pools of experts from universities and research institutes to provide technical support for policy-making. The cataloguing of all the known species of China, with the publication of annual updates (Catalogue of Life China)[207] and the ongoing taxonomic work on the plants of Mongolia[208] will be of huge long-term value. New species are being described, particularly in China. Mongolian university staff and students assisted with the 2006 IUCN regional Red List assessments for mammals, fish, birds[209], reptiles and amphibians. In both China and Mongolia, certain university and academy of sciences departments have specialised in conservation biology, and staff members have been active in conservation well beyond their academic work[210].

Despite this body of biodiversity expertise, conservation research results are slow to be reflected in conservation practice and government decision-making. This is in part because many scientists focus on the academic and publication aspect of their work, and also because there is little integration between natural and social sciences, resulting in recommendations that are difficult to integrate into policy agendas[211]. The situation is complicated because the sharing of data between government institutions, universities and research institutes is often problematic, with conflicting data of uncertain origin sometimes in circulation. Some scientists appear to be diffident when it comes to disputing government statements or policies, especially in China where discussions relating to social instability, corruption and the illegal wildlife trade are politically sensitive.

Some conservation projects funded by international donors have become closely associated with certain institutions, leading to productive partnerships between outside and domestic academic and research institutions. The Pastures, Conservation and Climate Action – Mongolia project[212], and its predecessor Values and Valuation: New Approaches to Conservation in Mongolia[213] are applied conservation science projects led by the University of Leicester, United Kingdom (UK), in conjunction with Mongolian partners such as the Mongolian Academy of Agricultural Sciences and the Mongolian Society for Range Management.

Russian science has been led for decades by the many institutes of the Russian Academy of Sciences, although recent reorganisation has led to the closure of some institutes, and this may lead to a larger role for universities in future. Researchers from Russian Academy of Sciences institutes commonly work in protected areas, and the Academy oversees several protected areas in the Russian Far East. Wilderness areas maintain their own scientific staff for monitoring natural ecosystems, but also collaborate with scientists from the Russian Academy of Sciences.

(200) http://www.jorae.cn/article/2015/1674-764x-6-6-427.html
(201) Yin R.S. and G.P. Yin (2010). China's primary programs of terrestrial ecosystem restoration: Initiation, implementation and challenges. Environmental Management 45, pp. 429-441.
(202) Weng, X., et al. (2015). Op cit.
(203) Under the laws on 'Environmental Protection' and 'Forests'.
(204) Mau G. and G. Chandsalikham (2006). Herder group evaluation. A study of herder groups, their present status and future potential: policy options for the Government of Mongolia. http://www.fs.fed.us/rm/pubs/rmrs_p039/rmrs_p039_018_029.pdf
(205) K. Schuler, pers. comm., 2009.
(206) http://www.planvivo.org/project-network/pastures-conservation-climate-action-mongolia/

(207) A project of the Biodiversity Committee of the Chinese Academy of Sciences, see http://www.catalogueoflife.org/col/details/database/id/121
(208) For example, the Database of Herbarium and Vascular Flora of Mongolia https://www.researchgate.net/publication/271273591_THE_DATABASE_OF_HERBARIUM_AND_FLORA_OF_THE_MONGOLIA
(209) http://zslsites.org/assets/nrl/Summary_Conservation_Action_Plans_for_Mongolian_Birds_NP_Original.pdf
(210) Wang Sung, for example, of the Institute of Zoology, Chinese Academy of Sciences, who co-chaired the Biodiversity Working Group of the CCICED. See Sung W and J. MacKinnon (1993). Urgent Recommendations to Save China's Biological Diversity: Report to the Chinese Council for International Cooperation in Environment and Development (CCICED). Biodiversity Science 1, pp. 2-13.
(211) In Mongolia, academics provided a positive influence during a movement to put an end to the programme to poison Brandts' Voles, which was stopped as a result of joint representation by researchers and NGOs.
(212) http://www.planvivo.org/project-network/pastures-conservation-climate-action-mongolia/
(213) http://www2.le.ac.uk/departments/geography/research1/projects/darwin

3.4 Civil society

3.4.1 Domestic CSOs

China

Increasing numbers of CSOs operate in China, but they are under a strict regulatory system that usually requires acceptance of supervision from a civil affairs office and/or a 'sponsoring organisation'[214]. There is a complex classification of CSOs according to organisation and funding source[215]. Some are created by government departments, for example the China Wildlife Conservation Association, which has State Forestry Administration officials on its staff and is able to access government budgets for some operating funds. Most of the growing numbers of environmental CSOs are active on air- and water-quality issues, with a smaller number working directly on biodiversity conservation, often in partnership with universities or research institutes, and with international CSOs.

Many organisations campaign and run projects and programmes in the environmental field through relationships with government that have been described as 'embedded activism'[216]. Under the revision of the Law on Environmental Protection, some CSOs are now authorised to bring public interest litigation lawsuits against the government for environmental crimes. Some have been successful, for example, in postponing or changing decisions on the damming of the free-flowing Nu river in Yunnan[217], and modifying or cancelling the Kelamaili coal mines in Xinjiang. Chinese civil society includes interesting examples of private sector leadership. Alxa SEE[218] Ecological Association (SEE) is the largest environmental NGO in China, and was initiated by more than 500 well-known entrepreneurs in 2016. The vision of SEE is to promote the sustainable development of nature and humanity, and create value through the integration of ecological, economic and social benefits. SEE supports biodiversity conservation projects in Alashan, Inner Mongolia and in Sanjiangyuan on the Tibetan plateau, and the conservation of mangrove forest in south China. Another NGO, the Protected Area Friendly Company[219], is developing innovative approaches based on economic solutions, as well as promoting the non-economic values of species.

Some NGOs contribute to the science of conservation in collaboration with universities or research institutes. The Shan Shui Conservation Centre[220], for example, is based at the Peking University Centre for Nature and Society, and is active in trying to influence government policy on conservation, working towards greater access to and sharing of reliable data, and raising interest and capacity for citizen science[221].

Mongolia

NGOs are free to form and operate in Mongolia, and there are over 700 environmental NGOs. They are sought-after by government to provide technical services in protected area management, and are an integral part of EIA processes. However, there are challenges with coordination and the quality of scientific work. The Mongolia Environmental Council has been established to help with coordination, to raise the profile of NGOs as trusted sources of information and balanced analysis, and to encourage NGOs to play a more important role in promoting coherent planning processes, especially where major infrastructure and mining projects are proposed.

Some NGOs have excellent technical knowledge and experience as well as a high level of diplomatic, networking and negotiating skills. The Wildlife Science and Conservation Centre, working with BirdLife International, carried out an assessment of the geographic overlap of natural habitat and economic development plans that later contributed to safeguarding plans and actions[222]. The Snow Leopard Conservation Foundation has campaigned successfully for the gazetting of a state protected area to provide protection to an otherwise unprotected snow leopard population.[223]

Russia

There are hundreds of environmental NGOs operating in the Russian Far East, focusing on a range of issues including environmental education (e.g. Phoenix Fund, Uragus) to research science (e.g. Institute for the Sustainable Use of Natural Resources, Amur-Ussuri Centre for Avian Biodiversity).

(214) Ru J. and L. Ortolano (2008). Corporatist control of environmental non-governmental organizations: A state perspective. Chapter 3 (pp. 44-68) in Ho P. and R.L Edmonds (2008). China's embedded activism: opportunities and constraints of a social movement. Routledge. ISBN: 978-0415433747.
(215) Social organisations (shehui tuanti), civil non-enterprise institutions (minban fei qiye danwei), and foundations (jijinhui). The last category includes two types of foundations: public fundraising and non-public fundraising foundations. In addition, there are many different types of informal CSOs: those registered as businesses those attached to a legal organisation, small community-based organisations, rural cooperatives, religious organisations and networks. http://www.icnl.org/research/monitor/china.html
(216) Ho P. and R.L. Edmonds (2007). China's embedded activism: opportunities and constraints of a social movement. Routledge. ISBN: 9780415433747.
(217) The 'embeddedness' of NGOs in this case allowed an unusual alliance, with the State Environmental Protection Agency supporting the environmentalists' case.
(218) http://www.chinacsrmap.org/Org_Show_EN.asp?ID=209, and http://www.see.org.cn/ (in Chinese)
(219) https://www.facebook.com/Global-Protected-Area-Friendly-System-1767248333503742/; http://www.baohudi.org/?p=3074
(220) http://www.shanshui.org/Default.aspx?id=71
(221) Lü Z., L. Gu, C. Wen, H. Wang and J. Zhong (2015). China Nature Watch 2014: an independent report on China's biodiversity conservation status. Biodiversity Science 23(5), pp. 570-574. DOI: 10.17520/biods.2015116
(222) http://www.birdlife.org/sites/default/files/attachments/CNH%20Report%20Final%2027%20Jan%202009.pdf
(223) http://www.snowleopard.org/mongolia-to-create-new-national-park-for-snow-leopards

Chinese industry is now the world's leading producer of photovoltaic cells, and the country has more solar PV capacity installed than any other country – more than 100 gigawatts.

As of 2013, any NGO in Russia that receives international funding and engages in political activity must register as a Foreign Agent under the 2012 Foreign Agents Law.[224] Ostensibly this law does not apply to environmental NGOs, because their activities are apolitical; however it has been used to target them, with dozens added to the register. In 2015, prosecutors argued that Sakhalin Environment Watch's environmental advocacy sought to sway public opinion 'in order to influence the decisions of government authorities, an intention directed at a public reaction and attracting the attention of the government authorities of the Sakhalin Province', thus satisfying the 'political activity' requirement. Also in 2015, following a report on industrial pollution by Bellona-Murmansk (an affiliate of the Oslo-based Bellona Foundation), the group was added to the Foreign Agent list and subsequently closed. In total, seven environmental NGOs have closed in Russia after being added to this list.

3.4.2 International NGOs

Many of the major international conservation NGOs are active in the region, and have established programmes in habitat and species conservation, carried out illegal wildlife trade surveys and campaigns, and assessed and monitored the impacts of mines, sometimes on contract to mining companies. They have made important contributions to the development of biodiversity offsets for mining, to strategic environmental assessments (SEAs) and to biodiversity priority setting. Their work has also helped to raise the profile of iconic species (e.g. giant panda, snow leopard, Yangtze dolphin), and regions such as the Yangtze watershed and the Yellow Sea.

In Mongolia, international NGOs have at times taken a leading role in conservation activities, including operating independently funded and managed anti-poaching patrols, and managing nature reserves[225]. Joint management is also being piloted in China[226]. International NGO action on the illegal wildlife trade (consumer education, investigation and analysis, and policy advocacy) is also important. Within the Russian Far East, WCS, WWF, Zoological Society of London and International Fund for Animal Welfare focus on the conservation of big cats, and also address anti-poaching, capacity building and forestry issues, with WWF and WCS having the largest presence, including offices in Vladivostok.

In China, the 'Overseas'[227] NGO Law, which came into force in January 2017, imposes some conditions on funding, operation of bank accounts, advocacy and supervision that have raised concerns in some NGOs[228].

(224) 'On Amendments to Legislative Acts of the Russian Federation regarding the Regulation of the Activities of Non-profit Organisations Performing the Functions of a Foreign Agent', 2012.
(225) For example, Hustai Trust manages the Hustai Nuruu NR, WWF manages Khar Yamaat NR, and there is a California State Parks' Sister Park Agreement between Ikh Nart NR in Mongolia and Anza-Borrego Desert State Park.
(226) Chongming Dongtan National Nature Reserve (NNR), Shanghai is co-managed with WWF and TNC.
(227) 'Overseas' is used to indicate that the law applies to all NGOs outside mainland China, including those established in territories which are considered by the Chinese Government as part of China: Hong Kong, Macau and Taiwan.
(228) http://www.icnl.org/research/monitor/china.html; https://www.theguardian.com/world/2016/apr/28/china-passes-law-imposing-security-controls-on-foreign-ngos

Art collector and antique show host Zhai Jianmin promoting the 10th International Antiques Fair in Hong Kong as an event free of ivory or rhino horn. Effective collaboration between international NGOs, local activists and opinion leaders has been key to work against the illegal wildlife trade.

3.5 Private sector

China joined the CBD's Global Business and Biodiversity Platform[229] in 2015, reinforcing its commitment to sustainable business growth. The development of corporate environmental and social responsibility standards, which provide for some measure of biodiversity 'friendliness' for products from the agricultural landscape, is a growing phenomenon. Greater sensitivity to biodiversity issues has been encouraged by the flotation of Chinese companies on foreign stock exchanges, and by China's 2008 Measures for the Disclosure of Environmental Information regulation, which requires companies to publish information on their environmental impacts.

The rapidly expanding private sector in China presents significant opportunities for addressing environmental issues. Private companies are sponsors of NGO actions on biodiversity conservation as part of their green branding. Tencent Internet Service Provider made its platforms and expertise available to filter communication related to illegal trade, sharing monitoring results with enforcement authorities[230], while hotels (e.g. the Marriott and the Hilton chains[231]) and restaurants (e.g. the Jindingxuan chain) have made high profile commitments to ban shark fins and other items from their menus. Marriott Hotels, Huaneng Power and Garnier have funded field conservation through Conservation International or the Shan Shui Conservation Centre. Vanke, the largest real estate company in China, has partnered with the Qomolangma National Nature Reserve Administration to establish the Everest Snow Leopard Conservation Centre. Alxa SEE Ecological Association has pledged to apply the green supply chain concept among its 500 private sector members.

Nature-based tourism is a particularly important sector because of its potential to generate revenue from the non-consumptive use of the environment, but it presents threats as well as opportunities. In China, the introduction of the 5-day working week in 1995 and additional annual holidays substantially increased the demand for outdoor recreation. Between 1994 and 2009 the total number of domestic visitors within China increased from 524 million to 1.9 billion, and revenues generated from this have increased accordingly. Fuzhou National Forest Park, for example, saw its annual income from ticket sales rise from EUR 11 400 in 1993 to EUR 368 600 in 2009, and the trend has continued[232]. While some tourism has contributed to park income, the increased pressure on resources, waste disposal and development to satisfy the demand for tourism infrastructure creates additional pressure on fragile environments.

In Mongolia, the tourism infrastructure is much less developed and landscape tourism, or 'off the beaten path' tourism, is part of the attraction for small numbers of foreign visitors, supporting a number of local tour companies. Sport hunting and fishing attract limited numbers of hunters and fishermen from North America and Europe.

In RFE there is a growing sport hunting and fishing industry. Travel agents are now offering cruises, including bird-watching expeditions, to the coastal areas of the RFE, including the Kuril Islands, Sakhalin and Kamchatka[233]. There are limited opportunities for eco-tourism in the southern Russian Far East, with some birdwatching and nature tours, but the industry remains in its infancy.

(229) https://www.cbd.int/business/bc.shtml
(230) http://www.focac.org/eng/jlydh/t1328342.htm
(231) http://www.travelweekly.com/Travel-News/Hotel-News/Marriott-to-stop-serving-shark-fin
(232) Guangyu W. (2012). National Park Development in China: Conservation or Commercialization? Ambio 41(3), pp. 247-261. Published online 27 October 2011. DOI: 10.1007/s13280-011-0194-9
(233) http://www.asahi.com/articles/ASJ8Z4JCQJ8ZUHBI00Y.html?ref=nmail (not available in English)

3.6 International agencies and donors

Aid to China is generally in the form of concessional finance, and, as a result, net Official Development Assistance (ODA) is negative, reflecting repayments that are greater than income. Estimates of overall financial flows to China from the Development Assistance Committee (DAC) countries, including private sector investment, totalled EUR 47 billion in 2014 and EUR 13 billion in 2015, far higher than ODA. China's aid dependence is very low, with net ODA totalling less than 0.001 % of gross national income.

Mongolia received net ODA of EUR 151 million from the DAC countries in 2015, and a total financial flow from DAC countries including private sector investment of EUR 511 million. Net ODA amounted to 2 % of gross national income, a fairly high level of aid dependence.

Bilateral donors

European Union

Sustainable development is one of the four themes of the EU-China 2020 Strategic Agenda for Cooperation, signed in 2013. Under the theme of sustainable development, the statements on forests and biodiversity, climate change, energy and urbanisation are of particular relevance to biodiversity conservation. There have been a number of joint programmes addressing this area, including the EU-China Natural Forest Management Project (EUR 17 million, 2003-2010), the EU-China Biodiversity Programme (EUR 30 million, 2009-2015) and a series of technical cooperation programmes on carbon capture and storage. There are also dialogues on environmental policy and climate change, cooperation on water resources, wildlife protection and CITES, and a bilateral cooperation mechanism on forest law enforcement, governance and trade[234].

EU allocations in the multiannual indicative plan 2014-2020 for Mongolia total EUR 65 million, and are focused on 'improved governance of revenues for inclusive and sustainable growth', and 'support for better employment opportunities'.[235] Between 2010 and 2015, EU investment in projects related to global climate change and sustainable economy totalled over EUR 24 million. There were no projects of more than EUR 1 million addressing biodiversity conservation in this period, and the bulk of the investment (7 projects, > EUR 19 million) is related to sustainable production and consumption, with just 1 project (> EUR 5 million) addressing climate change (cf. the island South-East Asia and Greater Mekong regions, where investment in biodiversity is on a similar level to sustainable production and consumption).

In Mongolia, an EU grant of nearly EUR 300 000 supports civil society participation in environmental decision making. The project has a specific focus on improving participation in EIA processes for mining.[236]

Germany

The German agency for international technical cooperation, GIZ, supports sustainable mineral resources management, biodiversity and energy efficiency in Mongolia, including one project on a national REDD+ inventory for Mongolia, and another on biodiversity and adaptation of key forest ecosystems to climate change (2015-2018).[237] German development bank KfW supports energy efficiency and biodiversity, and began a long-term Biodiversity and Adaptation to Climate Change Project with the Mongolian Ministry of Environment and Tourism in 2015[238].

The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, through its international climate initiative, supports 36 projects in China (none in Mongolia), among them two ongoing biodiversity projects: ecosystem protection for infrastructure and communities (2012-2017, 6 countries, EUR 4 million, implemented by IUCN); and the Central Asian Desert initiative: Conservation and Adaptive Use of Cold Winter Deserts in Central Asia (2016-2019, 5 countries, EUR 3.3 million, implemented by the Food and Agriculture Organisation).

USA

United States Agency for International Development has supported conservation work through Winrock on the Tibetan plateau, and through WCS in the eastern steppes of Mongolia. The agency also supports Asia's Regional Response to Endangered Species Trafficking programme, bringing together 10 countries including China, NGOs and private sector organisations, working to reduce consumer demand and improve enforcement[239] against the illegal wildlife trade.

France

French development agency AFD supports action for sustainable development and against climate change in China, with a major focus on urban development and energy. The agency has made

(234) Information from the website of the Delegation of the European Commission in China (see https://eeas.europa.eu/delegations/china/15394/china-and-eu_en), and the EU-China 2020 Strategic Agenda for Cooperation, available at http://eeas.europa.eu/archives/docs/china/docs/eu-china_2020_strategic_agenda_en.pdf
(235) European Union, MultiAnnual Indicative Plan (MIP) for Mongolia 2014-2020, available at https://ec.europa.eu/europeaid/sites/devco/files/mip20142020-programming-mongolia-20140814_en.pdf
(236) The proposal is called 'Give People a Voice!' and the grant beneficiary is WWF Germany.
(237) https://www.giz.de/en/worldwide/17729.html
(238) http://www.eco-consult.com/mongolia1.html
(239) Further details of this Asia-wide project are in the synthesis report. Also available at https://www.usaid.gov/biodiversity/wildlife-trafficking

Table 3.6 Net ODA disbursements to the East Asia region from DAC countries, 2011-2015

Country	ODA (EUR million)				
	2011	2012	2013	2014	2015
China	441.1	86.2	-156.9	-279.2	-40.7
Mongolia	199.2	275.5	278.8	172.9	150.9
Total	640.3	361.7	122.0	106.3	110.2

Table 3.7 Net ODA disbursements to the East Asia region, 2015, by donor (countries with net flows >EUR 7.7 million or USD 10 million)

Country	ODA (EUR million; 2015)							
	EU	Australia	Canada	France	Germany	Italy	Japan	Korea
CHI	70.31	5.77	-8.00	52.77	419.31	-12.23	-571.38	-5.69
MON	5.31	8.00	0.85	1.62	17.23	0.15	66.92	23.69
Total	75.62	13.77	-7.15	54.38	436.54	-12.08	-504.46	18.00

Table 3.7 (continued)

Country	ODA (EUR million; 2015)							
	Norway	Poland	Spain	Switzerland	UK	USA	Others	Total
CHI	8.77	-12.85	-17.69	10.46	52.46	25.69	11.92	29.62
MON	0.38	0.38	-0.77	19.00	0.77	6.92	5.77	156.23
Total	9.15	-12.46	-18.46	29.46	53.23	32.62	17.69	185.85

Source: OECD (2017).[241]

(240) OECD (2017). Geographical Distribution of Financial Flows to Developing Countries 2017: Disbursements, Commitments, Country Indicators. OECD, Paris. Available at http://www.keepeek.com/Digital-Asset-Management/oecd/development/geographical-distribution-of-financial-flows-to-developing-countries-2017_fin_flows_dev-2017-en-fr/

(241) OECD (2017). Geographical Distribution of Financial Flows to Developing Countries 2017: Disbursements, Commitments, Country Indicators. OECD, Paris. Available at http://www.keepeek.com/Digital-Asset-Management/oecd/development/geographical-distribution-of-financial-flows-to-developing-countries-2017_fin_flows_dev-2017-en-fr/

Bee-keeping in the Daba Mountains Nature Reserve, China. In 2010, biodiversity conservation considerations were included in the conditions for receipt of loans for agricultural development in and near the reserve. The project was supported by the EU-China Biodiversity Programme.

a EUR 30 million loan for the restoration of wetlands in China[242]. Fonds français pour l'environnement mondial has also supported climate change mitigation projects in China.

Japan

Japanese aid to China includes grants and loans for infrastructure development and technical assistance for capacity building[243]. In Mongolia, Japan supports sustainable development and improved governance in the mining sector, the diversification of small and medium-sized enterprises, improvement to social services and urban planning.

Canada

The Canadian Government has supported a series of task forces in China, one specifically on biodiversity and others including aspects on biodiversity, under the China Council for International Cooperation and Development (CCICED), which reports directly to the highest levels of government.

Australia

The Australian Government's Wildlife Conservation Plan for Migratory Shorebirds (2015)[244] includes joint actions with the Governments of China (and Korea) at sites on the Yellow Sea coast.

United Nations agencies

UNDP's Biodiversity Finance Initiative (BIOFIN)[245], launched in 2012, is a global partnership addressing the biodiversity finance challenge, enabling countries to measure their current biodiversity expenditures, assess their financial needs in the medium term and identify the most suitable finance solutions to bridge their national biodiversity finance gaps. BIOFIN is active in 31 countries worldwide, including Mongolia.

United Nations Environment Programme (UNEP) convenes the Forum of Ministers and Environment Authorities of Asia Pacific, which provide opportunities for ministers and high-level representatives from the region to gather and discuss regional priorities and solutions for pressing sustainability challenges,

(242) http://www.afd.fr/lang/en/home/pays/asie/geo-asie/chine#
(243) http://www.mofa.go.jp/policy/oda/region/e_asia/china/
(244) http://www.environment.gov.au/biodiversity/publications/wildlife-conservation-plan-migratory-shorebirds-2016
(245) http://www.biodiversityfinance.net/home

^

Pangolin, in demand for food and medicine in China, at a rescue centre in Thailand. International collaboration between governments, donors, multilateral agencies and NGOs is vital in the fight against the illegal wildlife trade. While there have been important successes, the scale of the problem remains huge.

^

A tourist camp in the Khuvsgul Lake National Park, Mongolia. Aware of the risks posed by poorly planned tourism in this fragile environment, the government and international donors are collaborating on the promotion of sustainable tourism.

as an input to the United Nations Environment Assembly. 'Maintaining biodiversity and sustainable provision of ecosystem services' was identified as one of the seven key priorities for the region.

The **UNEP World Conservation Monitoring Centre** (UNEP-WCMC) is engaged with the Chinese Ministry for Environmental Protection, providing recommendations for China's national business and biodiversity platform, an initiative to engage private sector and other stakeholders.

Multilateral development banks

Among other support provided for biodiversity, the **World Bank**, together with the Government of Mongolia, began to administer the Netherlands-Mongolia Trust Fund for Environmental Reform in 2005. The overarching objective of the fund was to strengthen environment and natural resources management in Mongolia; biodiversity conservation was also addressed in many of the projects funded under the scheme.[246] No other projects in the World Bank portfolio address environment/biodiversity themes.[247] Of the 104 World Bank projects active in China, one is directly concerned with biodiversity and two with forestry. The World Bank and GEF launched a EUR 2 million project, Landscape Approach to Wildlife Conservation in north-east China, in 2016, targeting landscapes important for the Amur tiger, with a focus on protected area management, reducing human-wildlife conflict, and habitat restoration.[248] The Hunan Forest Restoration and Development Project (EUR 61 million), and the Integrated Forestry Development Project for China (EUR 76 million) will both support the creation of multi-function, ecologically resilient forests with associated capacity for management.

Asian Development Bank's work in Mongolia is focused on the macro-economic environment: relevant social projects include conservation and storage of forest seed genetic resources (EUR 0.4 million, commenced in 2016), and the sustainable tourism development project (EUR 29 million, in preparation), focused on managing the increasing tourism pressure to Khuvsgul Lake National Park[249]. In China, ADB's environmental work is focused on wetlands, including an ADB-GEF project working on the protection and restoration of wetlands in Jiangsu province (loan of EUR 28 million, GEF grant funding of EUR 1.75 million), and programmes on lake conservation, payment for watershed services and the management of water pollution. In 2016, ADB added a wildlife trafficking component to their highway development programme in Yunnan.

(246) http://www.worldbank.org/en/news/feature/2012/03/16/mongolia-strikes-balance-between-development-environmental-protection
(247) http://maps.worldbank.org/p2e/mcmap/map.html?org=ibrd&level=country&code=MN&title=Mongolia
(248) http://www.worldbank.org/en/news/press-release/2016/03/01/world-bank-and-gef-to-support-tiger-conservation-in-northeast-china
(249) https://www.adb.org/projects/50013-002/main#project-pds

A new, Chinese initiated, development bank, the **Asian Infrastructure Investment Bank** (AIIB) focused on infrastructure development was created in 2015 and started operations in 2016. Most major global economies have become part of the bank, with the USA and Japan remaining outside. The bank is positioned to become a major financier of projects throughout Asia, and has described itself as a 'green' bank. It has adopted social and environmental safeguard policies broadly similar to other development banks.

Multi-donor funds and initiatives

The **Global Environment Facility**[250] (GEF) is now in its sixth funding cycle (2014-2018), with a total allocation for Mongolia of EUR 9 million, of which 43 % (EUR 3.9 million) is allocated for biodiversity, 31 % (EUR 2.8 million) for land degradation, and 26 % (EUR 2.3 million) for climate change. The allocation for China is EUR 149.6 million: 65 % for climate change (EUR 96.9 million), 30 % for biodiversity (EUR 44 million) and 5 % for land degradation. Mongolia's allocation is an 8 % increase from the previous GEF phase, China's an 8 % decrease.

GEF has funded 41 national projects (total funding EUR 119 million) in the focal area of biodiversity in China over the last 20 years, and 12 projects (EUR 10.2 million) in Mongolia. A small number of GEF-funded projects have been implemented in Siberia and RFE, including 1 in the Altai Mountains that was part of a matching set of 3 national projects (Mongolia, Russia and Kazakhstan). In Mongolia, GEF projects have focused on protected area systems and management, including the newer categories of protected area, such as local protected areas and managed resource protected areas[251].

GEF projects under implementation in China in 2016 include 6 on wetlands (EUR 20 million), 1 on PES (Chishui river), and an access and benefit-sharing project on protected area management in Qinghai. GEF's 6 biodiversity projects in the pipeline for China include projects on the proposed new National Parks System (focus on Gansu, Qinghai), the white dolphin and 2 projects on the East Asian-Australasian Flyway, both inland and coastal.

The GEF has a small grant programme (SGP) in China and Mongolia. The Chinese programme started in 2009 and has made 68 grants worth EUR 2.5 million, with 26 projects addressing the 'biodiversity' funding theme. Mongolia's SGP started in 2002, and has made 415 grants totalling EUR 2.7 million, with over half of them addressing the biodiversity theme.

(250) GEF funding is from national governments. Thirty-nine have contributed to GEF since its creation, with 30 countries contributing EUR 3.4 billion for the GEF-6 period (2014-2018). Donor countries include 18 of the 28 EU Members States. See https://www.thegef.org/partners/participants for a full list.
(251) http://www.mn.undp.org/content/mongolia/en/home/operations/projects/environment_and_energy/MRPA.html

4

Lessons learned

Golden snub-nose monkey, Sichuan, China. The Zhouzhi National Nature Reserve is the site of a long-term programme of research into the species, with monkeys habituated to the presence of researchers. The monkey is an endangered species, with an estimated 15 000 individuals surviving in the high mountain regions of west-central China.

4 _ Lessons learned

4.1 Protected areas

Significant areas have been declared as protected areas but a complex set of issues undermines their effectiveness. In China, the legal basis of PAs has proved too weak to give them effective protection, with the lack of a comprehensive law on PAs allowing incompatible activities inside or adjacent to PAs, as well as downgrading and degazettement. In Mongolia, downgrading is also a problem in some cases, even though the legislation is clearer overall than in China. In Russia, protected areas generally have a strong legal basis for protection and continued existence on the ground, once gazetted.

Key lessons and promising approaches related to protected areas are listed below.

- In China, the management of protected areas does not match the management regimes described in laws, regulations and zoning schemes. The lack of a single agency that is ultimately responsible for planning and coordinating the system of protected areas causes confused lines of authority and overlapping mandates at site level, with managers sometimes unable to control the land use within their boundaries and powerless to act in the interests of the biodiversity they are assigned to protect.
- Protected areas in China and Mongolia have frequently failed to accommodate pre-existing rights of local herders and farmers. Depending on the strength and political position of government, these conflicts have resulted in the displacement of people and their livelihoods, spikes in uncontrolled illegal activities, or moves to allow people to use resources within PAs despite the protected status (e.g. for herders in Mongolia).
- Operational budgets for PAs are too low, and in some cases PA managers pursue commercial opportunities to fund PA costs, but at the expense of biodiversity values. Revenue generated is often not available to the PA, with tourist money accumulating to people outside the park.
- Numbers of staff available and qualified to work in the field on protected area management are rather low. Some protected areas have no dedicated staff at all, but are managed from a regional office.
- Many staff in all three countries lack the capacity to perform their required functions, and training and capacity building has often been one-off, and not institutionalised. Opportunities are increasing, however, with online and dedicated university courses for conservation managers.

4.2 Landscape conservation and green development

Landscape-scale conservation and mainstreaming biodiversity into green development are essential to address the pressure from rapid economic growth. Well-managed protected areas are vital components of biodiversity conservation but they are not sufficient to meet the ecological needs of all species, especially wide-ranging and migratory species such as those found in large areas of East Asia. These wide-ranging species and large-scale ecosystems require landscape approaches that include but do not rely on protected areas. This requires a supportive policy context. The Governments of both China and Mongolia have already signalled a shift towards 'green' development and more attention to biodiversity conservation. China is now following a policy of green development, meaning protecting the environment and pursuing environmentally friendly economic growth. For the first time, this creates an incentive for agency leaders to consider environmental issues. Practical guidance, policies and measurements are needed, however, as many activities are labelled 'green' when they have little benefit for biodiversity.

Key lessons and promising approaches on landscape conservation are listed below.

- The quality of environmental planning – environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) – needs to be improved. Technical and procedural weaknesses are limiting the effectiveness of these key tools, and science is not used effectively. As a result, decisions made on projects are rarely overturned. Conservation projects tend to be exempt from assessment, even though some (such as captive breeding and habitat intervention) may have significant impacts on the ecosystem.
- The Chinese approach of 'red lining' (defining no-go areas for development within spatial plans) is a unique and important approach that could be improved with better science, improved data and more rigorous monitoring. Mongolia's science-based landscape-level mitigation policy is also an important opportunity for engagement.
- The environment is becoming an increasingly important political issue, and where there is political support, CSOs, NGOs and academic bodies can play an important role in facilitating lesson learning, technical support and public engagement, and are able to contribute directly to EIA processes or to be independent observers or monitors for development project implementation.

^

Herder, Mongolia. Protected areas in China and Mongolia have often failed to accommodate traditional use by local herders and farmers. In some cases, this has led to displacement of people, illegal exploitation or local opposition to the PA.

- The growth of environmentally conscious consumerism may support the growth of more sustainable land-use practices. The Global Protected Area Friendly System[252], demonstrated by the Protected Area Friendly Company of Beijing in several parts of China, appears to be a successful demonstration of branding production around nature reserves, using greener eco-friendly methods and charging a premium for these products.
- Payments for ecosystem services (PES) are being used experimentally in the region. The Pastures, Conservation and Climate Action programme, Mongolia[253] is a promising PES approach that could be a model for landscapes elsewhere. It emphasises local knowledge and ownership, and has achieved progressive reductions in livestock numbers and community-led conservation of key species and habitats.
- The involvement of local government in planning biodiversity protection is essential to develop ownership and support. There is some participation already, but it should be established as standard practice. When protected area managers and regional protected area administrations are included in routine development planning, biodiversity management in the landscape gets fuller consideration in land-use decision-making and action.
- Moves in China, Russia and Mongolia to recognise and work through community-level groups for forest and grazing, hunting and wetland management presents opportunities for biodiversity conservation. Recognition of land tenure rights and the granting of a mandate to manage are important to give the community confidence that they will continue to have access and influence over resource management and planning in the long term, with co-management (sharing of responsibility and benefits between protected areas and community) possible under certain circumstances.
- Many of the important biodiversity landscapes in the region straddle international borders, and rivers flow across many of the international borders in the region. Transboundary initiatives may be able to take advantage of political support, but are often complex.
- Despite positive changes in policy, individual sectors are not accountable for their biodiversity impacts, and have no incentives to work together. This constrains the development of landscape approaches and green economic activities. Guidance is available on how to mainstream biodiversity conservation and ecosystem services into China's green development from the China Council for International Cooperation and Development (CCICED)[254].

(252) Sketch of the Global Protected Area Friendly System: http://www.baohudi.org/?p=3074
(253) http://www.planvivo.org/project-network/pastures-conservation-climate-action-mongolia/
(254) The following research has been commissioned under CCICED for 2016: Green Transition Strategy Outlook (2015-2030); South-South Cooperation on Ecological Civilization; Rule of Law and Ecological Civilization; Environmental Protection Strategy for the 'One Belt One Road' Initiative.

^

Giant panda, Xiongmao Jidi breeding and research centre, China. The wild population of the panda has increased to nearly 2 000 after habitat protection and a ban on hunting. Captive breeding was initially a drain on the wild population, but some captive-bred pandas have now been released into the wild.

^

The swim bladder of the totoaba fish, endemic to the Gulf of California, Mexico, is in demand for traditional Chinese medicine. Totoaba fishers use gill nets, which catch non-target species, including the world's smallest dolphin, the vaquita. Both totoaba and vaquita are seriously threatened as a result.

4.3 Species-focused interventions and habitat conservation

Species-focused interventions are valuable in specific circumstances, but habitat conservation is normally a higher priority. Conservation action plans for single species and for whole groups (e.g. birds, reptiles, mammals, plants) have been developed. The consultation on such planning is as important as the product itself, and has resulted in proposals for new protected areas, revised hunting regulations, improved national protected species lists and other species-specific actions. Species-specific conservation plans are most useful when the target species is an umbrella or keystone species. Conservation of tigers in the Russian Far East has resulted in the creation of multiple protected areas in the Sikhote-Alin Mountains, as well as improvements to community and privately-owned hunting 'leases' in multiple use areas. Planning for tigers in north-east China is now having a similar impact across the Changbaishan Mountains. However, species-focused approaches should generally be considered in conjunction with effective protection of habitats and control of hunting and over-harvesting.

Key lessons and promising approaches related to species-focused interventions are as follows.

- Ex situ interventions (e.g. captive breeding) are often expensive, distract attention from the real threats to the species and can be a drain on wild populations. For example, millions of juvenile Chinese sturgeon were released into the Yangtze river to increase numbers, but the contribution to wild stocks is considered to have been negligible, and the population has continued to decline because the root causes, pollution and barriers to movement upstream to spawning sites[255], have not been addressed. The current practice of captive breeding of red-crowned cranes at their wintering sites in Jiangsu does nothing to address population threats, and may even add to them by putting pressure on the wild population. Until 2000, the captive giant panda population was also a drain on the wild population. However it is now contributing to conservation in the wild by reducing the demand for wild pandas, and there have been releases of captive bred individuals into the wild.
- Conversely, in situ species-focused approaches such as providing food for wild animals can change their movement patterns and expose them to disease or deprive them of important resources elsewhere in their range.

4.4 Illegal wildlife trade

Illegal wildlife trade is among the most serious threats to biodiversity in the region. Many species across these countries are already at low density but are hunted opportunistically for trade. Despite huge seizures of wildlife parts and products across the region, poaching and trade continues. China is a huge market for wildlife products from elsewhere in Asia and further afield. Policy signals from government suggest a willingness to take action against wildlife crime, including closing its domestic ivory market by the end of 2017. It will also address a loophole that allows smuggled ivory to be passed off as legitimate domestic trade. Since action against domestic ivory retailers started in March 2017[256,257], seizures have increased. China's commitment of funds and time to enforcement is significant compared to many other countries, but it is still inadequate given the scale of the problem.

Key lessons and promising approaches related to the illegal wildlife trade are listed below.

- Enforcement can be effective. Measures against the shahtoosh trade[258] demonstrate the value of addressing trade through several points in the trade chain: the demand in India, Japan and the West, the livelihoods of those in Kashmir who process illegally exported pelts[259], and poaching in China[260]. This had positive impacts on the Tibetan antelope population.
- Ultimately, demand reduction is essential to stem the illegal trade. A number of social marketing campaigns have tackled specific issues, such as shark fin consumption, with success.
- Sport hunting of large mammals is proposed as a contribution to conservation, but this only works under certain circumstances, including where revenues are used for conservation in the areas and communities where the hunting occurs. Careful consideration of the relative values of hunting versus tourism is needed, as neither approach is relevant for all situations.
- Farming wild species to supply the market poses a number of problems. Some species are difficult to breed in captivity, and 'farming' them is dependent on the capture and processing of animals from the wild. Such farms do not reduce pressure on wild populations. In some cases, the cultivation of wild species can increase the demand, resulting in continued pressure on the target species. Trade in farmed products may allow laundering of illegally caught wild products, which undermines consumer campaigns. Enforcement of bans and regulation of wildlife farms is generally weak, resulting, for example, in tiger farms continuing to sell body parts illegally, and illegal bear farms

(255) There is thought to be only one suitable spawning site below the Three Gorges Dam.

(256) The USA has made similar commitments, enacting a partial ban in July 2016.
(257) http://www.ifaw.org/international/news/ifaw-china-shuts-down-one-third-ivory-factories-and-shops
(258) Shahtoosh is a highly valued wool produced from the hair of the Tibetan antelope. Schaller G.B. (2000). Wildlife of the Tibetan Steppe. University of Chicago Press. 373 pp.
(259) Gopinath, R., R. Ahmed, A. Kumar and A. Mookerjee (2003) Beyond the ban: A census of Shatoosh workers in Jammu and Kashmir. Available at: https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/beyond-the-ban.pdf, downloaded 22 February 2018
(260) https://wildlifedetective.wordpress.com/2013/03/03/illegal-international-wildlife-trade-as-it-affects-the-uk/

Tour operators in Mongolia offer fishing for taimen, the largest of the salmon family. As fish populations have declined, some operators have managed and protected specific river basins, including through release of young fish. However, the success of these efforts is unknown due to lack of monitoring data.

Tiger at a scent-marking tree, Lazovsky strictly protected forest, Russian Far East. Tigers require large areas of habitat to find enough prey. Conservation authorities and NGOs are working with hunting lease owners and villagers to protect habitat and reduce illegal hunting and human-tiger conflict.

continuing to operate.

- Human-wildlife conflict is widespread and used to justify the hunting of threatened species. Payment of compensation for damage to crops, livestock or property has been a common approach to dealing with the problem. However, such payments are expensive and may discourage the use of other methods to reduce damage. The EU's China Biodiversity Programme developed an alternative way of spending bear damage compensation funds, using them to strengthen physical defences for houses and livestock

4.5 Accessible data for improved decision-making

Reliable and consistent data on status, trends and threats to biodiversity is a prerequisite for good planning and decision-making. It ensures that the public is well informed and able to participate effectively in conservation debates. At present, there is little evaluation of what works and what does not in conservation. Access to up-to-date and accurate data on biodiversity and protected areas is limited. Up-to-date data on taxonomy and species distributions is difficult to access. Maps in particular are often subject to restrictions, hindering analyses and conservation planning. Key lessons and promising approaches are given below.

- Different government agencies, special interest groups, academic researchers and NGOs hold data that could be shared through improved coordination and networking[261]. The private sector (especially in mining, energy and agriculture) often has important data as a result of EIA studies. An example of a useful initiative to make biodiversity information more accessible is the Mongolian Conservation Portfolio, assembled by the Mongolian Government and TNC[262], which has been used to inform planning and development decisions.
- Monitoring the environmental impacts of large infrastructure and economic development projects tends to focus on immediate impacts on biodiversity. Quantifying the economic impacts of the erosion of natural capital is, however, more likely to be useful for government decision-makers.
- Local people who live in or near wild habitats throughout the year have an enormous amount of informal knowledge. Partnerships and the sharing of customary and 'formal' knowledge appear to be a necessary foundation for success in local conservation initiatives.
- There is a small but growing movement for citizen science. This includes the work of the China Coastal Waterbird Census Group[263] and the China Nature Watch publication of the Shan Shui Conservation Centre, the China[264] Birdwatching Association and the Peking University Centre for Nature and Society.

([261]) For example, the South Korean Polar Research Institute had a research programme on glaciers in the Altai, in partnership with the National University of Mongolia, without the knowledge of the National Agency for Meteorology, Hydrology and Environment Monitoring (NAMHEM).

([262]) Via the website www.eic.mn, for example (website not in English).

([263]) Qingchuan B., J. Chen, Z. Chen, G. Dong, J. Dong, W. Dong, V. Wing Kan Fu, Y. Han, G. Lu, J. Li, Y. Liu, Z. Lin, D. Meng, J. Martinez, G. Ni, K. Shan, R. Sun, S. Tian, F. Wang, Z. Xu, Y. Yu, J. Yang, Z. Yang, L. Zhang, M. Zhang and X. Zeng (2015). Identification of coastal wetlands of international importance for waterbirds: a review of China Coastal Waterbird Surveys 2005-2013. Avian Research 6:12. See http://avianres.biomedcentral.com/articles/10.1186/s40657-015-0021-2

([264]) Lü Z., L. Gu, C. Wen, H. Wang and J. Zhong (2015). China Nature Watch 2014: an independent report on China's biodiversity conservation status. Biodiversity Science 23(5), pp. 570-574. DOI: 10.17520/biods.2015116

5

Strategic approaches

Giant panda, Bifengxia Nature Reserve, China. The giant panda has been the subject of a major conservation effort by the Chinese Government and international organisations. Protection and restoration of panda habitat in a network of reserves has benefitted a wide range of other species.

5 _ Strategic approaches

5.1 Priority geographies

Biodiversity and ecosystems are not distributed evenly across East Asia, and the selection of priority areas allows a focus on the most important areas. Section 1.2.4 describes the existing global analyses of the distribution of biodiversity, as they affect this region. In this section, these analyses are combined to define broad areas of particular interest for biodiversity conservation, 'priority regions for conservation'. However, these priority regions for conservation are very large. To further guide geographic prioritisation of conservation efforts, existing, published, landscape-level analyses were used to identify more focused areas, which are referred to as key landscapes for conservation (KLCs) (Figure 5.1).

KLCs should be considered as priorities for the funding of conservation-related actions. Potentially damaging projects (particularly infrastructure and large-scale land-use change) in areas identified as KLCs should be subject to specific scrutiny for biodiversity impacts.

The extensive deserts, grasslands and mountains of the north and west of the region pose special challenges for conservation. These include working for the conservation of wide-ranging species such as snow leopard over huge, inaccessible areas, and accommodating the needs of nomadic herder communities.

5.1.1 Defining KLCs in East Asia

No single analysis covers the whole East Asia region at landscape level, and so different analyses have been used to identify priorities for China, Mongolia and the Russian Far East. In **China**, the NBSAP (2010) refers to 33 priority terrestrial and freshwater areas for conservation (and 3 marine areas, not discussed further here). These are divided into 8 ecoregions, identified on the basis of representativeness, endemism and special ecological functions of various ecosystem types, as well as the richness, level of rarity and endangerment, threats, regional representativeness, economic and scientific values of species, and data availability on species distribution. The NBSAP analysis draws on work coordinated by The Nature Conservancy in a Conservation Blueprint for China. It is adopted directly without any changes to define the KLCs for China. In **Mongolia**, the best available landscape-level analysis defines priorities on the basis of 71 existing national protected areas (strictly protected areas, national parks, nature reserves, national monuments) and 34 additional areas, almost all of them extending or connecting existing PAs. These areas were consolidated and simplified to define KLCs. They are grouped into the four main eco-regions recognised in Mongolia. In the **Russian Far East** province of Primorsky Krai, the single, large KLC is based on the tiger conservation landscape in the region. Table 5.1 summarises the data sources and protocols for identifying KLCs.

It is important to recognise that the definition of KLCs is only as good as the available data. There will be important areas that are not included. In addition, large-scale maps do not effectively capture linear ecosystems (e.g. rivers, mangroves) or fragmented ecosystems (e.g. karst).

5.1.2 KLCs in East Asia

In China, the initial analysis by TNC identifies 40 priority terrestrial and freshwater areas for conservation, refined to 33 in the China NBSAP. The KLCs total 2.8 million km^2 in area, over 25 % of the land surface of the country. The KLCs are divided among 8 ecoregions, following the China NBSAP (Figure 5.1, Table 5.2). In Mongolia, 34 KLCs are identified covering 368 475 km^2. They are grouped according to the four main ecoregions present in Mongolia (Figure 5.1, Table 5.2).

The Russian Far East KLC is defined on the basis of a large tiger conservation landscape. It encompasses the ecosystems of conservation importance in the region, and totals 242 564 km^2 in area (Figure 5.1, Table 5.2).

Table 5.1 Data sources for KLC identification in East Asia

Country	Data source for KLCs
China	China National Biodiversity Conservation Strategy and Action Plan, 2011-2030[i], based on TNC, Conservation Blueprint for China[ii]. The names used for KLCs and ecoregions in China follow those used by the China NBSAP (2010), English version, section IV and section IV(A)1-8.
Mongolia	34 KLCs were defined in Mongolia by consolidating the results of the WWF (2010) publication *Filling the Gaps to protect the Biodiversity of Mongolia*[iii]. To consolidate the many small sites identified by WWF (2010) into larger landscape-scale units, gaps were filled and fragments deleted using the following protocol: non-priority areas less than 1 500 km² and surrounded by priority areas were combined with the surrounding priority areas, to form one KLC. Conversely, priority areas that are not connected to any other priority area and were less than 1 500 km² were deleted. The resulting KLCs were named with reference to the map of 'protected areas' (Chapter 2 in WWF, 2010), and 'proposed new protected areas' (2 maps in Chapter 6, in WWF, 2010). Two KLCs that were un-named on these maps were identified as Ramsar sites, with reference to the Ramsar list[iv], and the official names used for these were adopted for the KLC.
Russian Far East	Russian portion of the tiger conservation landscape for Russian Far East - China, with important landscapes within this area defined by Darman (2003)[v].

Sources:

(i) available at https://www.cbd.int/doc/world/cn/cn-nbsap-v2-en.pdf;

(ii) http://www.nature.org/ourinitiatives/regions/asiaandthepacific/china/explore/making-big-plans.xml;

(iii) WWF Mongolia Program office (2010). Filling the Gaps to Protect the Biodiversity of Mongolia. ISBN: 978-99962-0-226-1. Available at: http://mongolia.panda.org/?200853/Filling-the-GAPS-to-Protect-the-Biodiversity-of-Mongolia;

(iv) http://www.ramsar.org/document/the-list-of-wetlands-of-international-importance-the-ramsar-list;

(v) Darman Y. and M. Williams (2003). Conservation Action Plan for the Russian Far East Ecoregion complex. WWF.'

Figure 5.1 Priority regions for conservation and key landscapes for conservation in East Asia

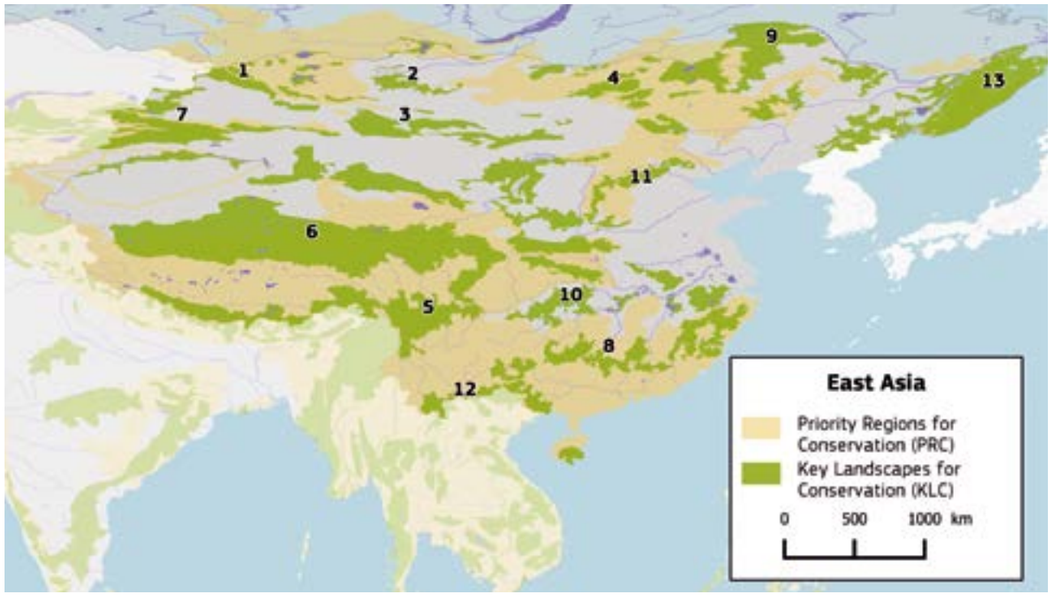


Table 5.2 List of KLCs in East Asia

Map #	KLC group	KLC name	Country	Area (km²)	Special significance
1	Altai-Sayan	Altai Tavan Bogd	MN	6 589	Global centre of temperate plant diversity; important populations of saiga antelope, snow leopard, argali sheep, reindeer; important wetlands. Transboundary with China and Russia.
		Khar Us Lake	MN	8 530	
		Khovsgol Lake	MN	8 446	
		Khyargas Lake	MN	3 412	
		Munkhkhairkhan	MN	4 934	
		Sharga	MN	3 136	
		Siilkhem A	MN	699	
		Turgen	MN	1 204	
		Ulaantaiga	MN	4 812	
		Uvs Lake	MN	4 421	
		Unnamed proposed new PA (3 KLCs)	MN	no data	
2	Hangay	Khan Khokhii	MN	2 215	Diverse conifer forest and steppe species communities, red deer, wild boar, musk deer, brown bear, argali sheep, Siberian marmot.
		Tarvagatai-Khangain	MN	5 476	
		Unnamed proposed new PA	MN	no data	
3	Central Asian Gobi Desert	Small Gobi A	MN	11 490	Key habitat for Central Asian migratory or nomadic species such as Asiatic wild ass, goitered gazelle, wild Bactrian camel, Gobi bear, Przewalski's horse, snow leopard, argali sheep. Transboundary with China.
		Small Gobi B	MN	6 812	
		Great Gobi A	MN	46 330	
		Great Gobi B	MN	9 251	
		Ikh Bogd Uul	MN	2 621	
		Suikhent uul	MN	48	
		Zagiin Us	MN	2 735	

Table 5.2 (continued)

Map #	KLC group	KLC name	Country	Area (km²)	Special significance
4	Daurian Steppe	Mongol Daguur A	MN	902	Temperate grasslands, mixed forest, endangered birds (saker falcon, great bustard) and mammals such as Mongolian gazelle, Mongolian marmot, grey wolf, brown bear, Eastern moose. Important wetlands hold white-naped crane, red-crowned crane, Siberian crane, relict gull. Transboundary with China and Russia.
		Mongol Daguur B	MN	152	
		Dariganga	MN	330	
		Dornod Mongol	MN	5 885	
		Khan Khentii	MN	12 301	
		Buir Lake and wetlands Ramsar site	MN	1 040	
		Lakes in the Khurkh-Khuiten river valley Ramsar site	MN	429	
		Nomrog	MN	3 208	
		Onon Balj A	MN	2 919	
		Onon Balj B	MN	1 063	
		Toson Khulstal	MN	4 585	
		Yakhi Lake	MN	2 512	
		Unnamed proposed new PA (2 KLCs)	MN	no data	
5	Alpine Canyon Region of South-west China	Northern Minshan Mountain and Hengduan Mountain	CN	61 792	Alpine and canyon ecosystems in Minshan and Hengduan mountains, giant panda, golden monkey, rare and endemic plants.
		Southern Hengduan Mountain	CN	no data	
6	Alpine Region of Qinghai-Tibetan Plateau	Sanjiangyuan-Kekexili-Changtang Area	CN	716 174	Parts of the Himalayas as well as the world's largest and highest plateau, source of several major Asian rivers. Tibetan antelope, wild yak, Przewalski's gazelle, alpine musk deer, Tibetan wild ass, Himalayan musk deer, black-necked crane, snow leopard.
		South-east of Himalaya Mountain	CN	34 685	
7	Desert Region of Inner Mongolia-Xinjiang Plateau	Altay Mountains Areas	CN	49 707	Transboundary with the Altai-sayan region in Mongolia. Bactrian camel, snow leopard, argali, relict gull, rare and endemic freshwater fish.
		Kumtag Area	CN	no data	
		Qilian Mountain Area	CN	130 989	
		South-western section of Tien Shan-Jungar Basin	CN	175 607	
		Tarim River Basin Area	CN	40 439	
		Western Erdos-Helan Mountains-Yinshan Mountains	CN	32 706	
		Xilingguole Pasture Area	CN	no data	

Table 5.2 (continued)

Map #	KLC group	KLC name	Country	Area (km²)	Special significance
8	Hilly Plain Region of East and Central China	Dabieshan Mountains	CN	34 261	Broad leaved evergreen forests, Chinese alligator, Chinese sturgeon, river dolphin, Siberian crane.
		Dongting Lake	CN	no data	
		Huangshan-Huaiyushan Mountain Area	CN	59 747	
		Nanling Mountains	CN	97 758	
		Poyang Lake	CN	10 175	
		Wuyishan	CN	81 542	
9	Hilly Plain Region of North-east China	Changbaishan Mountain Area	CN	186 900	Amur Tiger, Amur Leopard, wetlands, threatened freshwater fish.
		Daxing'anling Mountain	CN	291 538	
		Hulunbeir	CN	40 646	
		Songnen Plain	CN	38 228	
		Three rivers plain	CN	27 684	
		Xiaoxing'anling Mountain Area	CN	59 282	
10	Hilly Regions of Central, South and West China	Daba Mountain Area	CN	(with Qinling)	12 000 of the 31 000 vascular plant species that occur in China, 3 500 of them endemic to China; karst species and ecosystems, giant panda, crested ibis, black-necked crane, Sichuan dormouse, two species of snub-nosed monkey, giant salamander, endemic fish in Yangtze river.
		Limestone Area of West Guangxi and South Guizhou	CN	23 000	
		Qinling Mountain	CN	179 816	
		Wuling Mountain	CN	186 053	
11	Loess Plateau Region and North China Plain	Liupan Mountain and Ziwuling Mountain	CN	108 421	Wetlands, forest birds, North China leopard.
		Taihang Mountains	CN	46 843	
12	Lower Hilly Region of South China	Central and South Hainan Island Area,	CN	11 206	Tropical rainforest and tropical monsoon forest, mangrove. Forests on Hainan island: 4 200 plants, 630 endemic to the island; Hainan Eld's deer, Hainan gibbon, Hainan gymnure, Asian elephant.
		Mountain Area of Southwest Guangxi.	CN	no data	
		Xishuangbanna Area	CN	34 775	
13	Russian Far East	Amur and Ussuri river lowlands	RU	no data	Red-crowned crane, oriental white stork, scaly-sided merganser, Baer's pochard, mandarin duck, Blakiston's fish-owl, Amur tiger, far eastern leopard, Himalayan black bear, kaluga sturgeon, Chum, Pink Masu salmon species.
		Lake Khanka Lowlands	RU	no data	
		Sikhote-Alin Mountains and rivers	RU	no data	
		Southwest Primorsky Krai	RU	no data	

Figure 5.2 Priority regions for conservation, key landscapes for conservation and protected areas (IUCN categories I-IV for Mongolia, and nature reserves for China) in East Asia

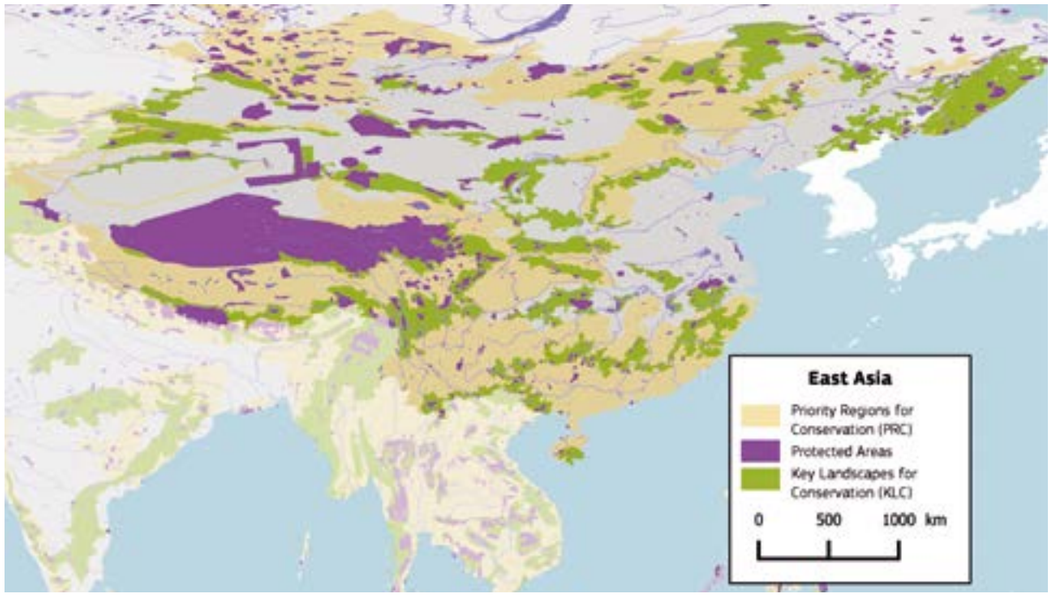


Table 5.3 Protected area coverage of KLCs in East Asia (IUCN categories I-IV)

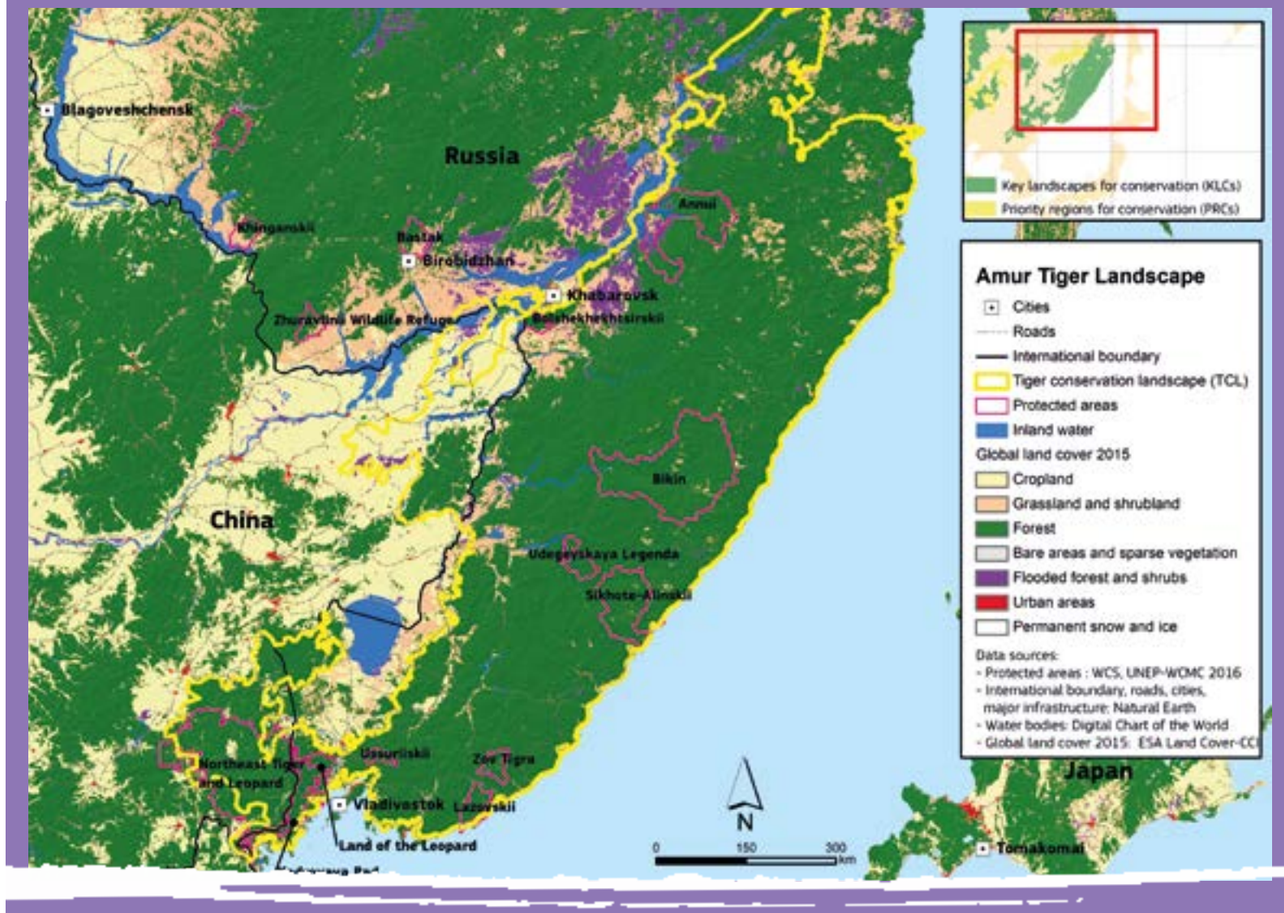
KLC group	Total area (km^2) of KLCs	Area of KLC covered by PA (km^2)[i]	% of KLC area in PA	No of PA in the KLC
Mongolia KLCs	368 475	198 305	54	38
China KLCs	2 828 619	2 604[i]	9[i]	11[i]
Russian Far East KLCs	242 564	26 149	10	28

(i) In the WDPA dataset, very few Chinese protected areas are classified in categories I to IV.
Source: For protected areas, IUCN and UNEP-WCMC (2016)[265].

When Chinese KLCs are overlaid with the distribution of protected areas in IUCN categories I to IV, only 9 % of the KLC area is within protected areas. This is a result of the classification of most Chinese PAs as category V and VI within the World Database on Protected Areas, or because a PA location is only given as a point, not a shape. This means that 9 % is not an accurate figure for PA coverage of important areas of biodiversity, but at the same time it reinforces the point that most Chinese PAs are in the 'landscape management' category, and may not be managed solely for biodiversity conservation.

In Mongolia, approximately 54 % of the KLC area is within protected areas, while just over 10 % of the KLC area identified in the Russian Far East is covered by protected areas (Figure 5.2, Tables 5.3, 5.4)

([265]) IUCN and UNEP-WCMC (2016). The World Database on Protected Areas (WDPA) (Online), September 2016. Cambridge, UK: UNEP-WCMC. Available at: www protectedplanet.net



Box 1 _ The Amur/Chaingbaishan tiger landscape of north-east Asia (KLC 13)

The forests of the Russian Far East and the adjacent transboundary areas in China support the Amur or Siberian tiger, which, together with the Bengal tiger, are the largest tiger sub-species. The majority of the population (perhaps 500 animals) is in Russia, but since about 2000, tigers have expanded into adjacent areas of north-east China, where the Chinese authorities have declared a new complex of protected areas. As a consequence of conservation efforts, this population is now relatively well protected and is expanding, and animals have been reported from other provinces in north-east China and close to DPR Korea. Historically, tigers would have inhabited much of the Korean Peninsula, north-east China and the Russian Far East. The tigers co-exist with the Amur leopard, a critically endangered sub-species of leopard of which fewer than 90 individuals remain.

Threats: poaching of tigers, leopards and their prey species; legal and illegal exploitation of timber concessions; land-use changes; new infrastructure and large-scale development projects opening up areas to hunters/poachers.

Priority interventions: combating poaching and illegal wildlife trade; expansion of protected area networks to conserve core populations; development of corridors to maintain connectivity between protected areas; control of logging and the activities of concessionaires; improving law enforcement and protected area management, and actions to mitigate the impact of human-wildlife conflict.

Table 5.4 Examples of important protected areas in the KLC groups identified in East Asia

Map #	KLC group	Important protected areas
1	Altai-Sayan	Sharga, Uvs Lake, Khar Us Lake
2	Hangay	
3	Central Asian Gobi Desert	Small Gobi A and B, Great Gobi A and B, Zagiin Us
4	Daurian Steppe	Mongol Daguur A and B, Dornod Mongol, Dariganga, Nomrog, Toson Khulstai, Onon Balj A and B
5	Alpine Canyon Region of Southwest China	Changtang National Protected Area, Sanjiangyuan National Park
6	Alpine Region of Qinghai-Tibetan Plateau	
7	Desert Region of Inner Mongolia-Xinjiang Plateau	Qilianshan National Park
8	Hilly Plain Region of East and Central China	Chinese Alligator National Protected Area
9	Hilly Plain Region of North-east China	Amur Tiger and Amur Leopard National Park
10	Hilly Regions of Central, South and West China	Giant Panda National Park
11	Loess Plateau Region and North China Plain	Xiaowutaishan National Protected Area
12	Lower Hilly Region of South China	
13	Russian Far East	Land of the Leopard National Park, Lazovskii Reserve, Sikhote-Alin Reserve, Ussuriskii Reserve, Bikin National Park, Bastak Reserve, Khinganskii Reserve, Khanka Reserve

East Asia (like Central Asia) is characterised by ecosystems that exist on a very large scale. Key species are often at a low density, and may rely on regular movement for their survival. As a result, transboundary considerations are especially important for the conservation of these areas. An example is the Ussuri and Amur rivers, which form the majority of the boundary between China and Russia. The biodiversity of both the freshwater ecosystems and the surrounding temperate forests, including the Changbaishan region, require transboundary cooperation over law enforcement against hunting, joint planning of land-use change and maintenance of corridors to allow wildlife movements. Similar considerations apply to the Altai Mountains, the Himalayas, Nomrog, the Xilingol Grasslands and the Central Asian Mountains (and the Pamirs). In southern China, the transboundary areas between Vietnam and Guangxi and Yunnan Provinces hold the Sino-Vietnam Karst corridor (described in the Greater Mekong chapter).

5.2 Strategic approaches to addressing the main pressures on biodiversity and ecosystems

5.2.1 Improve management and law enforcement in protected areas

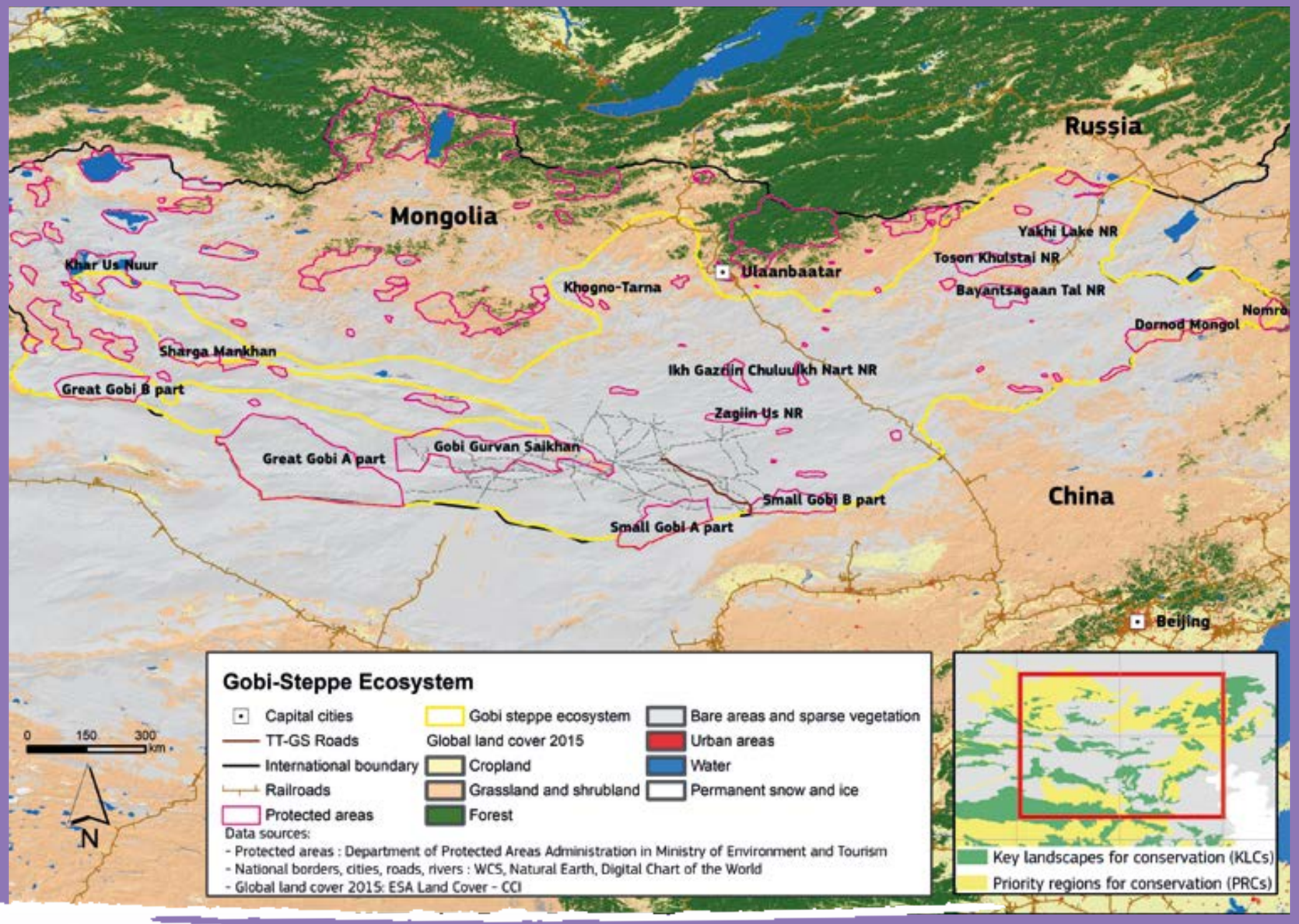
Protected areas have been developed for many years in China and Mongolia. They are key to the protection of biodiversity, given the current trajectory of economic development. Recent government policies and declarations suggest that further investment in protected areas can be expected, including in the context of meeting the UN's Sustainable Development Goals (SDGs). It will be critical, however, to improve the governance and legal status of protected areas, as well as the use (planning and implementation) of resources.

Less than 6 000 scaly-sided mergansers remain in north-east China and the Russian Far East, the result of habitat loss, pollution and disturbance. Landscape-scale changes including improved logging practices, sustainable fisheries and control of water pollution are needed to allow the population to recover.

In China, somewhat different approaches are relevant depending on the area. In general, the western and northern third of the country (Inner Mongolia, Gansu, Qinghai, Xinjiang, Tibet) has extensive areas of natural habitat and very large protected areas. There are opportunities for both improved protection and sustainable use. In the south and east of the country, rapid economic and industrial development has resulted in the degradation or disappearance of most natural habitats. Conservation interventions are needed urgently to protect what is left and to restore habitats and ecosystem functions where possible.

Key strategies are listed below.

- Support the enhancement of PA governance in China, through the sharing of technical expertise in PA system development and institution building. This should assist China in addressing the need for a stronger PA law that covers all PAs (including national parks). Existing laws and regulations that address PA management in different ecosystems should be updated. It also includes the strengthening of institutions, for example the establishment of a high-level agency or committee to oversee PA planning, operation, monitoring and evaluation, and coordination with other systems in China to leverage resources for PAs. The current focus on national park development by the Chinese Government offers an opportunity to engage in supporting effective funding arrangements, stakeholder engagement and PA operation.
- Support strategic and management planning for target PAs in China. This should include the definition of management objectives that are aligned with the legal status of the PA, and management systems to deliver objectives, including the appropriate management of tourism pressure.
- Pilot the management of PAs in collaboration with NGOs in China. Once there is sufficient institutional capacity to manage these relationships, NGOs should be involved in the management of nature reserves and other protected areas.
- Put in place capacity development programmes and career structures for PA staff linked to competency standards in all three countries. Encourage NGO involvement in collaborative management of PAs as a way of demonstrating management skills and improving effectiveness.
- Reduce donor dependence and increase sustainable financing for biodiversity conservation, including protected areas, in all three countries. Incentivise local governments to support biodiversity mainstreaming and PA management by building 'green' criteria into decisions on the allocation of funding from the national level.
- Reform the management of revenue accruing to PAs from tourism and other sources in China. This should strengthen the link between income and management quality. In Mongolia and Russia, continue to promote appropriately scaled tourism ventures.
- Carry out a systematic analysis of the ecological representativeness of the protected area system in China. Ensure coverage of coastal, freshwater and marine environments, as well as other species and ecosystems.



Box 2 _ The Gobi Desert-Daurian Steppe Ecosystem (KLCs 1, 3 and 4)

The Gobi Desert-Daurian Steppe in Mongolia is one of the largest and most ecologically intact temperate grassland and semi-desert ecosystems in the world, spanning nearly 2 000 km from the Daurian Steppe of China, Russia and Mongolia to the uninhabited wilderness of the Great Gobi and Dzungarian Gobi deserts.

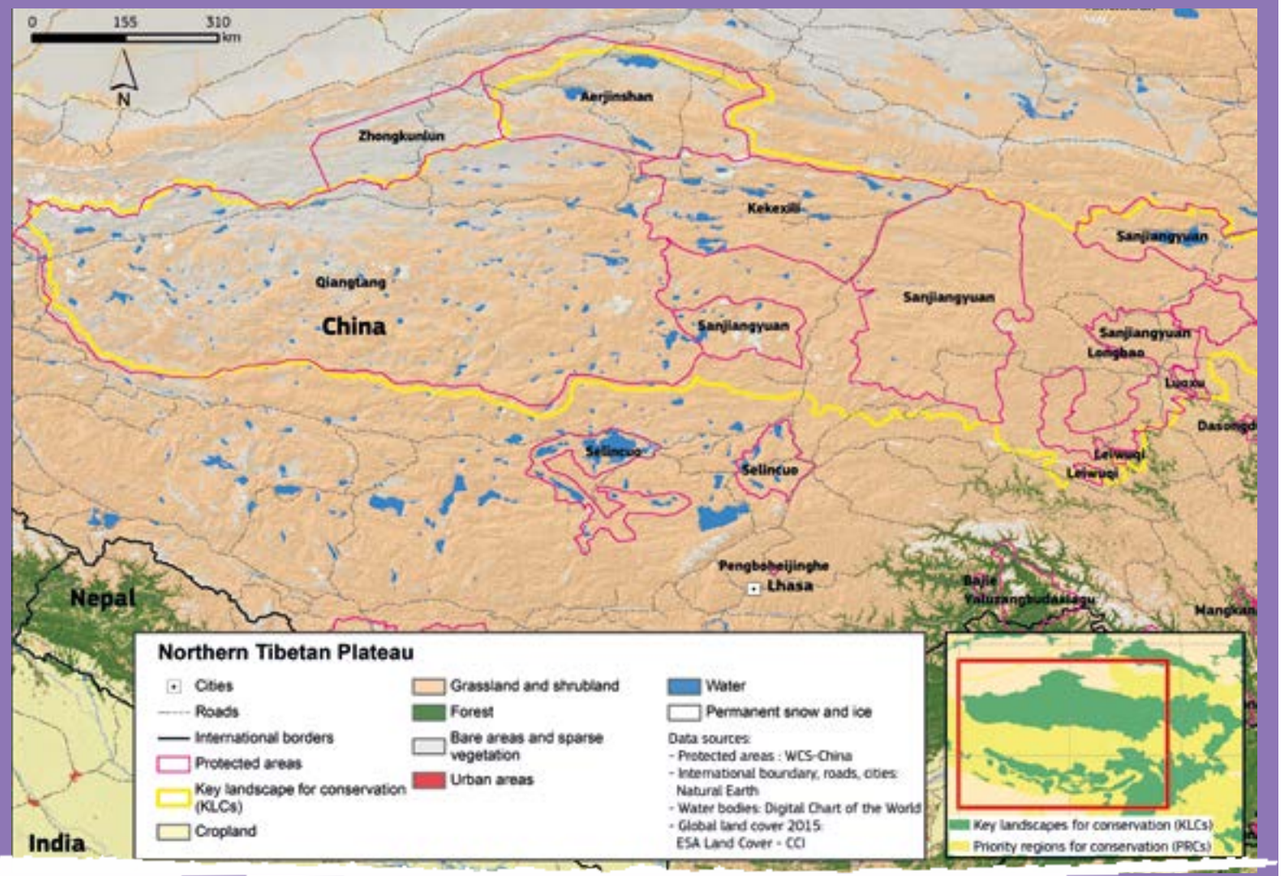
The ecosystem is of international importance for its populations of migratory wild ungulates, which include huge herds of Mongolian gazelle and khulan (wild ass), together with the world's largest population of black-tailed gazelle and, in the most remote areas, the critically endangered wild Bactrian camel. Przewalski's horse is being successfully reintroduced in the Dzungarian Gobi and Hustai Nuruu. The region is traversed by at least 3 migratory bird flyways and is the breeding ground for more than 20 globally threatened species of bird, including a quarter of the global population of white-naped cranes.

For thousands of years, nomadic herding communities have used the region. Their tradition of moving livestock to find the richest pastures allowed grassland to rejuvenate.

Nowadays, the region is facing challenges including climate change, water extraction, mining and intensive agriculture. Climatic conditions are changing, with rising average temperatures and intense dry and wet seasons occurring more frequently. Increasing water use in Russia, China and Mongolia, and for mining and infrastructure, exacerbate the impacts of climate change. Linear infrastructure such as roads and railroads are fragmenting grasslands, obstructing migration routes and allowing access to previously remote regions. The transmission of disease between wildlife and domestic livestock is an increasing problem. Large-scale agricultural initiatives are driving habitat loss, and a tripling of domestic livestock populations has degraded grasslands. Unsustainable hunting and collecting of plants for illicit trade are also driving species decline. As a consequence, the sustainability and productivity of the ecosystem are declining significantly.

Protected areas are important but cannot support highly mobile species over their entire lifecycle, especially where they cross international boundaries. The Dauria International Protected Area (DIPA) helps to address this through the coordinated management of three nature reserves in Russia, Mongolia and China. However, maintenance of good quality habitat outside protected areas is essential for the successful conservation of large mammals.

Priority conservation interventions include: recognising ecosystem values in economic and development project planning; requiring large projects to mitigate their impacts; ensuring that water and grassland are managed to benefit local communities and wildlife; expanding protected areas to cover the ranges of threatened species; enhancing law enforcement; developing improved, sustainable value chains for livestock products (e.g. wildlife certification programmes); tackling disease in wildlife and domestic livestock; and mitigating the impacts of linear infrastructure.



Box 3 _ Northern Tibet-Qinghai plateau and the Himalaya range (KLC 6)

Stretching over 3 000 km from east to west, and including the Himalaya range in the south, the Great Changtang region supports the most diverse upland ecosystems found in the world, on the highest plateau on Earth. Alpine steppe, alpine grassland and alpine desert are dominant, supporting a unique community of wildlife that is highly adapted to the extreme environment. Approximately 3 million people live on and around the plateau and benefit from the ecosystem services provided by the Great Changtang region.

In the north of the region, the Changtang National Nature Reserve (290 000 km²) is the world's second-largest terrestrial protected area, and is one of the last great intact wildernesses, with minimal human disturbance. In the south, the Qomolangma (Mount Everest) National Nature Reserve (33 810 km²) is home to 53 mammalian species, 206 bird species and 2 348 vascular plant species. In the east, the Sanjiangyuan National Nature Reserve (150 000 km²) protects the headwaters of several major rivers, including the Mekong (Lancang in China), Yangtze and Yellow Rivers.

Since the 1990s there have been some conservation success stories in the region, including improving the management of commercial hunting. However, conservation authorities remain poorly resourced with limited capacity, and are facing new threats from climate change, infrastructure expansion and accelerating land-use change. Four new national parks are being planned by the Tibetan Autonomous Region of China, but require technical support for their design and establishment. The distribution, quality and quantity of critical ecological resources are being markedly affected by climate change, which is happening faster in Tibet than most other places on Earth. Human-wildlife competition for resources is increasing, in particular between migratory wildlife, farmers and herders. There are significant risks of the spread of disease between domestic livestock and wildlife, sometimes with catastrophic effects (e.g. herd die-offs).

Priority interventions include: developing the capacity of local communities to engage in conservation; establishing community-based protected areas, including those based upon government-NGO-community partnerships; supporting wildlife-friendly and sustainable livelihood innovations; mitigating wildlife-human conflict and disease risk; improving the management effectiveness of the existing protected areas; supporting government capacity building for national park management; developing scientific monitoring systems for biodiversity in the region.

5.2.2 Reduce the ecological footprint of economic development and further integrate the ecosystem values of natural landscapes and protected areas

Threats to biodiversity in East Asia stem from the rapid rate of economic growth, and especially from projects in specific sectors, particularly extractive industries. In many cases the planning and execution of these projects has not taken adequate consideration of the potential negative effects on the environment. Important policy moves by central governments have started to recognise these issues: laws and procedures have been strengthened, but the task of implementing improved environmental standards is challenging. In some cases, projects that are assumed to be environmentally positive (e.g. reforestation) are a source of damage.

The points detailed below are essentially medium and long-term aims, working to improve planning and the implementation of policy.

- Embed biodiversity conservation needs into all stages of corridor planning for economic development. Proactive approaches to be used to identify all the proposed economic development corridors and to carry out initial assessments of the importance of their biodiversity.
- Ensure that interventions with a biodiversity conservation objective are also subject to screening. Provide support mechanisms for civil society to input these processes, and ensure that conservation NGOs with the appropriate expertise are consulted.
- Support the integration of biodiversity considerations into funding instruments that focus on land use; for example, China's 'sloping land conservation' and 'returning grazing land to grassland' programmes.
- Strengthen the legal basis for integrating biodiversity conservation into the planning and budgeting of key development sectors; these can be addressed by EIA and SEA laws or further regulation.
- Address the problem of lack of independence and rigor in EIAs and SEAs. Ensure EIA and SEA processes involve biodiversity experts/advocates from an early stage. Strengthen the training for EIA practitioners on biodiversity.
- Improve the monitoring of economic development projects. Report on their impacts on the regulatory functions of ecosystems and natural capital. Involve communities and CSOs in monitoring the actual impacts and use the results for adaptive management.
- Follow up on national biodiversity strategies and action plans (NBSAP) with implementation schedules, budgets and mainstreaming into higher-level plans as necessary. Give legal force to the integration of NBSAPs into policy and planning

5.2.3 Encourage regional cooperation on transboundary and international biodiversity threats

Many of the most important and threatened ecosystems in East Asia have connectivity across international borders, in particular rivers and steppe grasslands. Maintaining their connectivity is critical for the continuation of ecosystem processes, including migration routes, and the survival of some biodiversity. Connectivity also means that environmental degradation and pollution in one country can rapidly become an international problem. Globally, China is an increasingly important player in resource extraction, trade and infrastructure development. Exploitation of mineral resources across Mongolia is increasing dramatically. The Chinese Government has made some moves to define the environmental and social responsibilities of Chinese companies working overseas.

Key strategies include the following.

- Improve protection of priority transboundary conservation areas. Promote the creation of new transboundary areas including, for example, the proposed Yellow Sea World Heritage Site.
- Increase collaboration on transboundary water management. Mitigate the cross-border impacts of dams and pollution.
- Put in place mechanisms to address obstacles to transboundary wildlife movements (e.g. border fences hampering mammal migration).
- Support China in establishing environmental standards to limit negative impacts of its global footprint (e.g. in the Belt and Road Initiative), in collaboration with partner countries. Work towards establishing environmental standards and chain of custody for products and materials imported into China.

5.2.4 Support strong, consistent action against the illegal wildlife trade

China is one of the largest and fastest growing markets for wildlife products from around the world. It is an important driver of the illegal and unsustainable killing and harvesting of wild species. The huge, and increasing, volume of trade and investment flows between China and the rest of the world has helped the rapid growth of wildlife trafficking to China. In addition, China's biodiversity is a source of wild products for home markets. There are many 'farms' for threatened wild species, which may be contributing to the problem rather than providing an alternative supply. This dual role as supplier and market puts China in a uniquely important position to counter the illegal and unsustainable aspects of the trade. In Mongolia and Russia, hunting and trade is more limited but is nevertheless an important issue for the fragile forest and steppe environments and

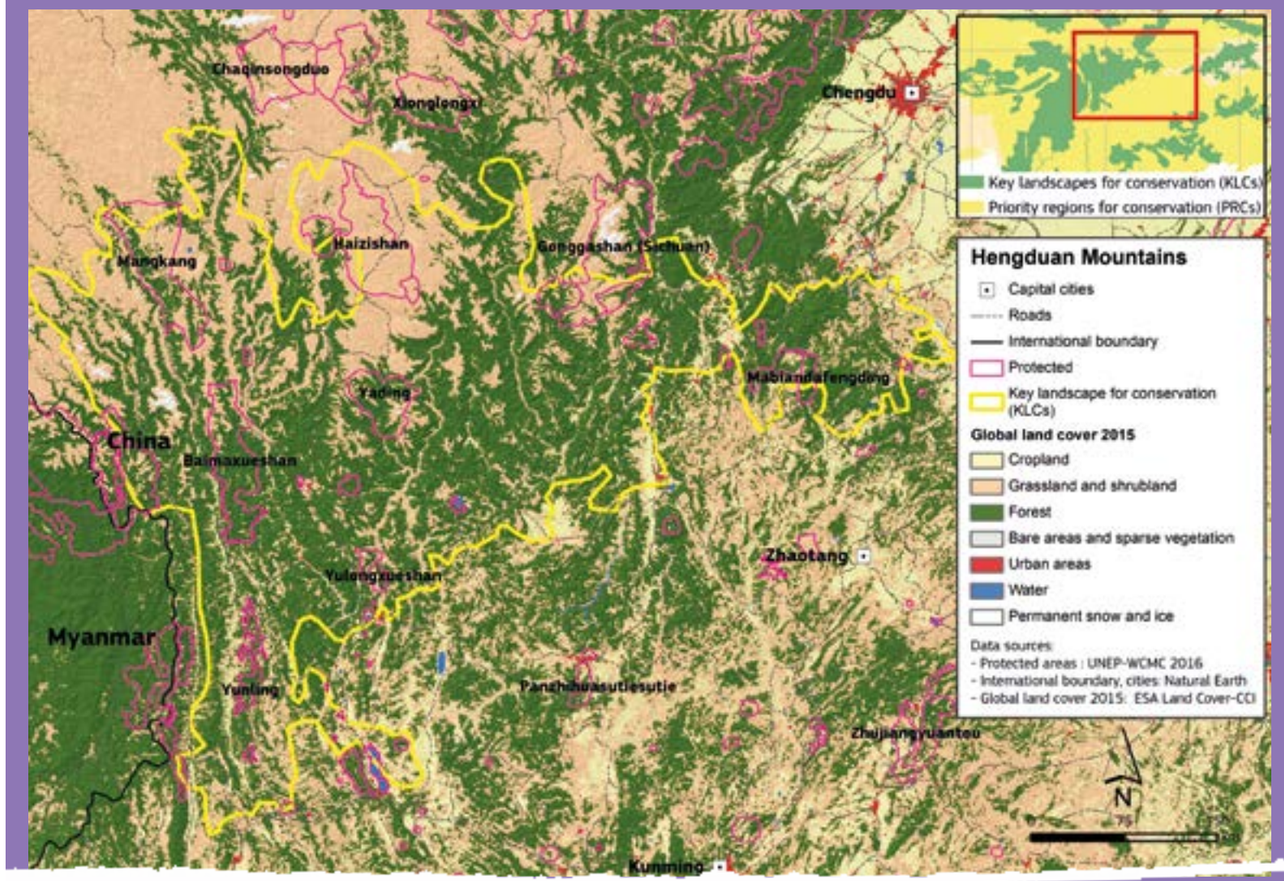
The tiny spoon-billed sandpiper is the focus of a major international conservation effort which includes a task-force under the EAAFP and the declaration of World Heritage and Ramsar sites. Other conservation actions for the species are education programmes, captive breeding and campaigns to reduce hunting and disturbance.

the species that depend on them. The short-term priorities are actions to limit the growth of the illegal wildlife trade through enforcement and other action, as listed below.

- Support stronger enforcement, with a focus on supporting law enforcement capacity development and multi-agency cooperation, especially for international borders and markets. This includes greater engagement with specialist NGOs. Information exchanges between Mongolia, China and Russia should be improved to target smuggling.
- Make illegal wildlife trade a priority for prosecutors and judges. Improve the sector's understanding of the significance of the trade through training, joint research or a judicial sector information exchange. Promote awareness of the links between the illegal wildlife trade, corruption, other organised crime and terrorism. Encourage investigations of financiers and political backers of the trade, as well as the operatives.
- Encourage governments to focus on stronger implementation of existing commitments, including under CITES.
- Support efforts on tracking and countering online illegal wildlife trade.
- Use existing regulations to take stronger action against illegal farming and the illegal sale of farmed wildlife products. Tighten monitoring to ensure compliance with CITES decisions.
- Promote public awareness and engagement in creating consumer pressure and in monitoring and reporting wildlife crime.

Medium-term priorities are to strengthen the legal basis for action, and address loopholes and factors that facilitate the illegal wildlife trade. They include the following.

- Invest in long-term, carefully targeted and evaluated behaviour change campaigns. Strengthen mechanisms for joint planning, measuring results and shared learning to encourage adaptive management of demand-reduction programmes. Put an emphasis on mechanisms for long-term sustainable funding for campaigns and education, especially for in-country actors. Collate data on the economic, cultural and social costs of wildlife crime as part of the efforts to convince policy-makers of the need to act.
- Work for wider changes in practice among the key industries (e.g. airlines, airports, shipping) that provide services used by the illegal wildlife trade, for example with improved inspection and 'wildlife trafficking-free' certification. Support the development of safeguards to reduce the use of the region's physical infrastructure and communications channels by the illegal wildlife trade.
- Secure further high-level political and financial support. Address illegal wildlife trade issues within policies and programmes on economic development and social issues, as well as within the conservation sector. Discuss illegal wildlife trade through international political and trade relationships.
- Strengthen the policies and regulations to control or ban farms breeding and stocking endangered wildlife (including tiger, bear) for commercial purposes, in accordance with



Box 4 _ Hengduan Mountains (KLC 5)

The Hengduan Mountains cover much of western Sichuan province as well as the northwestern portions of Yunnan, the eastern-most section of the Tibet Autonomous Region, and touching on parts of southern Qinghai. The area supports the greatest biological diversity in East Asia, is part of a global biodiversity hotspot and includes three of the Global 200 Priority Ecoregions, namely, the Tibetan Plateau Steppe in the north, the Hengduan Mountain Conifer Forests in the middle, and the North Indochina Subtropical Moist Forests in the south. The valleys of the Yangtze, Mekong and Salween form the Three Parallel Rivers of Yunnan World Heritage Site.

The Hengduan Mountains are primarily large north-south mountain ranges that separate the lowlands in northern Myanmar from the lowlands of the Sichuan Basin. Elevations range from 1 300 to 6 000 m. These mountain ranges were formed by the Indian subcontinent's collision with the Eurasian Plate, and are further shaped by the major rivers draining the eastern Tibetan Plateau. Most of the area remained free from glaciation during the ice ages, which means the area supports a complex array of habitats with a high degree of biological diversity.

Rapid economic growth and infrastructure development has led to unsustainable natural resource extraction, including logging, collection of medicinal plants, illegal hunting, over-grazing and unsustainable tourism development. These pressures have destroyed large areas of habitat, leaving populations of plants and animals isolated and highly threatened. Examples of threatened species include the golden snub-nosed monkey, the giant panda and the red panda. Currently, the protected area network covers approximately 88 527 km^2 (or 17.9 % of the area).

Priority conservation interventions include: improving the management effectiveness of existing protected areas; creating additional protected areas to maintain ecological connectivity across landscapes; assisting government at provincial, prefecture and county levels to develop regulations or policies under the existing provincial legislation framework to support conservation; supporting forest and biodiversity restoration measures; working with the private sector and communities to engage them in protected area management; developing mechanisms for payments for ecosystem services and other approaches to recognise natural capital in development planning.

Rangers in the Munkhkhairkan National Park, Mongolia, counting Siberian ibex and searching for snow leopard. Integrating local knowledge with scientific methods is vital for research leading to practical conservation management applications.

CITES agreements. Ban activities that facilitate illegal trade, such as stockpiling carcases on farms.

- Strengthen enforcement against illegal farming. Regularly monitor and inspect legal farms. Use intelligence-led methods to identify illegal trade from and through such farms.
- Review existing wildlife legislation. Update protected species lists (5-yearly updates are mandated in Chinese legislation). Review quotas and documents showing non-detrimental findings for CITES-listed species. Ensure that they incorporate international designations such as IUCN Red List status and are aligned with CITES requirements. Ensure that wildlife legislation is sufficiently broad to cover threatened non-native species that are trafficked through the country. Harmonise legislations with neighbouring countries. Support the development of appropriate regulations and capacity to ensure effective collaboration between national CITES Management and Scientific Authorities.
- Improve the management of sports hunting to ensure that it is sustainable and contributes more to conservation. Priorities for action are to increase the currently low return of revenue from hunter to conservation. Improve mechanisms for financial support so that community-based hunting systems can become sustainable. Improve the reliability and enforcement of quota systems. Reduce illegal harvests.
- Where feasible (e.g. for some timber, wild products sourced from common species), strengthen sustainable businesses; for example, through improved access to markets for certified products.

5.2.5 Improve information gathering, management and dissemination in support of biodiversity conservation

Both China and Russia have significant scientific capacity to collate biodiversity data for their countries. Mongolia has less capacity. Nevertheless, in all three countries, conservation planning and decision-making is hampered by a lack of easy access to relevant data. This often leaves decision-makers and protected area managers relying on out-dated perceptions of conservation priorities. As industrialisation proceeds and civil society organisations attempt to play a role monitoring the activities of large players, access to information and transparency are also becoming an important tool in overseeing environmental standards.

In the short term, efforts to compile and standardise information, and to make it available to scientists, conservation managers and decision-makers, are the priority, as detailed below.

- Establish, as far as possible, standard protocols for biodiversity data management across agencies. Set up standard spatial and relational databases and mechanisms to ensure that they are updated as information becomes available.
- Support promotion and education, including introducing materials on biodiversity and the environment in state curricula.
- Align biodiversity research with the information needs for greening the economy, and find funding from government and other interested parties for research and surveys.

A camel passes in front of Dabancheng Wind Farm, China. East Asia has seen rapid economic and social transformation in the last 50 years, but environmental concerns are only just beginning to be given attention in mainstream policymaking. Developments in China, in particular, will influence not just the region, but the globe.

5.3 Conclusion

The region covered by this chapter is a global centre of economic growth, with exceptional biodiversity of its own, situated next to the most biodiverse region on the planet, tropical South-East Asia and New Guinea. The pace of economic development creates acute challenges in terms of harmonising biodiversity conservation with continued growth, but there are signs that the countries of the region are moving towards finding a balance, not least with the improvements in environmental assessment and planning, and the emergence of China as the world's leading producer of renewable energy. A great deal has been done in terms of laying down a foundation of scientific knowledge about the environment, establishing protected areas, putting in place environmental safeguards and rules, and engaging and mobilising public opinion on the issues. Whether or not this will be enough to halt the loss of species and maintain ecological services remains to be seen.