

Strengthening Carbon Financing for Grassland Management in the People's Republic of China Potential Carbon Markets



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Foreword

he People's Republic of China (PRC) is being impacted by climate change, with average mean temperature increases for the last 6 decades of 0.25°C per decade. Climate models indicate that temperatures will continue to rise. Climate-related disasters, including droughts, severe storms, and flash floods, with high social and economic costs have increased in frequency and/or intensity. Food security in the PRC is predicted to decline due to climate change impacts. Yields of maize, wheat, and rice will likely decrease; and in natural ecosystems, intensifying degradation and desertification will lead to decreased productivity.

The Asian Development Bank (ADB) supports regional cooperation among the countries of Northeast Asia to combat dust and sandstorms resulting from desertification. ADB is strengthening the capacity of the governments of the PRC and Mongolia to access carbon financing to sustainably manage grasslands. ADB recognizes that healthy ecosystems are more productive and more resilient, and provide valuable ecosystem services, such as carbon sequestration. Healthy ecosystems form the firm foundation for herders' natural resource-based livelihoods.

In close cooperation with the PRC's Foreign Economic Cooperation Center of the Ministry of Agriculture, this knowledge product was prepared for the Government of the PRC, the private sector, other donors, and nongovernment organizations to review the current state of the PRC national policy regarding climate change mitigation and carbon markets. This publication aims to (i) outline the opportunities and challenges in producing carbon offsets from grassland-based livestock husbandry, (ii) review the government policies supporting the development of carbon markets, (iii) identify options for supporting the supply of offsets from the grassland-based livestock sector to leverage the opportunities presented by carbon markets, and (iv) provide recommendations for the PRC carbon finance.

The threats posed by climate change have significant impacts on the PRC's grassland ecosystems and livestock. This knowledge product provides inputs necessary for setting up provincial and national carbon markets and for pursuing external climate financing by the government and relevant stakeholders.

Ayumi Konishi Director General East Asia Department Asian Development Bank

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Abbreviations

ADB	Asian Development Bank
CBEEX	China Beijing Environmental Exchange
CCER	Chinese certified emission reduction
CDM	Clean Development Mechanism
CER	certified emission reduction
CGCF	China Green Carbon Foundation
ETS	emissions trading scheme
EU	European Union
GHG	greenhouse gas
NDRC	National Development and Reform Commission
PRC	People's Republic of China
QHEX	Qinghai Environment and Energy Exchange
SFA	State Forestry Administration
tCO ₂	metric ton of carbon dioxide
tCO ₂ e	metric ton of carbon dioxide equivalent
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VER	voluntary emission reduction

Executive Summary

considerable proportion of grasslands in the People's Republic of China (PRC) are degraded to some degree. Restoration and sustainable management of grasslands in the PRC have a large greenhouse gas (GHG) mitigation potential. Government-funded programs are investing in restoring and improving the management of grasslands. This report contributes to an assessment of the potential of carbon market mechanisms to support the achievement of grassland policy objectives by complementing existing government investments. It reviews the current state of national policy regarding climate change mitigation, particularly carbon markets, and outlines opportunities and challenges in producing carbon offsets from grassland-based animal husbandry to benefit from existing and emerging carbon markets.

The Government of the PRC has announced an objective to reduce the carbon intensity, measured as GHG emissions per unit of gross domestic product, by 40%–45% by 2020 compared with 2005 levels. The main policies to achieve this objective address the energy, industry, manufacturing, and building sectors. Within the agriculture sector, the GHG mitigation policy does not list grassland carbon sequestration, and the listed measures to address livestock waste (e.g., biogas) are not widely relevant in grassland areas. However, the promotion of grassland carbon sequestration and carbon trading are explicitly mentioned in a number of central government policies. Both the Inner Mongolia Autonomous Region and Qinghai Province have included support for trade in carbon offsets from grasslands in their current 5-year plans.

Carbon emissions trading markets are one of the PRC's main policy mechanisms to encourage reduction in GHG emissions. The central government's support for pilot carbon trading schemes in seven provinces and cities, which allow trade in offsets, potentially provides an opportunity to link supply of carbon offsets from grasslands with demand for offsets from other sectors. The Shenzhen GHG emissions trading scheme began operation in June 2013, and the other pilot schemes in Beijing, Chongqing, Guangdong, Hubei, Shanghai, and Tianjin are expected to begin trade by the end of 2013. With the initiation of these schemes, there are three potential sources of future demand for grassland offsets in the PRC: (i) international buyers in the voluntary market, (ii) domestic voluntary buyers motivated primarily by corporate social responsibility and business needs, and (iii) buyers meeting their compliance obligations in the evolving compliance carbon market in the PRC. Since grassland offsets cannot be used overseas to meet international buyers' compliance needs, the future scale of this source of demand is expected to be insignificant. The main source of potential domestic demand is likely to be the compliance market in the PRC.

Interim regulations on voluntary GHG emissions trading were issued in 2012 that set out the requirements for accessing domestic voluntary markets. Several of the pilot emissions trading schemes will also accept domestically approved voluntary offsets. The regulations provide a clear pathway for projects formerly developed relating to the Clean Development Mechanism (CDM) to transition to the domestic voluntary offset system. It is likely that, in the near future, the majority of domestic offsets will be from originally developed CDM-related projects. Hence, demand for grassland offsets from the pilot emissions trading schemes should not be overestimated. International voluntary markets remain a potential source of demand for grassland offsets originating in the PRC, but the 2012 regulations require that projects located in the PRC follow methodologies that have been approved

by the relevant domestic authorities. Therefore, irrespective of the intended market, methodologies applicable to mitigation activities in grassland-based animal husbandry must follow the national procedures for approval of new methodologies.

With the exception of biogas activities, grassland management and livestock management are new project types. Developing these project types will incur a range of costs and risks, which reduces incentives for private sector investment in early pilot projects. To date, most investments in development of grassland carbon offset projects have been made by international organizations, and examples of ongoing pilot activities are given in the report. Previous experience of the government's engagement with CDM and voluntary markets in the PRC suggests that there are a number of ways in which public agencies can support the development of new project types. Public investment in developing new methodologies and implementing pilot project activities will be necessary to provide proof of concept for new project types in the sector.

Introduction

Grasslands cover 400 million hectares, or more than 40%, of the land area of the People's Republic of China (PRC), and a considerable proportion of the PRC's grasslands are degraded to some degree.¹ Restoring degraded grassland and adopting sustainable management practices in the PRC's grasslands have large greenhouse gas (GHG) mitigation potential.² The carbon sequestration potential of the PRC's grasslands is recognized by the government in a number of policy statements, and several large-scale programs have been implemented that aim to restore and improve the management of grasslands.³

The Asian Development Bank (ADB) recently concluded technical activities assessing the potential contribution that carbon market mechanisms could make to achieve the objectives of national grassland management and livestock development policies in the PRC and Mongolia.⁴ This report reviews the current state of national policy regarding climate change mitigation, particularly carbon markets, and outlines the opportunities and challenges in producing carbon offsets from grassland-based livestock husbandry to benefit from existing and emerging carbon markets in the PRC. Although grassland carbon offsets are not an established project type either internationally or within the PRC, this review of relevant policies and mechanisms can inform stakeholders in both the grassland and climate change mitigation fields of the potential mechanisms for linking these two policy domains and of the main constraints that need to be addressed.

Grassland carbon sequestration is not currently prioritized in the major national climate change mitigation policies, but several central government policies explicitly support grassland carbon sequestration and related carbon trade. Two provinces (autonomous regions) intend to explore grassland carbon trade during the current Twelfth Five-Year Plan period of 2011–2015. Developing domestic carbon markets is one of the main national policies that potentially offer an opportunity for carbon offsets originating in grassland areas to link with carbon markets.

¹ Ministry of Environmental Protection. 2001. *The State of [the People's Republic of] China's Environment 2001*. Beijing.

² S. Wang, A. Wilkes, Z. Zhang, X. Chang, R. Lang, Y. Wang, and H. Niu. 2011. Management and Land Use Change Effects on Soil Carbon in Northern [People's Republic of] China's Grasslands: A Synthesis. *Agriculture, Ecosystems and Environment.* 142 (3–4): pp. 329–340.

³ Office for Western Development of the State Council. 2003. *Notification on Allocation of Tasks for the Grassland Retirement Program in 2003. (Guoxibannong [2003] No.8)*. Beijing; Ministry of Agriculture. 2011. *Suggestions on Strengthening Agricultural and Rural Energy Conservation and Emission Reduction*. Beijing.

⁴ ADB. 2010. Technical Assistance on Strengthening Carbon Financing for Regional Grassland Management in Northeast Asia. Manila (TA 7534-REG, \$1.4 million, approved on 17 May, financed by the Regional Cooperation and Integration Fund and the PRC Regional Cooperation and Poverty Reduction Fund).

Overview of Climate Policy in the People's Republic of China

his chapter reviews the PRC's main climate change mitigation policies as well as related policies in the agriculture sector. Although grassland carbon sequestration is not prioritized in national mitigation policy or agriculture sector mitigation policy, a number of central government policy statements and plans support grassland carbon sequestration and links with carbon trade. Both the Inner Mongolia Autonomous Region and Qinghai Province propose to explore links between grassland carbon sequestration and carbon trade in the Twelfth Five-Year Plan period.

Prior to the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in 2009, the PRC pledged to reduce its carbon intensity by 40%–45% by 2020 compared with 2005 levels.⁵ The Twelfth National Five-Year Plan for Social and Economic Development, which was released in March 2011, sets out a number of targets for various aspects of climate change mitigation (Table 1). Overall, the plan affirmed the 2020 emissions intensity reduction target and set a carbon-intensity reduction target—carbon dioxide (CO₂) emissions per unit of gross domestic product (GDP)—of 17% for the Twelfth Five-Year Plan, 2011–2015.⁶

Indicator	Eleventh FYP Target (% Decrease on Tenth FYP)	Eleventh FYP Target Achieved by End of 2011	Twelfth FYP Target Set (% Decrease on Eleventh FYP)
Increase in energy efficiency (%)	20.0	19.1	16.0
Decrease in carbon intensity (%)	(no target)	n/a	17.0
Decrease in water consumption per unit VAIO (%)	30.0	36.7	30.0
Nonfossil fuel in primary energy consumption (%)	n/a	8.3	11.4
Decrease in chemical oxygen demand (%)	10.0	12.5	8.0
Decrease in sulfur dioxide emissions (%)	10.0	14.3	8.0
Decrease in ammonia nitrogen (%)	(no target)	n/a	10.0
Decrease in nitrous oxide emission (%)	(no target)	n/a	10.0
Forest cover (%)	20.0	20.4	21.7
Increase in forest stock (million m ³)	(no taraet)	137	143

Table 1: Climate-Related Targets in the Eleventh and Twelfth Five-YearPlans of the People's Republic of China

FYP = five-year plan, m³ = cubic meter, n/a = not applicable, VAIO = value of agricultural and industrial output. Source: G. Yu and R. Elsworth. 2012. *Turning the Tanker: [People's Republic of] China's Changing Economic Imperatives and Its Tentative Look to Emissions Trading.* London: Sandbag Climate Campaign.

⁵ National Development and Reform Commission. 2012. [*The People's Republic of] China's Policies and Actions for Addressing Climate Change*. Beijing. The PRC's latest reported national GHG inventory was in 2005.

⁶ State Council of the PRC. 2013. *Twelfth Five-Year Plan for Energy Development*. Beijing. Achievement of this goal has been bolstered by inclusion in the Twelfth Five-Year Plan for Energy Development of absolute caps on total national coal and electricity consumption in 2015.

During the Eleventh Five-Year Plan period of 2006–2010, before announcing a national emissions intensity reduction target, the PRC had already begun implementing a range of measures designed to reduce the intensity of GHG emissions. These include regulatory measures as well as major energy conservation programs in a number of sectors.7 Regulatory measures have included introducing and raising energy efficiency standards for buildings and electrical appliances, and introducing labeling schemes. A wide range of energy conservation programs were introduced in the Eleventh Five-Year Plan period. The "Ten Key Programs" supported adjustment in economic structure, promoted energy-efficient technologies, and established energy management systems in several key energy-consuming sectors.⁸ The "One Thousand Enterprises" program set and supported achievement of energy-efficiency targets for 1,000 companies with large energy consumption profiles.⁹ This program was subsequently expanded into the "Ten Thousand Enterprises Energy Conservation and Emission Reduction" program, which is now one of the major policy initiatives incentivizing energy efficiency in the major emitting industries nationwide.¹⁰ This program supports over 17,000 enterprises that, in 2010, consumed more than 10,000 metric tons of coal equivalent to adopt energy-saving or emission-reducing technologies and processes.

The Twelfth Five-Year Plan builds on and intensifies support for energy conservation and emission reductions. The key policies and measures outlined in the Implementation Plan for the Twelfth Five-Year Plan for Emission Reduction are summarized in Box 1. Emissions trading, which is discussed further in the section on carbon markets in the PRC, is one among many policies and measures currently being promoted to address GHG emissions.¹¹

Following the release of the Twelfth Five-Year Plan on Energy Conservation and Emission Reduction, other sector mitigation plans and policies have gradually been issued. In the agriculture sector in 2011, the Ministry of Agriculture issued a policy statement on rural energy conservation and emission reduction in the PRC.¹² The policy's targets and measures are summarized in Box 2. The policy does not mention enhancing carbon sinks,¹³ and it does not specifically mention grasslands. The livestock priorities listed are generally relevant to large-scale livestock enterprises and less relevant to extensive grazing systems in pastoral areas. Lack of sufficiently precise data on soil carbon sequestration potential of grasslands at the national level was given as the main reason that grasslands were not included in the national agricultural mitigation policy.¹⁴

- ⁹ See http://hzs.ndrc.gov.cn/newzwxx/t20060413_66111.htm (in Chinese).
- ¹⁰ See http://www.ndrc.gov.cn/zcfb/zcfbtz/2011tz/t20111229_453569.htm (in Chinese).
- ¹¹ The PRC is reportedly also considering introducing a carbon tax. http://cn.reuters.com/article/ macroeconomicsNews/idCNL4S0AJ8IB20130114 (in Chinese).
- ¹² Ministry of Agriculture. 2011. *Implementation Guidance on Grassland Ecology Conservation Subsidy and Rewards Mechanism*. Beijing.
- ¹³ National Development and Reform Commission. 2012. Second National Communication on Climate Change of the People's Republic of China. Beijing. Soil carbon sinks are not included in the PRC's most recent national GHG inventory.
- ¹⁴ Personal communication with staff from the Science and Education Department, Ministry of Agriculture, in 2011.

⁷ L. Price, M. D. Levine, N. Zhou, D. Fridley, N. Aden, H. Lu, M. McNeil, N. Zheng, Y. Qin, and P. Yowargana. 2011. Assessment of [the People's Republic of] China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities during the 11th Five-Year Plan. *Energy Policy.* 39 (4): pp. 2165–2178.

⁸ The 10 programs addressed refurbishment of coal-fired boilers, regional electricity grids, use of excess heat and pressure, oil-saving and substitution technologies, electricity-saving machinery, energy use optimization techniques, energy saving in buildings, energy-saving lighting, energy saving in government agencies, and monitoring and technical service systems. http://www.ndrc.gov.cn/zcfb/zcfbtz/tz2006/t20060802 _78934.htm (in Chinese).

Box 1: Key Activity Areas of the Twelfth Five-Year Plan for Greenhouse Gas Mitigation Policies

- 1. Adjust industrial structure. Raise entry requirements to make approval processes stricter in high-energy-intensity and high-emission industries, close down plants using less advanced technologies, and promote technology upgrading.
- 2. Promote energy saving. Improve regulations and standards, and strengthen target responsibility systems and project assessment procedures. Implement key energy-saving projects; and improve energy management, especially in industry, construction, transport, and public buildings. Promote application of energy-saving technologies. Improve market instruments, including labeling, certification, government procurement systems, and energy-saving services. Promote circular economy and capacity building.
- Develop low-carbon energy sources. Adjust the structure of energy production, promoting clean coal, coal mine methane and natural gas, nuclear power, hydropower, wind, solar, biomass, and geothermal energy. Promote decentralized energy systems. By 2015, nonfossil fuel should provide 11.4% of primary energy consumption.
- 4. Increase carbon sequestration. Increase the pace of afforestation, continue to implement key ecological construction projects, consolidate and expand the Sloped Farmland Conversion Program, and implement afforestation projects for carbon sequestration. Implement urban, railroad, and highway green corridors. Strengthen forest tending, sustainable forest management, forest resources conservation, and conversion of low-yield forests, increasing forest growth rates and stock volumes. Improve the ecological compensation mechanisms. During the Twelfth Five-Year Plan period, 12.5 million hectares of new forest shall be added; forest cover rate shall reach 21.7%; and standing volume shall increase by 600 million cubic meters. Actively increase carbon sequestration in cropland and grassland ecological systems.
- 5. Control greenhouse gas emissions from non-energy activities. Control emissions in industrial processes. Promote noncarbonate raw materials in cement production; encourage the use of low-emission technologies in steel production and nonferrous metals; reduce the number of lime kilns; and upgrade technologies and reduce emissions in production of carbon materials, refrigerants, adipic acid, and nitric acid. Improving crop varieties and cropping techniques will promote control of agricultural greenhouse gas emissions, and strengthen waste treatment and utilization in animal husbandry and waste management to reduce the growth in methane emissions.
- 6. Strengthen conservation and replacement of high-emission products. Guide demand, and strengthen technical standards so that by using high-tensile building materials and high-grade concrete, the quality of buildings and their lifetime are extended. Implement programs to replace cement, steel, lime, and carbon materials. Encourage development and application of new high-grade, low-cost, low-consumption materials to replace traditional steel products. Encourage slow-release fertilizer and organic fertilizer to replace traditional fertilizer, and reduce the volume of fertilizer used and its emissions.

Source: State Council of the People's Republic of China. 2011. *Notification of the State Council regarding the Implementation Plan for the Control of Greenhouse Gases in the Twelfth Five-Year Plan.* Guofa 2011 (41). Beijing.

Box 2: Agricultural Mitigation Policy in the People's Republic of China

Targets. By 2015, compared with 2010, total agricultural chemical oxygen demand emissions will decrease by 8%; ammonia nitrogen emission will reduce by 10%; coverage of national soil nutrient testing program will reach 60%; fertilizer use efficiency will increase by 3%; unified pest and disease prevention and control will cover 30% of major crops by 2015; green pest and disease prevention and control will be promoted and high-pollution, high-residue pesticides eliminated; energy conserving cultivation methods will be promoted, and high-energy consumption procedures will be reduced; over 50% of intensive livestock farms or livestock-raising communities will be equipped with waste treatment facilities; households with biogas will reach 55 million, and annual biogas consumption will reach 21.6 billion cubic meters; high-energy consumption and high-polluting machines and fishing boats will be phased out; township enterprises will be upgraded for energy conservation; and rural production energy efficiency will increase.

Action Areas

- 1. Promote energy saving in agricultural production
 - i. Enhance energy saving in agricultural machinery and fishing boats
 - ii. Promote energy saving in crop planting systems
 - iii. Promote energy saving in township enterprises
 - iv. Promote energy saving in rural domestic life

2. Actively prevent and control agricultural nonpoint pollution

- i. Disseminate technologies for fertilizer, pesticide, and water conservation
- ii. Disseminate technologies for ecological livestock raising
- iii. Disseminate technologies for healthy aquaculture

3. Establish initiatives to promote reuse of rural waste

- i. Develop rural biogas
- ii. Implement a rural clean-up program
- iii. Use crop residues comprehensively
- iv. Collect and reuse mulching plastic film

4. Provide effective enabling measures for rural and agricultural energy conservation

- i. Strengthen leadership and consensus
- ii. Design and improve relevant policies and regulations
- iii. Increase financial inputs (including project funds, investments, agri-environment funds)
- iv. Strengthen technical support
- v. Initiate extensive training and dissemination

Source: Ministry of Agriculture of the People's Republic of China. 2011. *Suggestions on Strengthening Agricultural and Rural Energy Conservation and Emission Reduction*. Beijing.

In addition to the Twelfth Five-Year Plan for GHG mitigation (Box 1), specific policy support for increasing grassland carbon sequestration can be found in a number of other plans and policy statements. At the national level, the latest National Modern Agricultural Development Plan (2011–2015) recognizes the importance of "low-carbon technologies" and links with the Ministry of Agriculture's (MOA) policy statement.¹⁵ The plan also links with the recently released Twelfth Five-Year Plan for a Circular Economy in promoting technologies and practices that reduce production inputs and increase resource use efficiency.¹⁶ In setting out the priorities for agricultural development in arid and semi-arid grasslands and the Tibetan Plateau, the National Modern Agricultural Development Plan clearly states the importance of both developing modern agriculture and of protecting national ecological security, with ecology remaining the primary concern in grassland areas (footnote 15).

Actions to be promoted include

- i. ecological and organic production,
- ii. ecological protection and restoration,
- iii. grassland retirement (tuimu huancao) and settlement of pastoralists,
- iv. irrigation for forage cultivation, and
- v. establishment of a compensation mechanism for grassland carbon sequestration and ecology.

In terms of livestock development, the priorities are

- i. transforming the production methods;
- ii. improving the distribution of production and herd structure;
- iii. improving feed and management levels; and
- iv. strengthening synergies between agricultural and pastoral areas, and between grazing and stall-feeding, to promote livestock–forage balance and develop ecological livestock husbandry.

These livestock management priorities are also in line with a 2011 State Council policy statement on development in pastoral areas.¹⁷ In a policy statement regarding socioeconomic development in the Inner Mongolia Autonomous Region, the State Council of the PRC has also previously given specific encouragement not only for "developing and using low-carbon technologies," but also explicitly for "implementing forest and grassland carbon sequestration technology demonstration programs to control GHG emissions."¹⁸ The Twelfth Five-Year Plan for the Development of Western Regions also highlights the importance of innovation with ecological compensation schemes, including to "actively explore market-based ecological compensation models, such as trade water in rights and carbon sequestration trade."¹⁹

¹⁵ State Council of the PRC. 2012. *National Modern Agricultural Development Plan (2011–2015)*. Beijing. http://www.gov.cn/zwgk/2012-02/13/content_2062487.htm (in Chinese).

¹⁶ State Council of the PRC. 2013. Development Strategy for a Circular Economy and Near-Term Action Plan. Beijing.

¹⁷ State Council of the PRC. 2011. Several Opinions of the State Council on Promoting Good and Rapid Development in Pastoral Areas. Guofa 2011 (17). Beijing. http://www.gov.cn/zwgk/2011-08/09/ content_1922237.htm (in Chinese).

¹⁸ State Council of the PRC. 2011. *Opinions of the State Council on Further Support for Good and Rapid Socioeconomic Development in Inner Mongolia*. Beijing: State Council Information Office.

¹⁹ More generally, researching GHG monitoring methods is listed as a key task in the Twelfth Five-Year Plan for Agricultural Research. See http://www.moa.gov.cn/ztzl/shierwu/hyfz/201112/t20111227_2444181.htm (in Chinese).

Some provinces have also issued relevant policies and plans. The framework for the GHG mitigation policy in the Inner Mongolia Autonomous Region is given by the provincial Climate Change Implementation Plan (2010).²⁰ Relating to the pastoral sector, this plan highlights the following as policy priorities: (i) the reduction in the emissions intensity of ruminant production through improvements in livestock management and (ii) support for carbon sequestration in grasslands through restoration of degraded grasslands. Further, it explicitly strengthens efforts to develop methodologies for carbon accounting in grasslands and support for grassland carbon sequestration through carbon trading. The climate change section of the Inner Mongolia Autonomous Region's Twelfth Five-Year Plan for Socio-Economic Development reiterates support for forest carbon sequestration and grassland carbon sequestration, for developing an indicator system for grassland carbon sequestration and for carbon trade.²¹ Qinghai Province's Twelfth Five-Year Plan proposes to create production bases for ecological products in the Three Rivers Headwaters, Qinghai Lake, and Qilian Mountains regions, and to "explore a pathway for coordination of carbon trade and ecological conservation and construction."²²

²⁰ See http://www.sbgl.cn/km9/km902/km90206/2012-04-04/55552.html (in Chinese).

²¹ Inner Mongolia Autonomous Region (IMAR). 2011. Twelfth Five-Year Plan for Socio-Economic Development of Inner Mongolia Autonomous Region. Hohhot; and IMAR. 2011. Twelfth Five-Year Plan for Land Use of Inner Mongolia Autonomous Region. Hohhot. http://www.ssfcn.com/detailed_gh.asp?id=28795&sid=1573 (in Chinese).

²² Qinghai Province Reform and Development Commission. 2011. Twelfth Five-Year Plan for Socio-Economic Development of Qinghai Province. Xining. http://www.qhei.gov.cn/ghyfz/wngh/t20110214_ 359563.shtml (in Chinese).

Carbon Markets in the People's Republic of China

n August 2010, the National Development and Reform Commission (NDRC) selected five provinces and six cities as low-carbon pilot regions to innovate and demonstrate various approaches to low-carbon development.²³ In March 2011, the Twelfth Five-Year Plan stated the intention "to gradually develop carbon emissions trading markets."²⁴ To promote cost-effective measures to achieve the GHG intensity reduction targets of the plan, seven provinces and cities were selected in November 2011 for piloting emissions trading systems (ETSs).25 One pilot ETS is already operational, and the others are likely to begin trade by the end of 2013; a national emissions trading market may be established between 2016 and 2020.26 The NDRC has also released regulations on voluntary GHG emissions trading, which provides a framework for trade in voluntary markets, as well as for provision of offsets to the emerging compliance markets.²⁷ The most significant experience of the PRC with carbon trading has been with the Clean Development Mechanism (CDM) established under the United Nations Kyoto Protocol, and this provides an important basis for the newly established domestic voluntary and compliance markets. This chapter describes the main carbon market segments in the PRC. Eligibility of grassland offsets for each market segment is assessed in the next section.

Clean Development Mechanism

The CDM is the best known carbon trading mechanism in the PRC. Mitigation activities primarily based on soil carbon sequestration are not eligible for the CDM, and for reasons explained in this section, future international demand for emission reductions through CDM projects in the PRC will be very limited. However, the PRC's experience with CDM has provided a basis for the emerging domestic voluntary and compliance markets.

The PRC signed the Kyoto Protocol in 1998 and ratification acceptance began in 2002, making the PRC eligible to participate in the CDM. The initial projects went into operation in 2002, and the first project was registered with the CDM Executive Board in 2005.²⁸ Interim measures for operation and management of CDM projects were issued in July 2004, and

- ²⁴ See http://www.gov.cn/2011lh/content_1825838.htm (in Chinese).
- ²⁵ The regions are Beijing, Chongqing, Guangdong, Hubei, Shanghai, Shenzhen, and Tianjin. See http://www.ndrc.gov.cn/zcfb/zcfbtz/2011tz/t20120113_456506.htm (in Chinese).
- ²⁶ See http://www.drcnet.com.cn/DRCNET.Channel.Web/gylt/20120730/index.aspx (in Chinese).
- ²⁷ National Development and Reform Commission. 2012. Interim Regulations for Management of Voluntary Trade in Emission Reductions. Fagai Qihou (2012) No. 1668. Beijing.
- ²⁸ World Bank, Ministry of Science and Technology of the PRC, Deutsche Gesellschaft für Technische Zusammenarbeit, Federal Ministry of Economic Cooperation and Development (Germany), and Swiss State Secretariat for Economic Affairs. 2004. *Clean Development Mechanism in [the People's Republic of] China: Taking a Proactive and Sustainable Approach*. Washington, DC: World Bank.

²³ The regions are Baoding, Chongqing, Guangdong, Guiyang, Hangzhou, Hubei, Liaoning, Nanchang, Shaanxi, Shenzhen, Tianjin, Xiamen, and Yunnan. See http://www.sdpc.gov.cn/zcfb/zcfbtz/2010tz/ t20100810_365264.htm (in Chinese).

formally adopted in revised form the following year, and again in 2011.²⁹ By August 2013, 4,934 CDM projects in the PRC have been approved by the NDRC, including 3,728 that have been registered with the CDM Executive Board.³⁰ Among the registered projects, 1,327 have already begun issuing certified emission reductions (CERs). By August 2013, CDM projects in the PRC had issued 853 million CERs, contributing more than 60% of the global CDM credit volume.³¹ The PRC thus hosts the largest number of CDM projects of any country. However, compared with the overall investments in energy efficiency that have been and are still required to be made, the carbon revenues generated are very small. In addition, one of the reasons for the rapid growth in CDM projects in the PRC is that the implementation of a large proportion of CDM projects has been primarily financed domestically.³² Regulations requiring majority ownership of CDM projects by Chinese participants have also ensured strong national ownership and involvement.

Aside from benefiting from specific CDM projects, the PRC has built significant capacity in the development and management of CDM projects, and participation in the mechanism has put in place some key elements of carbon market infrastructure in the country. Senior national experts have been involved in the CDM Executive Board at the international level. At the national level, the National Leading Group on Climate Change is responsible for reviewing CDM policies, rules, and standards. The National CDM Board is responsible for reviewing project application documents. Responsibility for approval lies with the designated national authority, i.e., the NDRC. Numerous competence centers have been established; domestic validation and verification bodies have gained considerable experience, as have project development companies, brokerage firms, and trading exchanges. Many provinces have established CDM service centers within government, providing training and support to project proponents and local governments, and liaising with the national agencies.

Owing to concern that the involvement of more industrialized developing economies in the CDM does not contribute significantly to limiting global warming to below 2°C, the European Union (EU) has decided that from 1 January 2013, CERs from CDM projects registered after 31 December 2012 that are traded in the EU ETS must originate from least developed countries, and that other countries should be engaged in "new market mechanisms" for upscaled mitigation action.³³ This has provided an additional impetus for the PRC to develop its own domestic ETS. Considering also the oversupply of emissions allowances in the EU ETS, it is most likely that the PRC domestic market will absorb the supply from the large number of NDRC-approved CDM projects in the PRC that have not yet been registered with the CDM Executive Board. National regulations on voluntary trade in emission reductions provide clear guidance on how projects can make the transition from the CDM to domestic market mechanisms (footnote 27). However, there is potential in the future for a PRC national ETS to link with schemes in the EU and Australia, at which point consistency of the national scheme with basic requirements in these international schemes would most likely be important.

²⁹ See http://www.lawinfochina.com/display.aspx?lib=law&id=4846&CGid= and http://www.pkulaw.cn/fulltext_form.aspx?Gid=158567 (in Chinese).

³⁰ See http://cdm.ccchina.gov.cn/NewItemTable.aspx (in Chinese).

³¹ Clean Development Mechanism. CDM Insights, Project Activities. http://cdm.unfccc.int/Statistics/Public/ CDMinsights/index.html

³² W. Shen. 2011. Understanding the Dominance of Unilateral CDM Projects in [the People's Republic of] China: Origins and Implications for Governing Carbon Markets. *Governance of Clean Development Working Paper Series*. Norwich: University of East Anglia.

³³ See Commission Regulation (EU) No. 550/2011. http://emissions-euets.com/attachments/197_Commission %20Regulation%20No%20550_2011.pdf

Domestic Emissions Trading Schemes

In October 2011, the NDRC issued a notice and authorized seven administrative areas to develop regional pilot emissions trading schemes. The local authorities were instructed to determine the market rules, a target GHG emissions cap, and emission rights allocation rules, and to develop regulatory systems, registration systems, and trading platforms. Shenzhen's pilot scheme began operation in June 2013, and it is expected that the other pilot systems may begin operation by the end of 2013, paving the way for a potential national system before 2020.³⁴ The implementation plans for each pilot scheme are to be approved by the NDRC. While the national and disaggregated provincial emission reduction targets are intensity based, the pilot emissions trading schemes are required to have caps on absolute emissions.³⁵ Some officials working on climate change policy expect that, by 2020, the PRC may take on an international commitment to a limit on absolute emissions.³⁶

At the time of writing, some of the pilot provinces and cities have already issued either framework regulations or detailed implementation regulations (Table 2). The general approach adopted has been to identify key sectors for regulation and/or to set criteria for mandatory participation of firms in those sectors (e.g., firms with emissions exceeding a minimum threshold). Some pilot schemes also specify whether offsets may be used to meet emissions caps. In most cases, the regulations explicitly refer to Chinese CERs (CCERs) and forestry offsets. As of August 2013, most of the released and draft regulations are not explicit about the proportion of emission reductions that can be met using approved offset types.³⁷ Since the details of some pilot schemes have not yet been finalized, it is difficult to estimate the potential level of demand for CCERs or other offsets generated by these schemes. One estimate suggests that once a national ETS is operational, it may absorb 600 million CERs per year.³⁸ For comparison, the total emission covered in the first set of pilot schemes is around 800 million metric tons of carbon dioxide (tCO₂).³⁹ The eligibility of grassland offsets in these schemes is assessed in the subsection "Eligibility for Domestic Standards" on pages 16–18.

Interim Regulations on Voluntary Greenhouse Gas Emissions Trading

In June 2012, the NDRC issued Interim Regulations for Management of Voluntary Trade in Emission Reductions (footnote 27). The purpose of these regulations is to encourage and regulate voluntary GHG emissions trading and to gain experience to inform a future capand-trade system. The regulations also outline procedures for PRC-based CDM projects to transition to CCERs. Considering that PRC-hosted CDM projects registered after 31 December 2012 are no longer eligible in the EU ETS and that the NDRC has begun to facilitate the conversion of CDM projects to CCER projects by supporting translation and revision of the most commonly used CDM methodologies, existing and pipeline CDM projects are likely to become the major source of offset supply in the PRC market.

- ³⁵ An absolute cap on energy consumption has also been written into the national energy plan.
- ³⁶ Interview by Du Qun, ADB consultant, with the NDRC.
- ³⁷ An interview with NDRC Climate Change Office staff suggests 5%–10% is likely (Du Qun, ADB consultant, personal communication).
- ³⁸ A. Razzouk and G. Phillips. 2012. *The \$215 Billion Clean Energy Lesson*. Sindicatum Sustainable Resources. http://www.sindicatum.com/wp-content/uploads/2012/12/The-215bn-Clean-Energy-Lesson-Sindicatum -December2012.pdf
- ³⁹ R. Scotney, S. Chapman, C. Hepburn, and C. Jie. 2012. *Carbon Markets and Climate Policy in [the People's Republic of] China's Pursuit of a Clean Energy Future*. Sydney: Climate Institute.

³⁴ http://www.tanpaifang.com/tanguwen/2013/0818/23225.html

Pilot Scheme	Carbon Intensity Target (%)	Emissions Thresholds for Regulated Entities	Sectors Likely to Be Covered	Offsets Eligibility	Approximate Number of Regulated Entities	Related Trading Platform
Beijing	18	10,000 tCO ₂ annually	Power, heating, manufacturing, and public building sectors	CCERs (approved by NDRC)	600	China Beijing Environment Exchange
Shanghai	19	10,000 tCO ₂ annually	Energy-intensive sectors including power and non- industry entities	CCERs, and a local offset standard yet to be decided	200	Shanghai Energy and Environment Exchange
Tianjin	19	20,000 tons of standard coal equivalent	6 key sectors and public buildings	Eligible, limited to 10% for each enterprise	120	Tianjin Climate Exchange
Chongqing	17	20,000 tCO ₂ annually	Electrolytic aluminum, ferroalloys, calcium carbide, cement, caustic soda, iron, and steel	Forestry-based offsets may be eligible	unknown	Chongqing Carbon Exchange
Shenzhen	21	Enterprises selected on basis of multiple criteria	Key emitting enterprises and public buildings	Offsetting will be allowed, specifics not yet issued	635	China Shenzhen Emissions Exchange
Guangdong	19.5	20,000 tCO ₂ annually	Power, building materials and chemical sectors, probable extent to business entities	Forestry offsets and CCERs originating in Guangdong	~820	Guangzhou Carbon Emissions Exchange
Hubei	17	60,000 tons of standard coal equivalent	To include power stations and heavy industry	Eligible, limited to 10% for each enterprise	~100	Hubei Carbon Exchange

Table 2: Key Characteristics of Pilot Emissions Trading Schemes in the People's Republic of China

CCER = Chinese certified emission reduction; NDRC = National Development and Reform Commission; tCO₂ = metric tons of carbon dioxide. Sources: R. Scotney, S. Chapman, C. Hepburn, and C. Jie. 2012. *Carbon Markets and Climate Policy in [the People's Republic of] China: [People's Republic of] China's Pursuit of a Clean Energy Future*. Sydney: Climate Institute; W. Wang. 2012. Overview of Climate Change Policies and Prospects for Carbon Markets in [the People's Republic of] China. *Les Cahiers de la Chaire Economie du Climat Information and Debates Series* No. 18. July. http://www.chaireeconomieduclimat.org/wp-content/uploads/2012/07/12-07-10-Cahier-ID-n18 -Wang.pdf; http://www.tj.gov.cn/zwgk/wjgz/szfbgtwj/201303/t20130304_188946.htm; and http://www.sz.gov.cn/cn/xxgk/xwfyr/wqhg/ 20130521/ Since several of the regional pilot emissions trading schemes specify that some or all types of CCER may be eligible as offsets, the regulations on voluntary emissions trading also form a key part of the link between the current voluntary market and the emerging compliance markets.

The regulations set out overall principles and procedures for project management, verification and validation, issuance, and trade in CCERs. The general approach to regulation of voluntary emission reduction trading is records management, in which voluntary projects and their emission reductions should be recorded and registered with the NDRC, and trading must take place through approved platforms, with projects, emission reductions, trading, and retirement recorded in a national registry (Article 7). The main requirements of the regulations regarding projects and the management of emission reductions are summarized in Box 3. Requirements for registration of trading platforms are set out in Chapter 4 of the regulations, and requirements for validation and verification agencies are set out in Chapter 5 and annexes 1 and 2 of the regulations. Agencies applying for recognition as approved validation and verification agencies should, among other things, have validated or verified at least 30 projects, or either led two national projects or developed three methodologies that have been approved under the regulations. The similarity of these procedures with those of the CDM and the reliance on experienced validation agencies indicate the extent to which the domestic system is building on the basis created through the operation of the CDM in the PRC. Given the potential in the future to link with emissions trading schemes in developed countries, this basis in the CDM potentially has important longer-term implications.

Voluntary Carbon Markets in the People's Republic of China

While there are reportedly more than 100 trading platforms in the PRC,⁴⁰ three main carbon trading platforms (Beijing, Shanghai, and Tianjin) have facilitated the majority of CER and voluntary emission reduction (VER) transactions that were conducted through domestic trading platforms.⁴¹ On the demand side, to date, the international voluntary market has been the main source of demand for voluntary offsets originating in the PRC. The conversion of CDM projects to VER projects for international transactions has been one major option for the sale of projects developed using CDM methodologies. International agencies, including nongovernment organizations, philanthropic organizations, companies, and bilateral aid organizations, have also used over-the-counter voluntary market transactions to support innovation of new project types, particularly in the land use sector. Some grassland management pilot projects are summarized in the next section. Globally, compared to the CDM, the international voluntary market is much smaller.

In 2011, the primary CER market traded \$990 million, with almost \$2 billion in forward contracts for post-2012 CERs.⁴² By contrast, the global voluntary market transacted a total of around \$576 million.⁴³

⁴⁰ http://news.sina.com.cn/c/sd/2011-10-24/103923352589.shtml (in Chinese).

⁴¹ However, the majority of CDM and VER transactions have been conducted through direct negotiations between buyer and seller.

⁴² A. Kossoy and P. Guigon. 2012. State and Trends of the Carbon Market 2012. Washington, DC: World Bank.

⁴³ M. Peters-Stanley and K. Hamilton. 2012. *Developing Dimension: State of the Voluntary Carbon Markets* 2012. Washington, DC: Ecosystem Marketplace and Bloomberg New Energy Finance.

Box 3: Main Requirements for Emission Reduction Projects and Emission Reduction Management

Project Requirements

- 1. Emission reductions must be "real, measurable, and additional" (Article 3).
- 2. Projects should use accounting and monitoring methodologies approved by agencies registered with the National Development and Reform Commission (NDRC) (Article 9).
 - i. The NDRC has translated, evaluated, and revised existing Clean Development Mechanism methodologies for approval under the national system.^a
 - ii. New methodologies can be submitted for approval by the NDRC on the basis of recommendations made by validators approved by the NDRC. New methodologies are required to be "reasonable" and "practical" and to be accompanied by complete project documents (Article 11).
- 3. Projects submitted for recording with the NDRC should be validated by approved validators on the basis of the accuracy of the baseline and with project emission estimate calculations, additionality, and reasonableness of the monitoring plan (Article 12).
- 4. Documentation required to be submitted for recording of a project with the NDRC are set out (Article 15).
- 5. Projects can be recorded with the NDRC if they are in line with national laws and regulations; are among the permitted project types; meet project documentation requirements; have applied their methodology appropriately; are additional; have a validation report that meets the relevant requirements; and make contributions to sustainable development (Article 17).

Requirements for Management of Emission Reductions

- 1. To record emission reductions with the NDRC, monitoring records and a verification report verifying implementation of the monitoring plan should be submitted to the NDRC (Article 19).
- 2. Emission reductions recorded with the NDRC will be issued with a Chinese certified emission reduction (CCER) certification (Article 21).
- 3. Trade and retirement of CCERs must be conducted through a trading platform recorded with the NDRC (Article 22).

^a Translated methodologies are available at http://cdm.ccchina.gov.cn/nDetail.aspx?newsld=39507&Tld =20 and http://cdm.ccchina.gov.cn/Detail.aspx?newsld=42552&Tld=20.

Source: National Development and Reform Commission. 2012. Interim Regulations for Management of Voluntary Trade in Emission Reductions. Fagai Qihou (2012) No. 1668. Beijing.

The domestic voluntary carbon market (i.e., with domestic buyers of PRC-originated offsets) emerged in the PRC in 2009 with the sale of offsets produced through reduced use of private vehicles during the 2008 Olympic Games in Beijing.⁴⁴ In 2011, domestic voluntary carbon offset demand was still small in terms of volume, with transactions estimated at 0.3 million tCO₂ worth around \$1 million (footnote 43). Another market survey estimated that in 2010, 41 Chinese companies transacted over 0.23 million tCO₂ (footnote 44), of which only 10 companies transacted more than 5,000 tCO₂ and most deals were between 1 and 3,000 tCO₂. The credits transacted were certified according to different

⁴⁴ China Beijing Environmental Exchange. 2011. [The People's Republic of] China Carbon Trade Analysis Report. Beijing.

standards and, in most cases, non-Chinese standards—e.g., Verified Carbon Standard (VCS), Gold Standard, etc. To date, the majority of domestic purchases of offsets have been for the purpose of offsetting the emissions of particular public activities, with only a small number of companies offsetting emissions in enterprise operations (footnote 44). The primary motivations for offsetting include a voluntary desire to reduce climate impacts, links with media and communications strategies, and brand development. There are at least two domestic voluntary carbon standards under development in the PRC: the Panda Standard (led by the China Beijing Environmental Exchange [CBEEX]) and the Three Rivers Standard (led by the Qinghai Environment and Energy Exchange [QHEX]).⁴⁵ Only one transaction of projects related to these standards has been made: a forward sale of credits from a bamboo afforestation project associated with the Panda Standard that is intended to be based on a methodology that has yet to be approved by the standard.

Apart from transactions through emissions trading platforms, the PRC also has another vehicle for voluntary emission reductions: the China Green Carbon Foundation (CGCF). The CGCF was originally set up by the State Forestry Administration (SFA) and is the main operator of carbon sequestration forests. The CGCF operates the Green Carbon Fund, which mobilizes donations from individuals and companies, and, through local forestry agencies, invests the funds in afforestation and forest management. By 2012, the fund had invested in afforestation on more than 14,000 hectares in various carbon sequestration forests around the country.⁴⁶

Both trading and donation modalities are expected to link with the emerging CCER market in the near future, as demand for offsets from the pilot emissions trading system increases.

⁴⁵ A voluntary standard associated with the Shanghai exchange was announced some years ago, but no public documentation has been released.

⁴⁶ See www.thjj.org

Eligibility of Grassland and Livestock Offsets in Carbon Markets

his chapter assesses the eligibility of grassland and livestock offsets in different carbon market segments. A number of energy-related livestock waste mitigation methodologies (e.g., biogas) have been approved and widely applied, including in the PRC. However, no methodology related only to reduced emissions from enteric fermentation has been approved under the CDM. Soil carbon sequestration is the largest mitigation option in grasslands of the PRC. Projects primarily based on soil carbon sequestration are not eligible for the CDM. In addition, the exclusion of new PRC-originated CERs from the EU ETS from January 2013 onward means that the CDM is no longer a target market segment for new project types in the PRC. Activities promoting soil carbon sequestration and reductions in enteric fermentation are eligible in some overseas compliance markets, but international offsets are not currently eligible under those schemes. International and domestic voluntary markets and the emerging domestic compliance markets are the main market segments of relevance to grassland-based animal husbandry in the PRC.

Eligibility for International Standards

Carbon accounting standards reflect the objectives of the related climate policy objectives as well as market requirements. The UNFCCC's CDM standard regulates the creation of United Nations-recognized offsets in developing countries, which Annex I countries (i.e., developed country parties to the UNFCCC that have taken on GHG emission reduction commitments) can use to fulfill part of their emission reduction and limitation obligations. Methane avoidance is an eligible activity under the CDM. A number of energy-related livestock waste mitigation methodologies (e.g., biogas) have been approved and widely applied, including in the PRC. However, no methodology related only to reduced emissions from enteric fermentation has been approved under CDM, although some livestock methodologies in other markets do include enteric fermentation emissions along with other emission sources. Although soil carbon is the main mitigation potential in grasslands, projects primarily based on soil carbon sequestration are not eligible for the CDM. Finally, with the exclusion of new PRC-originated CERs from the EU ETS, the world's largest market, the CDM would not be a viable market to consider when developing grassland carbon offsets in the PRC. Improved livestock management and soil carbon sequestration are eligible in two other overseas compliance markets: the Alberta Offset Scheme in Canada and the national Australian Carbon Farming Initiative.⁴⁷ However, international offsets are not currently eligible under those schemes, although a future link between a national ETS in the PRC and the Australian ETS is possible.

⁴⁷ For the Alberta Offset Scheme, see http://environment.alberta.ca/0923.html; and for the Australian Carbon Farming Initiative, see http://www.climatechange.gov.au/cfi

Internationally, therefore, the main potential market segment is the voluntary market. Currently, the standard with the largest volume of transactions is the VCS. In 2012, 43 million tCO₂e⁴⁸ registered with the VCS were transacted at an average price of \$4 per tCO₂e.⁴⁹ In 2012, European corporate buyers purchased most voluntary offsets from projects based in Asia, with prices varying depending on project type and projectspecific characteristics (footnote 49). For livestock management, the VCS applied CDM methodologies, but grassland soil carbon sequestration is eligible and included as an agricultural land management activity. Two generic methodologies applicable to soil carbon accounting and monitoring have been approved:50 a methodology specific to sustainable grassland management that is undergoing its second validation,⁵¹ and a methodology for avoided conversion of grasslands to cropland that has been submitted for approval.52 The sustainable grassland management methodology undergoing its second validation was developed on the basis of a pilot project in the PRC (boxes 4 and 5). The methodology is mainly applicable to improved grazing management effects on soil carbon and does not account for improvements in livestock management that may reduce the GHG intensity of livestock products. Methodologies for avoided conversion of grassland⁵³ and for grazing land and livestock (beef and dairy) management⁵⁴ are under consideration by a smaller standard based in the United States, the American Carbon Registry.

Eligibility for Domestic Standards

Prior to the release of the voluntary guidelines on GHG emission reduction trading, two domestic voluntary carbon standards had been publicly announced in the PRC by private entities. The Panda Standard, developed by CBEEX, has released a standard document as well as specific rules regarding agriculture, forestry, and other land uses.⁵⁵ Grassland management is an eligible activity, but livestock activities are not at present eligible, unless integrated into grassland management. The Three Rivers Standard, developed by QHEX, has issued standard documents, but has not yet issued specific rules for the agriculture sector, though both grassland management and livestock management are expected to be eligible project activities.⁵⁶

Projects registered to either of these standards may also be expected to register with the NDRC, and it is likely that most domestic sources of demand would expect the emission reductions to be registered as CCERs, following the regulations outlined earlier. In order to facilitate this, both standards may need revision to incorporate the regulatory requirements and reduce duplication of validation and verification procedures. Both standards could, however, exist alongside the national regulations. In particular, the national standards are not explicit on many specific project or methodology requirements that are addressed

⁵⁶ See www.threeriversstandard.com

⁴⁸ Carbon dioxide equivalent (CO₂e) means converting other GHGs into comparable units based on their effect on global warming on a 100-year timescale.

⁴⁹ M. Peters-Stanley and D. Yin. 2013. *Maneuvering the Mosaic: State of the Voluntary Carbon Markets 2013.* Washington, DC: Ecosystem Marketplace and Bloomberg New Energy Finance.

⁵⁰ See http://v-c-s.org/methodologies/VM0021 and http://v-c-s.org/methodologies/VM0017

⁵¹ See http://v-c-s.org/methodologies/methodology-sustainable-grassland-management-sgm

⁵² See http://v-c-s.org/methodologies/avoided-planned-conversion-grasslands-and-shrublands-crop-production

⁵³ See http://americancarbonregistry.org/carbon-accounting/avoided-conversion-of-grasslands-and-shrublands

⁵⁴ See http://americancarbonregistry.org/carbon-accounting/grazing-land-and-livestock-management -methodology

⁵⁵ See www.pandastandard.org

Box 4: Three Rivers Sustainable Grassland Management Carbon Project in Qinghai Province

The Three Rivers Project, located in Qinghai Province, People's Republic of China, is a pilot project using carbon finance to support restoration of degraded grasslands and to increase livestock productivity. Potential benefits are expected to be higher productivity and profitability of herding operations, thus contributing to poverty alleviation, food security, and greater resilience to droughts from improved vegetation cover and soils. Emission reductions are primarily from soil carbon sequestration and reduced livestock methane emissions.

Carbon revenues will be used in conjunction with government ecological restoration investments to compensate for the costs of implementing grassland restoration activities and to invest in productivity-enhancing infrastructure. Government investments will primarily support grass cultivation and construction of warm sheds, while carbon revenues will provide performancebased payments to incentivize improved stocking-rate management. The incentive payments will also be used to invest in improved productivity and livestock product marketing and to assist herders to overcome risk barriers. Although households will have fewer livestock, the livestock retained will be more productive livestock, and herders will be engaged in more profitable value chains.

The project also serves to address some of the key barriers to accessing carbon finance in grasslands by developing a carbon accounting and monitoring methodology and demonstrating cost-effective monitoring approaches suited to extensive grazing contexts. Development of the pilot project has been jointly supported by the Food and Agriculture Organization of the United Nations, the Ministry of Agriculture of the People's Republic of China, and Qinghai Province Science and Technology Department.

Source: L. Lipper, B. Neves, A. Wilkes, T. Tennigkeit, P. Gerber, B. Henderson, G. Branca, and W. Mann. 2011. *Climate Change Mitigation Finance for Smallholder Agriculture: A Guide Book to Harvesting Soil Carbon Sequestration Benefits*. Rome: Food and Agriculture Organization of the United Nations.

in each of the private voluntary standards, and both private voluntary standards contain provisions for monitoring of non-GHG impacts that are not regulated in the national regulations.

Agriculture is listed as an eligible mitigation sector in an annex to the national regulations on voluntary emissions trading. No specific limitations on agricultural activities are listed, so it may be assumed that both grassland and livestock management are at present eligible for approval by the NDRC under the voluntary regulations.⁵⁷ Potential grassland and livestock management projects could therefore be developed either under the Panda Standard or the Three Rivers Standard and apply for CCER status by adhering to the national regulations. Project developers could alternatively submit an approved international methodology to the NDRC for approval under the national regulations, or they could develop new methodologies and submit them directly to the NDRC. The Three Rivers Standard intends to produce a revised version of the VCS sustainable grassland management methodology (Box 5) for submission to the NDRC in relation to the pilot project described in Box 4. The Panda Standard may also adapt the VCS methodology

⁵⁷ At present, 22 firms have received CDM accreditation as validation or verification bodies in the CDM's agriculture sector, and it is likely that at least some of them may apply for accreditation under the PRC regulations.

to the standard's own requirements and submit it to the NDRC. In addition, Winrock International is developing a methodology applicable to revegetation of degraded grasslands that is intended for use under the Panda Standard. At present, it is assumed that if a grassland or livestock mitigation project is approved through the CCER system, its emission reductions would be fungible with other CCERs. One exception may be in the case of Guangdong, where current draft regulations limit the scope of eligible CCERs to those originating in Guangdong and forestry offsets (Table 2).

Box 5: Draft Sustainable Grassland Management Carbon Accounting and Monitoring Methodology

On the basis of a pilot project in Qinghai Province, supported by the Ministry of Agriculture of the People's Republic of China, the Food and Agriculture Organization of the United Nations, and Qinghai Province Science and Technology Department, a methodology to monitor and account for greenhouse gas (GHG) emission reductions has been submitted to a leading voluntary carbon market standard, the Verified Carbon Standard. The methodology is currently undergoing its second validation.

The methodology can be applied on degraded grasslands, and has been designed with respect to activities such as improved grazing management, grass cultivation, and shrub or tree management. The main carbon pools considered include soils, aboveground woody biomass, and belowground biomass. GHG emission sources taken into account include livestock enteric fermentation and manure deposition on grassland, and project emissions due to the use of fertilizers and agricultural machinery.

In many contexts, soil carbon is likely to be a major carbon pool affected by grazing management and other grassland management activities. The methodology provides two options to account for change in soil carbon stocks: direct measurement and an activity-based monitoring approach. The latter derives emission factors from the application of a biogeochemical model validated for the project region, and uses data from the monitoring of grazing and other activities to estimate emission reductions. The methodology also accounts for possible leakage due to market effects of project implementation and potential displacement of grazing outside the project boundary.

Source: Verified Carbon Standard. Methodology for Sustainable Grassland Management. http://v-c-s.org/methodologies/methodology-sustainable-grassland-management-sgm

Barriers and Opportunities in the Supply and Demand for Grassland Offsets

In recent years, there has been a low level of demand for carbon credits to offset corporate emissions and the emissions from specific public activities (footnote 44). As awareness of climate change and its impact increases, and as consumer product markets become increasingly sophisticated, there may be an increase in demand from companies in the PRC to offset their emissions for corporate social responsibility and branding purposes. However, the emergence of a domestic compliance market is expected to provide a much stronger motivation for corporate investment in offsets. In particular, the link created by the regulations on voluntary GHG emissions trading and the regulations being developed for the pilot emissions trading schemes provide the basis for expecting an increase in the future domestic demand for offsets in the PRC. In the near future, the majority of this market is likely to be met by supply of credits from projects registering with the NDRC that were developed under the CDM. Meeting a part of future demand through the supply of offsets produced through grassland-based livestock management will require that a number of barriers are addressed.

With the exception of biogas activities, grassland management and livestock management are new project types. Developing these project types will incur both costs and risks, the principal ones of which are summarized in Table 3.

	Development Phase	Implementation Phase
Costs	 Methodology development Developing emission factors Baseline activity documentation Stakeholder negotiations in project design phase 	 Up-front investments in adopting mitigation activities Financing costs Monitoring costs
Risks	Uncertainty over methodology approvalUncertain future demand and prices	 Implementation (adoption) risks Climate and livestock product market volatility

Table 3: Costs and Risks in Developing Grassland-Based Livestock Projects

Source: Project team.

The presence of risks in developing new project types reduces incentives for private investment in developing these projects. Some of the major costs of developing a new project type have public goods characteristics. Once a carbon accounting and monitoring methodology is approved, it is generally available for any market participant to use. Overcoming the initial costs of methodology development can make a major contribution to reducing the costs of project development. Emission factors can also be available for use in any project and the research on which they are based is a public good. Some

aspects of project implementation, such as technology extension and collective action, are also public goods. Public investment to support these aspects of project development and implementation can increase the risk-adjusted returns for private investors in offset projects, and thus encourage private sector investment in the development of new project types and demonstration projects that would accumulate experience to inform further replication of these projects.

The PRC's history of engagement with the CDM and the support of the SFA for forestry carbon projects in the PRC are examples of how the support of public agencies to offset project development costs can help overcome barriers to the development of new project types (boxes 6 and 7).

Compared with other project types, development of methodologies and other key project elements for agriculture projects is less advanced in all countries. Internationally, governments have also seen fit to support the development of key elements required for voluntary agricultural offset projects (boxes 8 and 9).

Box 6: Clean Development Mechanism Service Centers in the People's Republic of China

A main tool to support carbon market development was the establishment of Clean Development Mechanism (CDM) Technical Service Centers. Since 2004, 29 provinces have set up provincial CDM centers with the aim of supporting local government and firms to access the CDM. The functions of the centers were to (i) build local capacities; (ii) overcome limitations on access to information, networks, and knowledge to develop and operate CDM projects; and (iii) advise provincial and local governments on related policy issues. Capacity-building activities for many provincial centers were provided through bilateral aid projects, with the donor country often gaining first right of purchase on any resulting certified emission reductions that were generated. The CDM centers convened training workshops and conferences and distributed information materials. They also sometimes played key roles in coordinating the development of CDM projects—though in many sectors, private project developers were more prolific in the number of projects developed—and, in some cases, facilitated access to buyers, for example, through participation in trade fairs.

An evaluation based on a small sample of provinces suggested that the CDM centers had an observable impact in the early stages of market development, when awareness raising and basic capacity-building needs were most important. As capacities to develop projects developed more widely among market participants, the relative importance of the CDM centers as a source of technical know-how declined. Private project developers have been responsible for development of most CDM projects, which can be taken as a sign of the market having reached a sufficient stage of maturity.

Source: M. Schroeder. 2009. Evaluating the Impact of Chinese Provincial CDM Centers for Local Market Development. In R.D. van den Berg and O. Feinstein, eds. *Evaluating Climate Change and Development*. World Bank Series on Development. Volume 8. Washington, DC: World Bank.

Box 7: Carbon Forestry in the People's Republic of China

The People's Republic of China (PRC) became eligible to participate in the Clean Development Mechanism (CDM) in 2002. Soon after, a number of pilot carbon forestry projects began to be designed, in particular, a project supported by the World Bank BioCarbon Fund in Guangxi Zhuang Autonomous Region, which became the world's first registered CDM afforestation project. In 2003, the State Forestry Administration (SFA) established a Carbon Sequestration Management Office. In 2005, a key project was initiated to identify priority areas for CDM afforestation projects in the country, which enabled an analysis of carbon sequestration potential during the Kyoto Protocol commitment period. Through to 2007, the SFA was mainly considering carbon trading mechanisms in relation to overseas investment in CDM projects in the PRC. In 2007, forest carbon sequestration was listed as a key climate change mitigation measure in the PRC's National Action Plan, signifying the importance of domestic action to promote carbon forestry.

In view of the complexities of the CDM as a mechanism to promote forest carbon sequestration and uncertainties caused by international temporary certified emission reduction (tCER) prices, the SFA, together with SINOPEC, established in 2007 the China Green Carbon Fund (later the China Green Carbon Foundation [CGCF]) to promote carbon forestry in the PRC.^a Although a privately established fund, it maintains close contacts with the relevant agencies of the SFA in its management and operation. The fund is a financing vehicle for individuals and enterprises to donate funds for investment in carbon forestry, supplementing fiscal resources. Donations are channeled to local forestry bureaus in areas with designated "carbon sequestration forests."

This initiative was paralleled by activities to develop measurement and monitoring approaches for the quantification of carbon sequestration. The CGCF worked with expert institutes to develop its own project-level accounting and monitoring guidelines. At the same time, the Ministry of Finance approved a National Forest Carbon Sequestration Accounting and Monitoring System project. This included two main aspects: (i) development of accounting and monitoring systems in 17 provinces and (ii) establishment of seven carbon rights trading pilot provinces and cities. This work, involving several national research institutes and a large number of local government forestry agencies, is establishing the basis not only for estimation of the contribution of forest carbon sequestration to the achievement of national climate change mitigation targets, but also for establishment of baselines, local capacity, and operational management systems to support future operations of the CGCF.

^a Temporary CER or tCER is a CER issued for an afforestation or reforestation project activity under the CDM which expires at the end of the commitment period following the one during which it was issued. Source: L. Nuyun. 2008. Establishment and Operation of China Green Carbon Fund. Presentation at the International Workshop on Development of Forestry Carbon Sequestration and Bio-energy in [the People's Republic of] China. Beijing. 17 December. http://www.forest-trends.org/documents/files/doc_865.pdf

Box 8: United States Department of Agriculture's Environmental Quality Incentives Program Grants for Voluntary Agricultural Offset Projects

The Environmental Quality Incentives Program (EQIP) is a program run by the Natural Resources Conservation Service of the United States Department of Agriculture (USDA) that provides financial and technical assistance to farmers to help plan and implement conservation practices that address natural resource concerns on farmand forestlands. One type of grant available through the program is Conservation Innovation Grants. These grants target support for the development and adoption of innovative conservation approaches and technologies. In 2011, Conservation Innovation Grants were made available specifically for innovation in reducing greenhouse gas (GHG) emissions and promoting carbon sequestration in agricultural lands. Up to \$5 million were available as targeted grants, and a further \$10 million were available to farmers working together with recipients of the targeted grants.

The requirements for targeted grants was that they secure the participation of agricultural producers, determine baseline values of GHG emissions and/or carbon sequestration, verify the implementation and maintenance of GHG reduction and carbon sequestration practices, and determine GHG reduction benefits so that these benefits can be successfully registered in a commonly recognized carbon registry. The grants were awarded through a competitive bidding process, including review by a technical panel. In total, nine grants were made, of which two were for livestock management and one for avoided conversion of grasslands.

Sources: USDA. 2010. Fact Sheet: Conservation Innovation Grant Program for Reducing Greenhouse Gas Emissions and Promoting Carbon Sequestration. December. http://www.epa.gov/agstar/documents/CIG-%20FactSheet.pdf; and USDA. Conservation Innovation Grants—Greenhouse Gas Awardees: Fiscal Year 2011. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ national/programs/financial/cig/?cid=stelprdb1042408

Box 9: Australia's Carbon Farming Initiative

The Carbon Farming Initiative (CFI) is a voluntary carbon offsets scheme managed by the Government of Australia that helps farmers and land managers earn additional income by the sale of carbon offsets produced through improved agricultural and land management practices. Eligible offsets must use a methodology that has been approved by the Domestic Offsets Integrity Committee, a committee consisting of independent experts.

The CFI was initiated in 2011. To support the development of the program, a total of A\$429 million will be invested over 6 years. This includes investments in

- i. filling the research gap to fund research into new mitigation technologies and practices for land managers and a national survey to identify common practice;
- ii. converting research into methodologies to convert research into estimation methodologies for use in the CFI;
- iii. action on the ground to assist industry and farming groups to test and apply research outcomes in real farming situations;
- iv. refundable tax offsets for new eligible conservation tillage;
- extension and outreach to provide technical information and support to farmers, land managers, and their key influencers to assist them to participate in land sector emissions management activities and the CFI; and
- vi. carbon farming skills to make funding available for training and accreditation of carbon brokers and aggregators so landholders have access to credible, high-quality advice and carbon services.

Source: Department of Agriculture of Australia. Climate Change, Carbon Farming Futures. http://www.daff.gov.au/climatechange/carbonfarmingfutures

Future Demand and Supply of Grassland Offsets in the People's Republic of China

here are three potential sources of future demand for grassland offsets in the PRC: (i) international buyers in the voluntary market, (ii) domestic voluntary buyers motivated primarily by corporate social responsibility and business needs, and (iii) buyers meeting their compliance caps in the evolving compliance carbon market in the PRC. To date, international investors (primarily bilateral and philanthropic institutions but also companies) have been the main investors in grassland offsets, focusing on innovating methodologies and pilot projects. Since grassland offsets cannot be used overseas to meet international buyers' compliance needs, the future scale of this source of demand is not likely to be significant. In the future, the main source of potential domestic demand is likely to be the compliance market in the PRC. With the release of interim regulations on voluntary GHG emissions trading, the broad requirements for accessing this market have been set out, though the specifics of how the system will operate still remain to be explored in practice. In the longer term, domestic carbon markets have the potential to reach a similar scale as the EU ETS or the combined regional carbon markets in North America. The coming years through to 2015 and possibly beyond should be seen as a testing phase for domestic compliance markets. If, as has happened in some other markets, emissions allowances are over-allocated for political reasons, fewer enterprises will have demand for offsets and the price signal transmitted to the voluntary market will not be strong.

Early pilot experience in the PRC is more advanced than in many other developing countries. Draft methodologies and at least one pilot project design have been produced. The existing draft methodologies are applicable to grassland management but may not be applicable in all situations across the grassland regions of the PRC. Methodologies related to reducing the GHG intensity of livestock production suited to application in the grassland regions of the PRC do not yet exist. In theory, such methodologies could help incentivize improved livestock management in ways that support sustainable grassland management. No pilot project has gone into implementation, so proof of concept has yet to be demonstrated for projects in the grassland-based livestock sector. Demonstrating proof of concept is the critical next step for grassland-based offsets if they are to provide herders with a link to carbon markets.

Investment in the development and piloting of new project types is generally not attractive to the private sector because of the additional costs and risks involved compared to investment in established project types. Innovation and demonstration of new approaches will require public investment, particularly in the public goods aspects of offset project development and implementation: (i) research targeted to meeting the information needs of project developers; (ii) methodology development, validation, and approval; and (iii) contributions to the costs of initial investments in project implementation. Public funding can be used to reduce the risks faced by the private sector, to lower the costs of investment and production of carbon credits faced by landholders, and to support the development of the market by investing in methods and financing vehicles that will enable the market volume to grow.

Strengthening Carbon Financing for Grassland Management in the People's Republic of China: Potential Carbon Markets

Carbon emissions trading markets are one of the main policy mechanisms of the People's Republic of China (PRC) to encourage the reduction of greenhouse gas emissions. Grasslands cover 40% of the PRC's land area, and these contain large amounts of carbon. Restoration and sustainable management of these grasslands have large greenhouse gas mitigation potential. This publication assesses the potential of carbon market mechanisms to support the achievement of grassland policy objectives. It also reviews the state of national policy regarding climate change mitigation, particularly carbon markets, and outlines opportunities and challenges in producing carbon offsets from grasslands.

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