



MINISTRY OF ENVIRONMENT
AND GREEN DEVELOPMENT

Making Grasslands Sustainable in Mongolia

International Experiences with Payments for Environmental
Services in Grazing Lands and Other Rangelands





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Foreword

Mongolia is severely impacted by desertification and climate change. The Gobi Desert continues to expand northward, with over 70% of Mongolia's land degraded through overgrazing, deforestation, and climate change. Degradation is a downward spiral, as degraded lands are less resilient to climate change impacts. Average mean temperature increases are more than 2°C. Climate models indicate that temperatures will continue to rise, and more than 80% of the country's territory is defined as highly vulnerable to climate extremes. Climate-related disasters, including droughts, severe storms, and flashfloods, with high social and economic costs (particularly for herders) have doubled in frequency.

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 Mongolia and the People's Republic of China in accessing carbon financing to sustainably manage grasslands. ADB recognizes that healthy ecosystems are more productive, 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 Mongolia's Climate Change Coordination Office of the Ministry of Environment and Green Development, this knowledge product was prepared for local government officials, other donors, and nongovernment organizations to raise awareness of potential financing mechanisms in the environment sector. This publication aims to (i) explain the types of environmental services, including carbon sequestration; (ii) provide information on existing payments for environmental services schemes in Mongolia and internationally; and (iii) provide recommendations for implementation of payments for environmental services.

The threats posed by climate change have significant impacts on Mongolia's grassland ecosystems and herders' livelihoods. This knowledge product identifies potential financing mechanisms which the Government of Mongolia and relevant stakeholders can potentially adopt and incorporate into their specific climate change and environmental strategies and plans.



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Leadership and inspiration were provided by the staff of the Mongolian Ministry of Environment and Green Growth, and significant contributions were made by the Ministry of Industry and Agriculture, the Ministry of Finance, and members of the steering committee throughout the project. Community members and local government staff were a vital component of the project and their participation and insights were essential.

ADB management and technical/administrative staff, particularly Yue-Lang Feng, Frank Radstake, and Karen Chua, provided valuable guidance and support during the project. Alvin Lopez, Ongonsar Purev, Charles Rogers, and Takeshi Ueda provided substantive comments that improved the quality of the document. Joy Quitazol-Gonzalez and Heidee Luna supported the entire process from initial formatting and compilation of technical reviews through to final publication. Publication support (graphics, editing, proofreading, and typesetting) were ably provided by the team of Anna Sherwood, including Rodel Bautista, Caroline Ahmad, Ma. Theresa Arago, Ma. Cecilia Abellar, Jasper Lauzon, and Alvin Tubio.

Abbreviations

ADB	– Asian Development Bank
BMP	– best management practice
CCA	– community conservation agreement
CCC	– Commodity Credit Corporation
CDM	– Clean Development Mechanism
CER	– certified emission reduction
EBI	– environmental benefit index
ESPH	– Empresa de Servicios Públicos de Heredia (Heredia Public Services Enterprise), Costa Rica
EU	– European Union
FSA	– Farm Service Agency (United States Department of Agriculture)
GDP	– gross domestic product
GEF	– Global Environment Facility
GHG	– greenhouse gas
ha	– hectare
NAPSWQ	– National Action Plan for Salinity and Water Quality (Australia)
NGO	– nongovernment organization
NRCS	– Natural Resources Conservation Service (United States Department of Agriculture)
NSW	– New South Wales
PES	– payments for environmental services
PRC	– People’s Republic of China
PSAH	– Pagos por Servicios Ambientales Hidrológicos (Payments for Hydrological Environmental Services Program), Mexico
PUG	– pasture user group
SDC	– Swiss Agency for Development and Cooperation
TSP	– technical service provider
UK	– United Kingdom
UNEP	– United Nations Environment Programme
US	– United States
USDA	– United States Department of Agriculture
USFWS	– United States Fish and Wildlife Service
VCS	– Verified Carbon Standard

Executive Summary

There has been considerable interest in the potential for economic incentive schemes to support stakeholders to conserve forests and biodiversity and to provide watershed services. Much less attention has been paid to the potential of incentive schemes to deliver improved environmental services (also called ecosystem services) in grasslands and other grazing lands. Grasslands and other grazing lands store up to 30% of the world's soil carbon, and provide a range of other use and nonuse values, including biodiversity and soil conservation, water supply and retention, recreation, and spiritual values. The environmental services provided may be categorized as provisioning services, regulating services, and cultural services. The primary use by herders of grasslands is grazing by livestock, and the production of livestock products makes major contributions to herders' livelihoods.

Payments for environmental services (PES) are one potential mechanism to provide land users in grasslands with incentives to increase the supply of positive externalities of grassland utilization (e.g., biodiversity), and decrease the supply of negative externalities (e.g., soil erosion or carbon emissions). The main distinction between PES and other forms of incentives or support is that PES schemes make payments conditional upon performance of improved management or delivery of environmental services. Evidence suggests that PES schemes can result in an increase in the supply of environmental services, although some schemes have not increased their supply and there have been few rigorous evaluations. One general set of reasons for the limited environmental impact is that market-based instruments may be less effective in contexts where other markets are missing or not working well, since these constrain the opportunities for land users to pursue more profitable livelihood options. Even where schemes are able to increase the supply of one environmental service, there may be trade-offs with other environmental services. Similarly, not all PES schemes have improved incomes for the poor or addressed equity concerns. Careful design and a thorough assessment of these issues can improve PES implementation.

PES is currently not widely practiced in Mongolia, but has been included in the recent Green Development Strategy of the Government of Mongolia. This knowledge product provides a descriptive overview of 50 PES schemes in operation in grasslands and other grazing lands worldwide as well as a number of schemes under development in Mongolia. It also discusses some key issues relating to the design of PES schemes in the context of Mongolian grasslands.

Introduction

Types of Environmental Services

Environmental services are “the benefits people obtain from ecosystems.”¹ These benefits may be categorized as provisioning services, regulating services, and cultural services (Table 1). The primary use by herders of grasslands is grazing by livestock, and the production of livestock products makes major contributions to herders’ livelihoods. These products include food products and a range of other products, many of which are both consumed locally and traded internationally. Non-livestock rangeland products may also be important components of herders’ incomes as well as provide food and support human health.² In addition to these provisioning services, grasslands provide ecosystem-regulating services, such as conservation of biodiversity in grassland habitats, regulation of soil erosion and sandstorms, and regulation of the climate through carbon sink and source functions.³ Cultural services also have a variety of values to different stakeholders in grasslands and other grazing lands. The provision of regulating services is particularly influenced by the activities of herds and herders, often in unintended ways. These services are therefore “externalities” of livestock husbandry that affect other stakeholders both on- and off-site.⁴ These environmental services are valued in different ways by different stakeholders, but, unlike traded livestock products, they are mostly not remunerated, often resulting in undersupply of positively valued environmental services.

Table 1: Environmental Services of Grasslands and Other Grazing Lands

Provisioning Services	Regulating Services	Cultural Services
Food (e.g., meat, dairy)	Air quality regulation	Spiritual and religious values
Fiber (e.g., wool)	Climate regulation (e.g., carbon sequestration)	Aesthetic values
Other products (e.g., leather, horns, hoofs, bones, etc.)	Water regulation (e.g., regional hydrology)	Recreation and ecotourism
Fuel (e.g., dung)	Erosion regulation	
Animal genetic resources	Sandstorm regulation	
Plant genetic resources	Disease and pest regulation	
	Pollination	

Source: Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being: Synthesis*. Washington, DC: World Resources Institute.

¹ Environmental services are also referred to as “ecosystem services.” The definition of environmental services is derived from the Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-Being: Synthesis*. Washington, DC: World Resources Institute.

² D. Winkler. 2008. Yartsa Gunbu (*Cordyceps sinensis*) and the Fungal Commodification of Tibet’s Rural Economy. *Economic Botany*. 62 (3). pp. 291–305.

³ K. Havstad et al. 2007. Ecological Services to and from Rangelands of the United States. *Ecological Economics*. 64 (2). pp. 261–268.

⁴ Food and Agriculture Organization of the United Nations (FAO). 2007. *State of Food and Agriculture 2007: Paying Farmers for Environmental Services*. Rome.

The Concept of Payments for Environmental Services

Payments for environmental services (PES) are one potential mechanism to provide land users in grasslands with incentives to increase the supply of positive externalities of grassland utilization (e.g., biodiversity) and decrease the supply of negative externalities (e.g., soil erosion or carbon emissions). The definition of what constitutes a PES scheme has been discussed by various authors.⁵

One widely cited narrow definition of a PES scheme is

“(a) a voluntary transaction where (b) a well-defined environmental service (ES) or a land use likely to secure that service (c) is being ‘bought’ by a (minimum one) service buyer (d) from a (minimum one) service provider (e) if and only if the service provider secures service provision (conditionality)” (footnote 5a).

The main distinction between PES and other forms of incentives or support is that PES schemes make payments conditional upon performance. Conditionality may apply to system inputs (e.g., management practices), states of the agricultural system (e.g., vegetation cover rates), or the system’s outcomes (e.g., rural development outcomes) (footnote 5c). Payments may be in various forms, such as financial assistance, technical assistance, or other in-kind benefits. Both “suppliers” and “buyers” may be private bodies; but nongovernment organizations (NGOs) are often involved either as “suppliers” or “buyers,” and governments are often one of the major buyers of environmental services on behalf of citizens.

It is important to note that land users’ decisions are affected by a range of factors, not all of which can be addressed through PES schemes. PES schemes are, therefore, one among many policy options for addressing environmental management (Table 2).

Perspectives on Payments for Environmental Services

In the narrow definition of PES cited above, it is conceived as a market transaction. “Buyers” and “sellers” are well-defined, negotiating and engaging in the transaction voluntarily until a price is agreed that results in allocation of resources and supply of environmental services that reflects their full and appropriate social value. Very few PES schemes actually reflect this conceptualization in practice.⁶ The “suppliers” of environmental services are often not free market actors, and many PES schemes have, in fact, been imposed through

⁵ (a) S. Wunder. 2005. Payments for Environmental Services: Some Nuts and Bolts. *CIFOR Occasional Paper*. No. 42. Bogor, Indonesia: Center for International Forestry Research; (b) M. van Noordwijk, B. Leimona, T. Tomich, S. Velarde, B. Swallow, S. Suyanto, and L. Joshi. 2007. Criteria and Indicators for Environmental Service Compensation and Reward Mechanisms: Realistic, Voluntary, Conditional and Pro-Poor. *ICRAF Working Paper*. No. 37. Nairobi, Kenya: World Agroforestry Centre; (c) M. van Noordwijk and B. Leimona. 2010. Principles for Fairness and Efficiency in Enhancing Environmental Services in Asia: Payments, Compensation, or Co-investment? *Ecology and Society*. 15 (4). p. 17. <http://www.ecologyandsociety.org/vol15/iss4/art17/>; (d) R. Muradian, E. Corbera, U. Pascual, N. Kosoy, and P. H. May. 2010. Reconciling Theory and Practice: An Alternative Conceptual Framework for Understanding Payments for Environmental Services. *Ecological Economics*. 69 (6). pp. 1202–1208.

⁶ (a) Footnote 5d; (b) M. van Noordwijk, B. Leimona, R. Jindal, G. B. Villamor, M. Vardhan, S. Namirembe, D. Catacutan, J. Kerr, P. A. Minang, and T. P. Tomich. 2012. Payments for Environmental Services: Evolution toward Efficient and Fair Incentives for Multifunctional Landscapes. *Annual Review of Environmental Resources*. 37. pp. 389–420.

Table 2: Potential Incentive Mechanisms for Improved Management of Grasslands

Regulatory incentives	• National or subnational legislation, e.g., land use and agricultural zoning laws, and nature protection and environmental protection laws • Grassland and grazing laws
Financial aid	• Credit policies
Grant aid	• Government cost-sharing grants • Input subsidies • Technical assistance (extension services)
Conditional payments	• Payments for specified practices • Payments for specified ecosystem services • Input subsidies • Off-take subsidies • One-off grant payments • Recurring payments for ecosystem services
Product market payments	• Labeling for niche products (e.g., geographical indications) • Certification of products • Ecotourism revenues

Source: A. Wilkes, K. Solymosi, and T. Tennigkeit. 2012. Options for Support to Grassland Restoration in the Context of Climate Change Mitigation. Background paper for Global Agenda of Action on Livestock. Brasília. 7–12 May.

legislation and other forms of government or community action.⁷ The relationship between management practices and environmental services is often not well understood or easily quantified, and many schemes are based on assumptions about the flow of environmental services rather than payments for actual services delivered.⁸ They are, therefore, not conditional on actual environmental service supply. The “buyers” of environmental services are sometimes motivated less by demand for the services themselves and more by a desire to maintain relationships with government regulators and branding.⁹ Thus, willingness to pay may not simply reflect the value of the environmental services themselves. Furthermore, in many developing countries, stakeholders expect PES schemes not simply to result in economically efficient supply of environmental services but also to support poverty alleviation and other rural development objectives,¹⁰ though evidence suggests that many PES schemes are not in fact “pro-poor” but remain focused on achieving environmental objectives.¹¹

⁷ A. Vatn. 2010. An Institutional Analysis of Payments for Environmental Services. *Ecological Economics*. 69 (6). pp. 1245–1252.

⁸ J. Boyd and S. Banzhaf. 2007. What Are Ecosystem Services? The Need for Standardized Environmental Accounting Units. *Ecological Economics*. 63 (2–3). pp. 616–626.

⁹ G. Villamor, M. van Noordwijk, F. Agra, and D. Catacutan. 2007. Buyers’ Perspectives on Environmental Services (ES) and Commoditization as an Approach to Liberate ES Markets in the Philippines. *ICRAF Working Paper*. No. 51. Bogor, Indonesia: World Agroforestry Centre.

¹⁰ S. Pagiola, A. Arcenas, and G. Platais. 2005. Can Payments for Environmental Services Help Reduce Poverty? An Exploration of the Issues and the Evidence to Date from Latin America. *World Development*. 33 (2). pp. 237–253.

¹¹ S. Wunder. 2008. Payments for Environmental Services and the Poor: Concepts and Preliminary Evidence. *Environment and Development Economics*. 13 (3). pp. 279–297.

The divergence of the reality of PES schemes from the market-based understanding and the diversity of actual practical experiences have led to alternative conceptualizations of PES schemes (footnote 6). PES schemes are better understood relating to a continuum across three paradigms (footnote 5c). First, some PES schemes are well described by the market-based paradigm, where land users and buyers negotiate monetary PES, with payments conditional on environmental service delivery. In this paradigm, poverty or equity issues are not a primary concern. These types of scheme conform to a “commodification of environmental services” approach. Second, a large number of schemes, whether market-based or government-driven, focus on compensating land users for the opportunity costs of changing land management practices as an incentive for enhanced environmental service provision. In this case, contracts may or may not be voluntary; environmental services are often estimated or assumed to reduce transaction costs; and poverty impacts may be considered in PES scheme design, since opportunity costs vary among land users. This approach has been typified as “compensation for opportunity costs.” A third approach, “co-investment in land stewardship,” focuses on providing land users with support for meeting natural resources management and rural development objectives. Support is conditional on progress toward these higher-level objectives and may include a broader range of mechanisms than direct monetary incentives. Integrated conservation and development projects and ecosystem-based approaches often are similar to this type of PES scheme.¹²

Broadening the comprehension of PES schemes to include a continuum of approaches enables the design of PES schemes to be informed by a better understanding of the role of nonmarket contextual factors, assessment of trade-offs among objectives, and consideration of a range of appropriate interventions and a wider range of impacts.

Potential Benefits, Risks, and Trade-Offs

Evidence suggests that PES schemes can result in an increase in the supply of environmental services, though some schemes have not increased their supply and there have been few rigorous evaluations.¹³ One general set of reasons for limited environmental impact is that market-based instruments have limited effects in contexts where other markets (e.g., crop produce, credit, and labor markets) are missing or not working well, since these constrain the opportunities for land users to pursue more profitable livelihood options (footnote 13). Even where schemes are able to increase the supply of one environmental service, there may be trade-offs with other environmental services.¹⁴ Similarly, not all PES schemes have improved incomes for the poor or addressed equity concerns (footnote 11).

In a number of cases, lack of land tenure particularly has limited the ability of land users, especially the poor, to participate in and benefit from PES schemes; but PES schemes can also help to secure tenure for the poor.¹⁵ PES schemes that fail to integrate social with

¹² T. McShane and M. Wells, eds. 2004. *Getting Biodiversity Projects to Work*. New York: Columbia University Press.

¹³ S. Pattanayak, S. Wunder, and P. Ferraro. 2010. Show Me the Money: Do Payments Supply Environmental Services in Developing Countries? *Review of Environmental Economics and Policy*. 4 (2). pp. 254–274.

¹⁴ E. Nelson, S. Polasky, D. J. Lewis, A. J. Plantinga, E. Lonsdorf, D. White, D. Bael, and J. J. Lawler. 2008. Efficiency of Incentives to Jointly Increase Carbon Sequestration and Species Conservation on a Landscape. *Proceedings of the National Academy of Sciences of the United States of America*. 105 (28). pp. 9471–9476.

¹⁵ M. Grieg-Gran, I. Porras, and S. Wunder. 2005. How Can Market Mechanisms for Forest Environmental Services Help the Poor? Preliminary Lessons from Latin America. *World Development*. 33 (9). pp. 1511–1527.

environmental objectives could lead to loss of access to natural resources and essential livelihood assets, and many PES programs are unable to address existing deficiencies in the broader governance context, which impact on the welfare of the poor.¹⁶ In some contexts, therefore, directly addressing poverty, land tenure, governance, or other major constraints on improved resources management may have a greater impact on natural resources management than the provision of financial incentives. Schemes planned and implemented with full local participation and with programming informed by the needs of poor communities may perform better at addressing both rural livelihoods and environmental management.¹⁷ Table 3 summarizes some of the potential benefits and risks or trade-offs of PES schemes.

Table 3: Potential Benefits and Risks or Trade-Offs of Payments for Environmental Services Schemes for the Rural Poor

Potential Benefits for the Rural Poor of Payments for Environmental Services

- Increased cash income
- Adoption of sustainable resource use practices
- Expanded experience with business activities
- Improved resilience of local ecosystems and flow of ecosystem services
- Increased productivity of land due to ecosystems service investments

Potential Risks and Trade-Offs

- Lack of clarity about what is being agreed, bought, and sold
- Loss of rights to harvest products or draw on environmental services
- Loss of employment
- Loss of control and flexibility over local development options and directions
- Distributional and equity impacts
- Increased exposure to risks
- Inequitable outcomes in changing circumstances
- Clash of culture and commerce

Source: Forest Trends, The Katoomba Group, and United Nations Environment Programme. 2008. *Payments for Ecosystem Services—Getting Started: A Primer*. Washington, DC: Forest Trends.

Why Look at Payments for Environmental Services in Rangelands?

There has been considerable interest in the potential for economic incentive schemes to support stakeholders to conserve forests¹⁸ and biodiversity¹⁹ and to provide watershed

¹⁶ A. Williams, M. L. du Preez, P. Bofin, and A. Standing. 2011. *REDD Integrity: Addressing Governance and Corruption Challenges in Schemes for Reducing Emissions from Deforestation and Forest Degradation (REDD)*. Bergen, Norway: Chr. Michelson Institute.

¹⁷ H. Rosa, D. Barry, S. Kandel, and L. Dimas. 2004. Compensation for Environmental Services and Rural Communities: Lessons from the Americas. *Political Economic Research Institute Working Paper*. No. 96. Amherst, MA: University of Massachusetts Press.

¹⁸ (a) N. Landell-Mills and I. Porras. 2002. Silver Bullet or Fool's Gold? A Global Review of Markets for Forest Environmental Services and Their Impact on the Poor. *Instruments for Sustainable Private Sector Forestry Series*. London, UK: International Institute for Environment and Development; (b) S. Wunder. 2007. The Efficiency of Payments for Environmental Services in Tropical Conservation. *Conservation Biology*. 21 (1). pp. 48–58.

¹⁹ The Economics of Ecosystems and Biodiversity (TEEB). 2010. *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*. <http://www.teebweb.org/wp-content/uploads/Study%20and%20Reports/Reports/Synthesis%20report/TEEB%20Synthesis%20Report%202010.pdf>

services.²⁰ Much less attention has been paid to the potential of incentive schemes to deliver improved ecosystem services in rangelands, i.e., grasslands and other grazing lands.²¹

Generally lacking dense forest cover and of limited value for crop production, the productivity, economic importance, and environmental value of rangelands are often overlooked.²² Rangelands are defined by their use for grazing by domestic or wild herbivores (footnote 22b), and include a range of vegetation types, such as open grasslands and shrublands, as well as grassland with low woody plant canopy cover. Other grazing lands, such as pasture, are often common land used within agricultural zones and forested areas. A number of global estimates of the extent of grazing lands, rangelands, and grasslands have been made. The more reliable among this is for grasslands, the global extent of which has been estimated at 5,250 million hectares (ha), with 28% of the world's grasslands found in semiarid regions, 23% in humid regions, 20% in cold regions, and 19% in arid regions.²³

Rangelands, including grasslands, harbor biodiversity of global importance;²⁴ store up to 30% of the world's soil carbon;²⁵ and provide a range of other use and nonuse values, including soil conservation, water supply and retention, recreation, and spiritual values (footnote 21). Of the 145 major watersheds of the world, 25 are made up of at least 50% grassland, and almost half of the 234 global centers of plant diversity that house important plant gene pools include grassland habitat (footnote 23). Rangelands across the globe are vulnerable to habitat loss through conversions to other uses, such as crop cultivation and urban development (footnote 23). Only 7.6% of global grasslands are in protected areas, a lower percentage than forests;²⁶ and six out of the 13 most at-risk biomes worldwide are grasslands.²⁷

²⁰ (a) I. Porras, M. Grieg-Gran, and B. Neves. 2009. All That Glitters: A Review of Payments for Watershed Services in Developing Countries. *Natural Resource Issues*. No. 11. London, UK: International Institute for Environment and Development; (b) D. Southgate and S. Wunder. 2009. Paying for Watershed Services in Latin America: A Review of Current Initiatives. *Journal of Sustainable Forestry*. 28 (3–5). pp. 497–524.

²¹ (a) B. Heidenreich. 2009. *What Are Global Temperate Grasslands Worth? A Case for Their Protection*. <http://cmsdata.iucn.org/downloads/grasslandssocioeconomicreport.pdf>; (b) S. Silvestri, P. Osano, J. de Leeuw, M. Herrero, P. Ericksen, J. Kariuki, J. Njuki, C. Bedelian, and A. Notenbaert. 2012. Greening Livestock: Assessing the Potential of Payment for Environmental Services in Livestock Inclusive Agricultural Production Systems in Developing Countries. *ILRI Position Paper*. Nairobi, Kenya: International Livestock Research Institute.

²² (a) R. Hatfield and J. Davies. 2006. *Global Review of the Economics of Pastoralism*. Nairobi, Kenya: International Union for Conservation of Nature; (b) L. t'Mannetje. 2002. *Global Issues of Rangeland Management*. <http://www.date.hu/acta-agraria/2002-08i/mannetje.pdf>; (c) C. Neely, S. Bunning, and A. Wilkes. 2009. Review of Evidence on Drylands Pastoral Systems and Climate Change: Implications and Opportunities for Mitigation and Adaptation. *Land & Water Discussion Paper*. No. 8. Rome, Italy: FAO.

²³ R. White, S. Murray, and M. Rohweder. 2000. *Pilot Analysis of Global Ecosystems: Grassland Ecosystems*. Washington, DC: World Resources Institute.

²⁴ (a) R. Blench and F. Sommer. 1999. Understanding Rangeland Biodiversity. *ODI Working Paper Series*. No. 121. London, UK: Overseas Development Institute; (b) W. Henwood. 1998. An Overview of Protected Areas in the Temperate Grassland Biome. *Parks*. 8 (3). pp. 3–8; (c) footnote 23.

²⁵ (a) Footnote 23; (b) J. Grace, J. San Jose, P. Meir, H. S. Miranda, and R. A. Montes. 2006. Productivity and Carbon Fluxes of Tropical Savannas. *Journal of Biogeography*. 33. pp. 387–400.

²⁶ World Resources Institute. EarthTrends. <http://earthtrends.wri.org/text/biodiversity-protected/map-249.html>

²⁷ J. Hoekstra, T. M. Boucher, T. H. Ricketts, and C. Roberts. 2005. Confronting a Biome Crisis: Global Disparities of Habitat Loss and Protection. *Ecology Letters*. 8 (1). pp. 23–29.

For pastoralists and other livestock keepers, rangelands provide important productive services. Livestock support the livelihoods of more than 1 billion people, including the majority of the world's poor; and the livestock sector in many developing countries contributes an important part of national gross domestic product (GDP).²⁸ At the same time, livestock grazing is often attributed a key role in degradation of ecosystems by overgrazing,²⁹ driving demand for deforestation,³⁰ and demand for fodder crops which drives arable land expansion.³¹ Ecosystem degradation, in turn, affects the productivity and long-term sustainability of livestock production.

Incentives for improved ecosystem services from rangelands have received little attention to date (footnote 21). This report provides a descriptive overview of 50 PES schemes in operation in grasslands and other grazing lands worldwide and discusses some key issues relating to the design of such schemes. The final sections discuss the relevance of the review for Mongolia, a country whose land area is dominated by rangelands, which provide the basis of livelihoods for about 40% of the population.

Framework and Methods

As noted above, few PES schemes conform to the narrow market-based definition, and diverse approaches and measures are applied in practice. In the rangelands context, there are a number of other common forms of intervention aimed at shaping incentives for environmental management and ecosystem services provision. Examples include enactment of legislation to control grazing,³² establishment of protected areas under existing laws (footnote 24b), provision of subsidies for inputs or products, grant investment in improved livestock and grassland management projects, and technical extension services. PES schemes are distinguished by the explicit intention of the schemes to incentivize provision of environmental services by making conditional payments. Grants, subsidies, and taxes may also have these goals. By contrast, PES schemes imply that the provision of incentives (e.g., cash payments) is conditional on performance of a desired management activity, achieving a desired environmental state, provision of a specified good or service, or progress toward certain environmental outcomes (footnote 5b and 5c).

There are also different degrees of conditionality, which we have represented in a heuristic framework (Figure 1). The framework suggests that forms of support for environmental service provision in rangelands (including PES schemes) can be differentiated by the degree to which payments are made in return for one-off or recurring delivery of the required service, and by whether the performance required is adoption of a management activity or provision of an environmental service itself, i.e., inputs, states, or outputs (footnote 5c).

²⁸ (a) World Bank. 2007. *World Development Indicators*. Washington, DC; (b) World Bank. 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC.

²⁹ H. Steinfeld, P. Gerber, T. Wassenaar, V. Castel, M. Rosales, and C. de Haan. 2006. *Livestock's Long Shadow*. Rome, Italy: FAO.

³⁰ T. Downing, S. B. Hecht, H. A. Pearson, and C. Garcia-Downing. 1992. *Development or Destruction: The Conversion of Tropical Forest to Pasture in Latin America*. Boulder, CO: Westview Press.

³¹ R. Naylor, H. Steinfeld, W. Falcon, J. Galloway, V. Smil, E. Bradford, J. Alder, and H. Mooney. 2005. Losing the Links between Livestock and Land. *Science*. 310 (5754). pp. 1621–1622.

³² A. Tal. 2009. The Logic and Logistics of Grazing Regulations. *Land Degradation and Development*. 20 (4). pp. 455–467.

Figure 1: Typology of Forms of Support for Environmental Service Provision in Rangelands

	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Support and conditionality	Technical support for planning and implementing improved land management practices	Supporting initial costs of adopting improved land management practices	Recurring payments for implementing improved land management practices	Recurring payments for delivery of ES
Scheme characteristics	Voluntary participation No direct payment Support not conditional	Voluntary ES delivery not measured Payments not performance-related	Voluntary ES delivery not measured Payments tied to performance of BMPs Monitoring of BMPs	Voluntary ES delivery measured Payments tied to results Monitoring of ES

BMP = best management practice, ES = environmental service.

Source: Project team.

Information on existing PES schemes operational in rangelands across the globe was obtained from available publications and internet resources in English and Chinese. Information sought on the PES schemes included indications of the scale (in hectare and/or financial scale) of each scheme, the environmental services targeted and why, who the suppliers of the environmental service are, what is paid for and how it is paid, how compliance and progress are monitored, who the buyers are, and what institutional arrangements link buyers with suppliers, including the legal framework of each scheme. PES schemes were included for review in the following overview of international PES schemes, where information on most items could be obtained and where the scheme is already in operation. The inclusion of schemes in this review is not comprehensive.

Many potential and existing schemes were not included in the review for various reasons, leading to some areas of underrepresentation, particularly the following:

- (i) Wildlife predation compensation schemes have not been included, unless they are designed to provide positive incentives for wildlife conservation and contain an element of conditionality.
- (ii) There is a huge range of ecotourism-based incentive schemes throughout all continents, which, by and large, have not been included.
- (iii) The use of community conservation agreements (CCAs) is becoming increasingly popular among some conservation organizations based in the United States (US), but only a few CCA-type schemes were included in this review because of limited published descriptions.
- (iv) There are a variety of local PES schemes in Latin America focusing on forest and watershed services.³³ Due to incomplete information, not all schemes involving grazing lands have been included.

³³ (a) S. Pagiola, P. Agostini, J. Gobbi, C. de Haan, M. Ibrahim, E. Murgueitio, E. Ramírez, M. Rosales, and J. Pablo Ruíz. 2004. Paying for Biodiversity Conservation Services in Agricultural Landscapes. *Environment Department Paper*. No. 96. Washington, DC: World Bank; (b) footnote 20b.

- (v) There are a large number of agri-environmental schemes in the European Union (EU), funded by a combination of EU and national government funds. Only some of these schemes have been included. Given the diversity of grassland management issues in the EU, there are likely to be several schemes in other EU member states with interesting design components that have not been reviewed here. This review also examines federal government incentive schemes in the US and Canada but does not treat the schemes implemented by each state or province independently. By contrast, even though many Australian schemes are the result of cooperation between the Commonwealth and states, these schemes are more diverse and a number of them have been treated separately.
- (vi) With the exception of one PES scheme, grant programs funded by bilateral and multilateral donors and funds such as the Global Environment Facility (GEF) have also been excluded.

In total, 50 rangeland PES schemes were identified. For most schemes, information on impacts was limited; and this review does not assess different scheme designs based on their impacts. The next section, therefore, focuses on describing how PES schemes in rangelands are structured and operated. The 50 schemes identified cover types 2–4 of the framework in Figure 1 and represent a range of diverse schemes rather than a comprehensive inventory. Annex 1 provides a brief summary of each scheme, and Annex 2 provides more details and data sources.

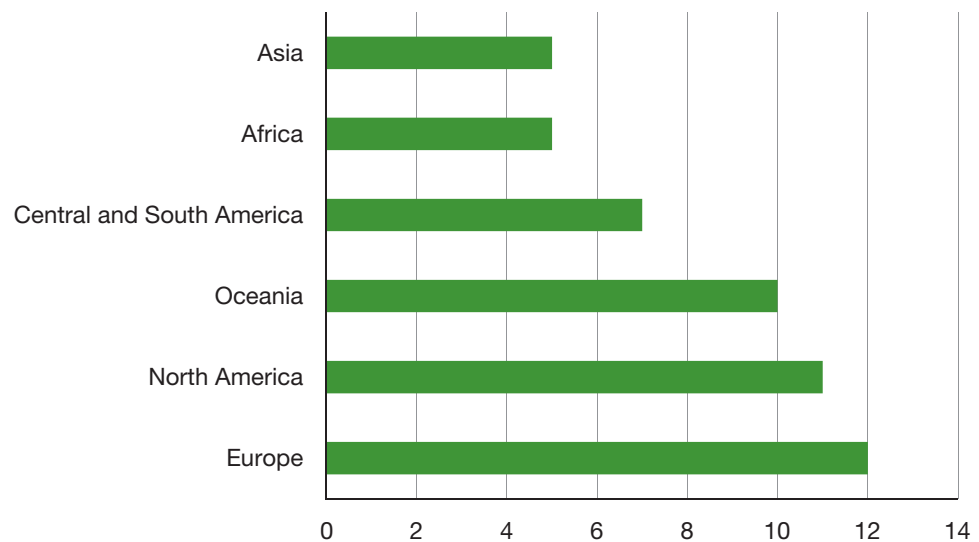
In addition to the global review, available information on PES schemes in Mongolia was sought through publications, internet materials, and inquiries with a number of experts in the environmental field in Mongolia. Since most schemes identified are either at a conceptual stage or still under development, they were not included in this review. A qualitative analysis was made of emerging PES schemes in Mongolia, focusing on the potential constraints and opportunities for rangeland-related PES schemes in Mongolia.

Overview of International Payments for Environmental Services Schemes

Location and Scale

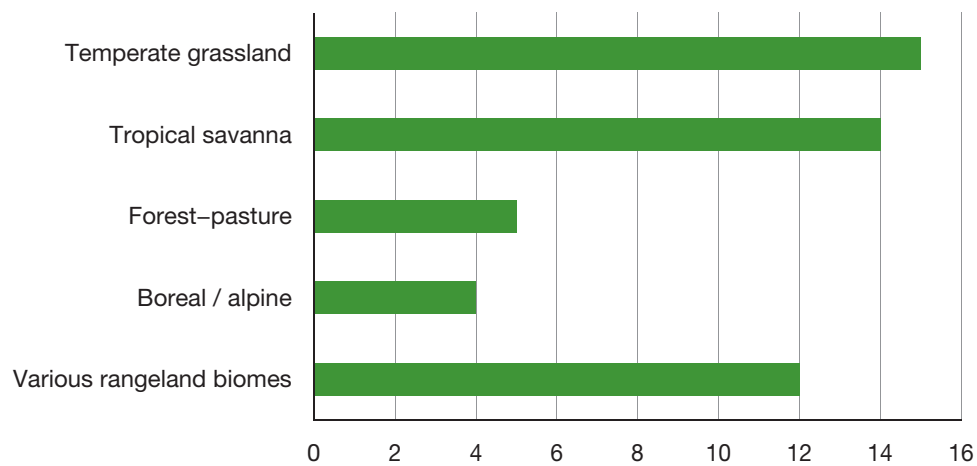
The Americas, Europe, and Oceania have the largest number of PES schemes reviewed (Figure 2). Schemes from developed countries in Australia, Europe, and North America account for two-thirds of the schemes reviewed. The US and Australian federal (Commonwealth) and state governments have been developing a number of incentive mechanisms in recent years to improve the delivery of ecosystem services by land users. Most European countries have implemented at least one agri-environmental scheme addressing grasslands.

Figure 2: Payments for Environmental Services Schemes by Location



Source: Figure based on data derived from literature review.

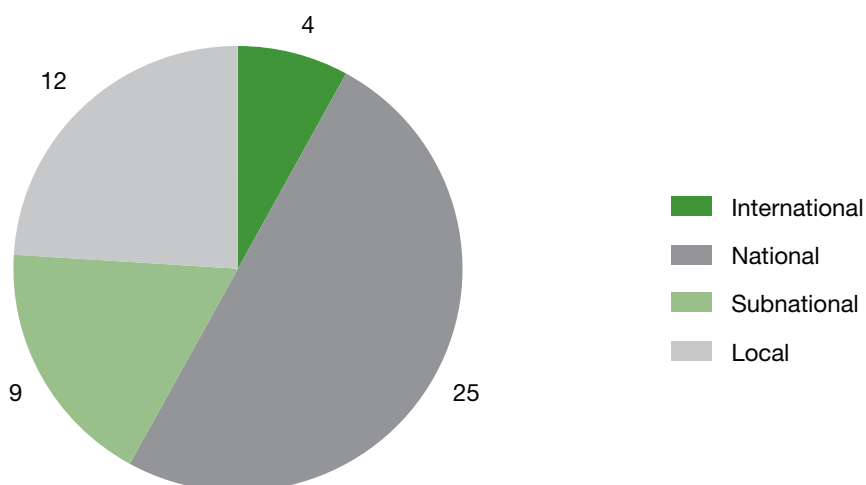
European and North American schemes account for the large number of PES schemes in temperate grasslands (Figure 3). Many Australian PES schemes are in tropical savanna type biomes; hence, the large number of savanna schemes. Most of the US PES schemes and the three PES schemes in the People's Republic of China (PRC) reviewed are nationwide schemes and, therefore, cover multiple rangeland types (Figure 3). The

Figure 3: Payments for Environmental Services Schemes by Biome Type

Source: Figure based on data derived from literature review.

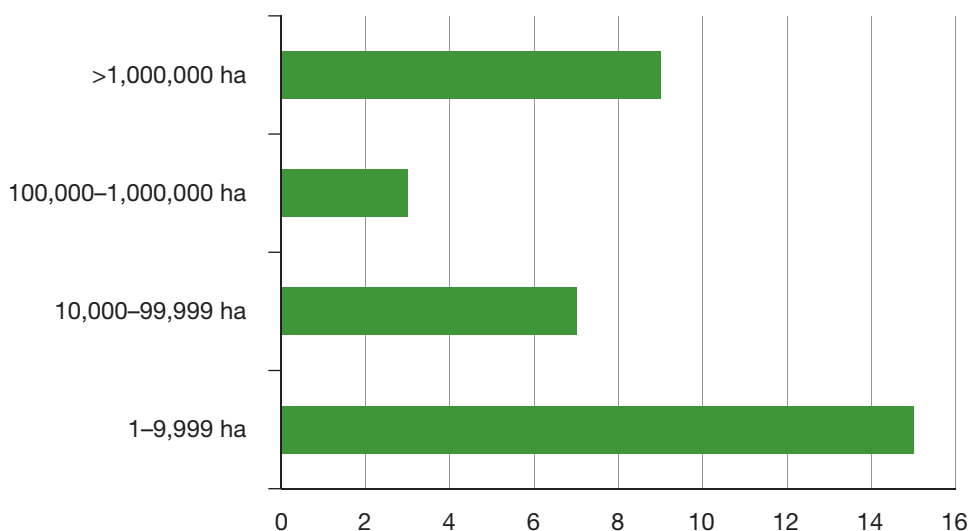
majority of PES schemes in forest-pasture biomes occur in Latin America, where forest conversion for creation of pasture is one of the major threats to forest conservation.

Figures 4 and 5 give an indication of the scale of the PES schemes for which information was reviewed. In terms of the level at which the PES scheme is implemented, half of the 50 schemes reviewed are national schemes (Figure 4). About a quarter of the schemes reviewed are more than 100,000 ha in scale (Figure 5). The total area enrolled was identified

Figure 4: Payments for Environmental Services Schemes by Scale

Source: Figure based on data derived from literature review.

Figure 5: Payments for Environmental Services Schemes by Area



ha = hectare.

Notes:

1. Area enrolled identified for 34 out of 50 PES schemes.
2. Data refer to different years.
3. For some schemes, this is accumulated enrolled area. Some PES schemes allow short-term enrollment, so the area enrolled at any one time may be smaller than indicated.
4. Data for some programs include non-rangeland enrolled.

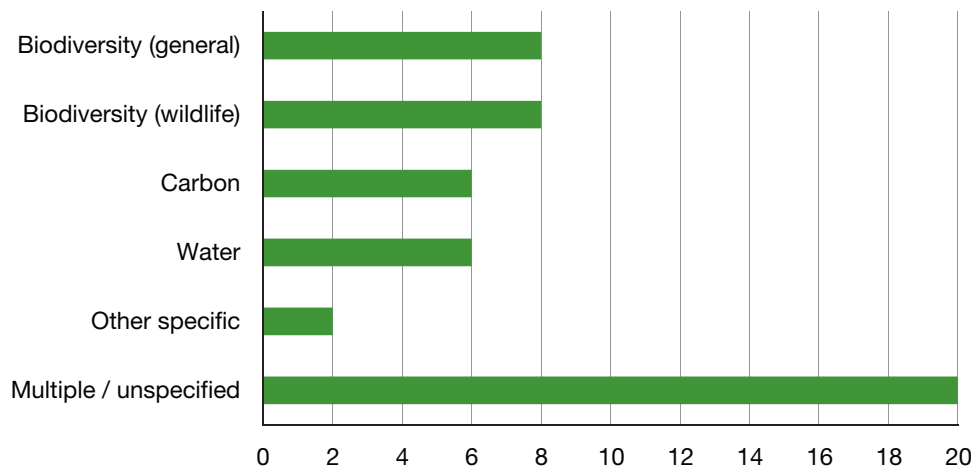
Source: Figure based on data derived from literature review.

for 15 of the 25 national schemes. Among these, 9 are more than 1 million ha in scale, and 11 are more than 100,000 ha in scale. Subnational schemes typically address regional issues and vary in physical area covered. There are also a large number of local schemes that are small in physical scale. The international schemes reviewed—including Clean Development Mechanism (CDM) or voluntary market carbon sequestration projects—are also small in scale. Despite their subnational nature, several of the Australian schemes reviewed have also enrolled very small land areas, either because the schemes were pilots or because the full scheme has not been operating for many years. It is difficult to identify comparable data on the financial scale of the programs, since programs have been running for different durations and incurred different design costs, which are only included in information available on cost estimates for some programs.

What Are the Environmental Services Demanded?

As indicated in the introduction, rangelands provide multiple environmental services. Figure 6 shows the environmental services targeted by the 50 schemes reviewed. About one-third specifically target biodiversity services, including plant and wildlife biodiversity. Given the close interrelationship between many environmental services, as well as the value of rangelands for productive services, it is perhaps unsurprising that 30% of the 50 schemes reviewed specifically enumerate multiple services that are targeted. In part, this reflects a developing understanding of environmental services over time. For example, the US Farm and Ranch Lands Protection Program initially focused on preserving topsoil.

Figure 6: Payments for Environmental Services Schemes by Targeted Environmental Services



Notes: "Other specific" includes soil erosion and salinity. Of the 20 "multiple and/or unspecified," 5 are unspecified and 15 are explicitly state multiple ecosystem services.

Source: Figure based on data derived from literature review.

With the 2008 Farm Bill, however, its remit widened to include more general "agricultural use and related conservation values." This also reflects the difficulty and cost of quantifying the impact of changes in management practice on the flow of specific ecosystem services.

In terms of the environmental services demanded, a distinction can be made between those PES schemes focusing on overcoming negative externalities (e.g., soil erosion or salinity) and those focusing on increasing provision of positive externalities (e.g., increasing biodiversity or preserving water supplies). In the case of many payments made under the EU PES schemes, the precise nature of the positive externality is often difficult to define, e.g., where schemes pay land users for maintenance of "cultural landscapes." Although this may be difficult to measure, research has shown willingness to pay by citizens for cultural landscape components.³⁴ Since target ecosystem services are sometimes not well defined, some EU PES schemes have been characterized more as producer support subsidies rather than PES schemes in the strictest sense.³⁵

What Is Being Paid For?

Very few of the PES schemes reviewed actually reward measured delivery of ecosystem services. Only three of the international PES schemes reviewed made payments on the basis of field measurements of ecosystem services. These were (i) a German pilot PES

³⁴ For example, D. Campbell. 2007. Willingness to Pay for Rural Landscape Improvements: Combining Mixed Logit and Random-effects Models. *Journal of Agricultural Economics*. 58 (3). pp. 467–483.

³⁵ T. Glebe. 2007. The Environmental Impact of European Farming: How Legitimate Are Agri-Environmental Payments? *Applied Economic Perspectives and Policy*. 29 (1). pp. 87–102.

scheme for increasing vascular plant diversity, in which payments were made on the basis of the number of species counted in each plot enrolled in the pilot; (ii) a Dutch PES scheme that paid farmers per clutch of bird eggs found; and (iii) a Swedish PES scheme that paid communities for additional carnivore offspring. Five PES schemes provided ex post rewards for estimated delivery of ecosystem services. These PES schemes were based on indirect methodologies for estimating ecosystem service delivery in response to documented management activities. Four of these PES schemes paid for carbon sequestration services, in which various methodologies were applied for estimating the response of greenhouse gases (GHGs) to changes in land management, but GHG fluxes were not actually measured.

Most PES schemes (41) paid land users for performing certain land management practices which are assumed to lead to positive environmental outcomes. In most cases, these were incentives to adopt a particular management practice (e.g., to plant hedgerows or reduce stocking levels); but, in some cases, the payment was made to prevent an undesirable action (e.g., to avoid undesirable land use conversions or to avoid disturbing wildlife). Among PES schemes making payments for management actions, 20 targeted payments by specifying some characteristic of the land plot to be enrolled in the program, usually by assessing the plot against an index of environmental benefits (see section on measurement below), or by targeting specific types of land, such as degraded lands where restoration is assumed to deliver larger amounts of the desired environmental service or where land plots are known to be the habitat of a target species.

Most PES schemes reviewed specify land management practices eligible for financial support. There is a huge diversity of specific practices supported in one PES scheme or another, some of which are illustrated in Table 4. Environmental services of local value and locally relevant management practices vary greatly. In the Canadian, European, and US PES schemes, subnational agencies are empowered to determine priority management practices for support. Large-scale PES schemes in the PRC, by contrast, specify eligible practices at the national level.

Table 4: Illustrative Management Practices in Rangelands That Deliver Ecosystem Services

Ecosystem Service	Illustrative Management Practices
Water services	• Maintaining riparian buffers • Restrictions on grazing • Afforestation • Preventing conversion of forests
Wildlife habitat	• Leaving field corners untilled • Maintaining hedgerows • Preventing poaching • Preventing deforestation
Carbon	• Afforestation • Preventing deforestation • Rotational or planned grazing
Soil conservation	• Planting perennial grasses • Limit stocking densities

Source: All illustrative practices derive from protocols of schemes reviewed in this report.

Measurement, Monitoring, and Enforcement

Measurement

Most PES schemes do not actually measure the ecosystem services delivered by suppliers but make payments conditional upon performance of a certain management practice. In this case, monitoring is performed by observing or requiring reporting on the practice or a piece of related infrastructure that has been put in place to enable the practice (e.g., an anaerobic digester or fence).

Indexes of environmental services are used in a number of PES schemes reviewed. The purpose of measurement in these cases is not to make ex post measurements of ecosystem services delivered, but as an ex ante indicator of the value of land plots applying for enrollment or of the relative value of proposed changes in management practices provided by different bids for enrollment. Two examples are presented in Boxes 1 and 2. Where land plots have been selected after measurement against some index of ecosystem value or potential ecosystem benefits, this can be used to help management agencies target payments to those land plots that will deliver the highest value for a given budget. Some PES schemes provide guidance on how many points will be awarded for each type of land or each management activity, requiring that each farm must reach a minimum total number of points in order to qualify, but leaving selection of plots and activities up to the farmer.

Monitoring and Enforcement

Monitoring practices appear to vary widely between PES schemes and are often documented in the materials made available on the internet by government implementation agencies. Several PES schemes were reviewed that make one-off payments to support the adoption of improved management practices (Type 2 schemes in the terminology of Figure 1). In North America, these PES schemes typically require some degree of co-funding by the landowner, and public payments are made to reimburse landowners for costs already incurred. Monitoring is therefore restricted to ascertaining whether the action has, in fact, been performed. Since most programs do not measure actual environmental services delivered, these are not monitored. Among the few systematic evaluations that have been conducted, these tend to rely on the wealth of academic research results that usually builds up as large-scale programs are implemented. An example is the Conservation Effects Assessment Project of the US Natural Resources Conservation Service, which recently completed a review of the impacts of various incentive schemes in grazing lands.³⁶ However, even in the US, which is relatively well-researched, analysis of available evidence was unable to accurately quantify the environmental benefits of these programs.³⁷

Type 3 schemes—those that provide recurring payments for specified management activities—typically rely on a legal contract and the threat of inspection, but, so far, the available reports imply that inspections of land plots are limited to small samples. Fuller auditing of program documentation held within the implementation agencies is more common.

³⁶ D. Briske, ed. 2011. *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps*. Washington, DC: United States Department of Agriculture, Natural Resources Conservation Service.

³⁷ Footnote 36, pp. 10–11.

Box 1: Carbon and Biodiversity Indexes in Silvo-Pastoral Management

Silvo-pastoral practices, such as maintaining and planting trees in pastures, can increase carbon stocks and improve biodiversity (e.g., birds, butterflies), while cut-and-carry plots can substitute for freely grazed pasture and thus preserve forest. A pilot project operating in three Latin American countries developed an index to reflect the carbon and biodiversity status of land plots and farms. A list of land uses was prepared, and each land use was allocated points for carbon and biodiversity benefits. These two indexes were then aggregated to form an environmental service index to be employed as the basis for calculating payments to participants. Payments were made for the purpose of overcoming cost barriers to adoption. Payment levels were set at \$75 per incremental point per year over a 4-year period, up to a maximum of \$4,500 per farm.

Land Use	Biodiversity Index	Carbon Sequestration Index	Environmental Service Index
Annual crops (annual, grains, tubers)	0.0	0.0	0.0
Degraded pasture	0.0	0.0	0.0
Natural pasture without trees	0.1	0.1	0.2
Improved pasture without trees	0.4	0.1	0.5
Semi-permanent crops (plantain, sun coffee)	0.3	0.2	0.5
Natural pasture with low tree density (<30/ha)	0.3	0.3	0.6
Natural pasture with recently planted trees (>200/ha)	0.3	0.3	0.6
Improved pasture with recently planted trees (>200/ha)	0.3	0.4	0.7
Monoculture fruit crops	0.3	0.4	0.7
Fodder bank	0.3	0.5	0.8

ha = hectare.

Source: S. Pagiola, P. Agostini, J. Gobbi, C. de Haan, M. Ibrahim, E. Murgueitio, E. Ramírez, M. Rosales, and J. Pablo Ruiz. 2004. Paying for Biodiversity Conservation Services in Agricultural Landscapes. *Environment Department Paper*. No. 96. Washington, DC: World Bank.

Of the 50 PES schemes reviewed, only three PES schemes relied on field sampling for monitoring. Other PES schemes that reward estimated provision of environmental services mostly used proxy indicators and estimation methodologies (sometimes supplemented by field sampling), as is common with CDM and other carbon accounting methodologies.

Who Is Being Paid?

In all but one case, landowners or land users received payments, often directly into their private bank accounts. In many cases, these landowners are individuals. In some cases, however, groups of households, entities such as companies, NGOs, or charities receive payments. The decisions over eligibility of various types of actors to receive rewards largely reflect tenure arrangements and the structure of the agricultural business and conservation sectors in each country. Six PES schemes make reward payments to communities since, in these contexts, rangelands are collectively managed by indigenous communities. In these cases, the communities themselves decide on the use of the payments. Two PES

Box 2: Environmental Benefits Index in the United States Conservation Reserve Program

The Conservation Reserve Program pays farmers to retire cropland from production, most of it being seeded to grass. Landowners submit competitive bids in a nationwide auction. The Environmental Benefits Index is used to evaluate and rank land offered for enrollment. Scores are based on the expected environmental benefits to soils, water quality, wildlife habitat, and other priority issues. Each bid submitted is assigned a number of points based on its expected environmental benefits. Each bid is then compared with all other bids in the national auction, and bids are accepted or rejected on the basis of the ranking results.

Permanently Introduced Grasses and Legumes

Planting of two to three species of an introduced grass species	10 points
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Establishment of Permanent Native Grasses

Mixed stand (minimum of three species) of at least two native grasses and at least one forb or legume species beneficial to wildlife	20 points
Mixed stand (minimum of five species) of at least three native grasses and at least one shrub, forb, or legume species best suited to wildlife in area	50 points

Source: United States Department of Agriculture. Farm Service Agency. Aerial Photography Field Office. http://www.apfo.usda.gov/Internet/FSA_File/crpebi03.pdf

schemes make payments to groups of landowners. One scheme in Brazil makes payments to local governments only. This PES scheme is designed to provide local governments with fiscal incentives to increase the area under protected area management.

A large number of PES schemes reward land users for adopting management practices. Of the 50 PES schemes, eight schemes made payments based solely on the contents of management plans. Among other methods for deriving payments, 14 schemes paid a flat rate per hectare. In some cases, this flat rate is derived by PES scheme design or implementing agencies on the basis of calculations of the average implementation costs and foregone income of representative land users in the program region. Muñoz-Piña et al. document the process of defining payment levels in a Mexican PES scheme to prevent deforestation, in which a flat rate had initially been calculated based on farm surveys, but was finally agreed after negotiation with agribusiness sector and farmer representatives.³⁸ One PES scheme pays on the basis of implementation costs and foregone income, but calculates this for each participant in the program based on their proposed management plan. Twelve PES schemes pay land users on the basis of the assessed environmental value of land plots or an assessment of the value of ecosystem service changes using environmental benefit indexes. In some cases, this is then translated into a per hectare payment. In others, the payment is linked to the number of points on the index scale, where the value of one point has been set in advance. Six of the 50 PES schemes require land users to submit bids for the value of the services to be provided, with implementing agencies selecting those bids that have the highest environmental value per unit cost of the bid. Eight PES schemes pay land users on the basis of measured or estimated environmental services provided. In the case of the carbon sequestration projects reviewed, 1 ton of carbon either sells for a price agreed during the development of the project or for the market price of 1 ton of carbon at the time of sale.

³⁸ C. Muñoz-Piña, A. Guevara, J. M. Torres, and J. Braña. 2008. Paying for the Hydrological Services of Mexico's Forests: Analysis, Negotiations and Results. *Ecological Economics*. 65 (4). pp. 725–736.

Most of the national and subnational PES schemes are implemented by preexisting government agencies. Among the smaller PES schemes, there is a variety of intermediaries, such as trust funds and NGOs, some of which were set up specially to administer the PES scheme. Boxes 3 and 4 illustrate the roles of these intermediaries.

Box 3: The Natural Resources Conservation Service as Intermediary in the United States Incentive Programs

Apart from Conservation Technical Assistance, which is funded through annual budget appropriations, all major conservation programs of the United States Department of Agriculture (USDA) are funded by the federal government through the Commodity Credit Corporation (CCC). The CCC is incorporated as a federal corporation within USDA by the Commodity Credit Charter Act (62 Stat.1070; 15 USC 714) of 1933. The CCC is managed by a board of directors, subject to the general supervision and direction of the Secretary of Agriculture who is the chair of the board. Other board members are appointed by the President with approval of the Senate and Congress. Because the CCC has no operational staff, its programs are carried out through the personnel and facilities of the USDA Farm Service Agency (FSA). The FSA, in turn, provides oversight of the Natural Resources Conservation Service (NRCS), which implements agricultural conservation programs directly with farmers and other landowners. The NRCS has three regional centers across the country, responsible for oversight and evaluation of the state NRCS offices, which also provide technical support to the states. Staff of each state NRCS administer the incentive programs. Direct advice to landowners is provided by private technical service providers (TSPs) who must be registered with and certified by the NRCS. NRCS staff, other government agencies, and private businesses all apply for certification. When a landowner participating in a program requests technical support, the NRCS allocates a budget to the participant based on what it would cost the NRCS to conduct the work. The program participant selects a TSP from the list of registered providers and contracts them to provide the services. The participant is reimbursed by the NRCS after the payment has been made.

Sources: USDA. Natural Resources Conservation Service. <http://www.nrcs.usda.gov>; and USDA. Farm Service Agency. http://www.fsa.usda.gov/Internet/FSA_File/ccc_fact_sheet.pdf

Box 4: Institutional Arrangements in a Carnivore Conservation Program

In northern Sweden, indigenous Sami people herd reindeer. Herders lose nearly 20% of their flocks to carnivores each year. In 1996, the Government of Sweden implemented an incentive scheme to maintain stable populations of wolverines, lynx, and wolves in the area. The state pays Sami villages depending on the number of carnivore reproductions that are certified on the villages' reindeer grazing grounds. The payments are not made to compensate for actual predation losses. The money is paid to Sami villages and the villages decide how to use and distribute the money. In most villages, all herders are equally exposed to predation, and most villages decided to use the payment for collective purposes. Only a few villages decided to distribute the funds to individuals. It is common that some herds are more exposed than others, so villages tended to allocate some of the funds to individuals. Most villages review annually how to spend the funds. Paying villages collectively gave community members the flexibility to decide over fund use in ways that best suited local conditions.

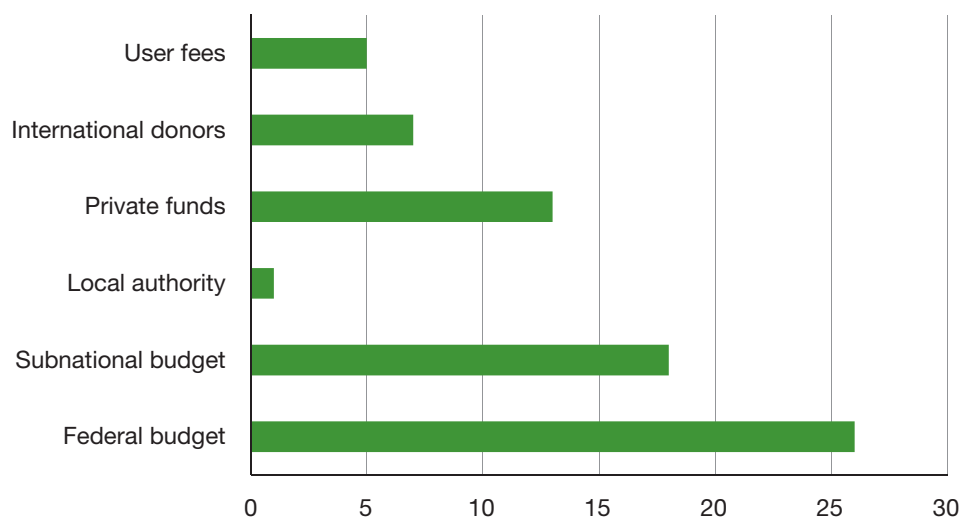
Source: A. Zabel and K. Holm-Müller. 2008. Conservation Performance Payments for Carnivore Conservation in Sweden. *Conservation Biology*. 22 (2). pp. 247–251.

Who Pays and How?

Who Pays?

Of the 50 PES schemes reviewed, about half (26) receive funding from national (federal) state budgets and one-third receive funds from subnational government budgets (Figure 7). Funds from international donors, which were mostly used to design, pilot, and initiate PES schemes in developing countries, also ultimately come from governments. That is, in a large number of cases, governments are representing taxpayers in making payments for ecosystem services. Private finance is a source of funding in about a quarter of the PES schemes reviewed. If payments made by land users as a result of cost-share requirements (eight North American PES schemes) are included together with the private finance, then 40% of PES schemes could be considered to involve private payments for environmental services in the cases reviewed here.

Figure 7: Who Pays for Rangeland Environmental Services?

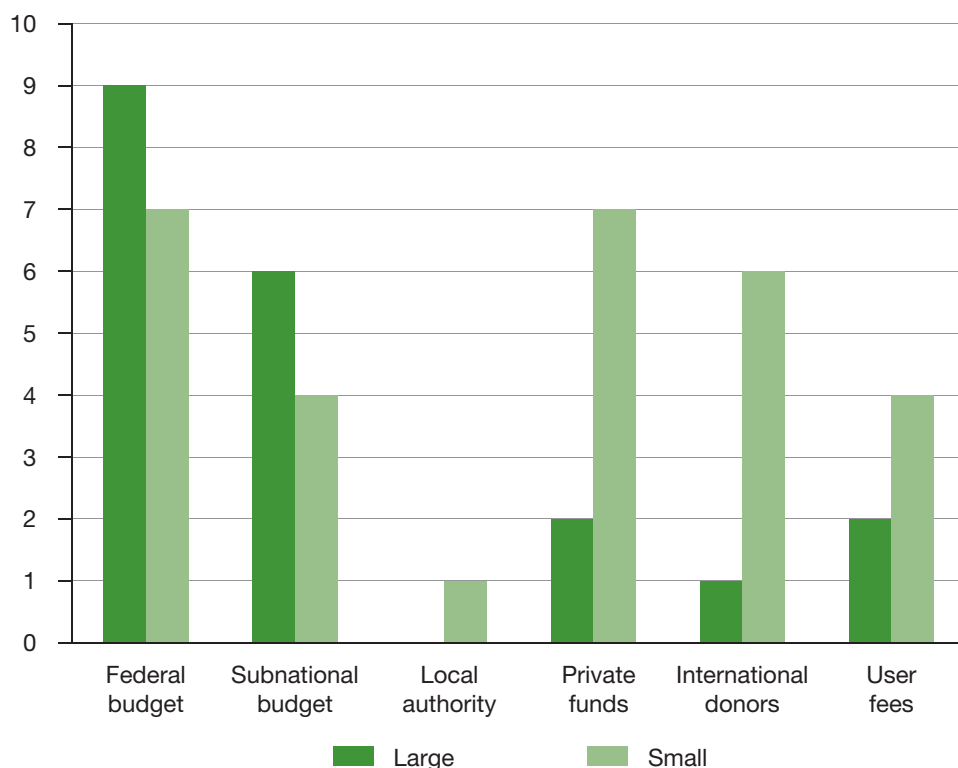


Note: Land user cost-share investments are not included in the figure.

Source: Figure based on data derived from literature review.

Figure 8 shows that the funding source differs somewhat between small and large PES schemes. For large PES schemes (>100,000 ha), federal and subnational state funds are the most common sources of funding. For small schemes (<100,000 ha), private funds and international donor funding have been common. Several PES schemes in Australia with funding from the Commonwealth and state (i.e., subnational) funding are also small scale. User fees contribute to four watershed management PES schemes involving management of grazing land (all in Latin America) and a habitat conservation and ecotourism program (CAMPFIRE) in Zimbabwe. No other ecotourism programs in rangelands have been included in the case studies reviewed.

Figure 8: Source of Funds for Large and Small Payments for Environmental Services Schemes



ha = hectare.

Notes:

1. Includes only 34 PES schemes for which area information is available.
2. Small PES schemes are those <100,000 ha, and large PES schemes are those >100,000 ha.
3. Land user cost-share investments are not included in the figure.

Source: Figure based on data derived from literature review.

How Are Payments for Environmental Services Schemes Enacted?

The introduction to this review noted that rangelands can deliver a variety of benefits, and Figure 6 showed that a variety of ecosystem services are being demanded from rangeland management. The cases reviewed come from a number of different countries and regions in each country, each of which has its own specific environmental issues, as well as issues driving changes in land use and range management. Thus, for each PES scheme, the justification for establishing a PES scheme (i.e., why there is effective demand) differs. Of the 50 cases reviewed, several specifically provide incentives to avoid conversion of land use and land cover in rangelands. In some cases, this is to preserve grassland or forest, while in other cases, it is to preserve wildlife or wildlife habitats associated with rangelands. Other PES schemes (e.g., agri-environment PES schemes in Europe and North America) address concerns such as declines in wildlife habitats within working agro-ecosystems. The drivers of ecosystem services decline, and the source of political demand that drives the establishment of these incentive PES schemes differs from case to case.

Most PES schemes operate within the existing legal environment. For large projects, this means that funds supporting PES scheme implementation were appropriated from regular agricultural or natural resource management budgets, and PES scheme implementation was planned through the same planning frameworks as other rural or agricultural support programs (Box 5). For example, the large-scale PES schemes in the PRC were enacted by decision of the State Council—the highest level of government—which enabled long-term appropriations for the PES schemes from the Ministry of Finance. Although decision-making processes vary between countries, the development and implementation of large-scale PES schemes in most cases is a question of enacting policy within existing legal frameworks. The Mexican Pagos por Servicios Ambientales Hidrológicos (PSAH; Payments for Hydrological Environmental Services Program) scheme was designed within the framework of an existing law, but required the development of an innovative fiscal instrument for appropriating and distributing funds, as described in Muñoz-Piña et al. (footnote 38). Most small projects also operate on the basis of existing laws, using contracts or trust funds to enact the transfer of funds and to ensure performance by the ecosystem service supplier. Trades in the voluntary carbon market have also taken place on the basis of existing laws, though buyers often require national government agencies to provide written evidence of “no objection” to secure their rights over the newly traded environmental assets.

Box 5: Legal and Policy Framework for Incentive Payments for Environmental Services Scheme in the United States

Conservation and land management activities are implemented not only by the United States Department of Agriculture (USDA), but also by the Forest Service, Bureau of Land Management, Fish and Wildlife Service (USFWS), and other federal government agencies. USDA is the federal department charged with the development and execution of federal government policy on farming, agriculture, and food. One of its main roles is the drafting of the Farm Bill every 5 years or so, which is submitted to Congress for approval. Most of the programs and projects listed in the Farm Bill are under the purview of USDA. In recent years, USDA has shown a preference for addressing environmental problems caused by agriculture through financial assistance and education programs targeting private landholders.

These programs are of four broad types: working-land programs, land retirement programs, agricultural land preservation programs, and conservation and technical assistance. For example, the 2008 Farm Bill continued many programs and projects that had been initiated under the 1985, 1996, and 2002 Farm Bills (e.g., Environmental Quality Incentives Program, Conservation Security Program, etc.), made adjustments to some ongoing programs (e.g., by limiting the area to be supported under the Conservation Reserve Program), and created some new programs to address newly arising priority environmental issues.

Sources: USDA. Farm Service Agency. <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=la re&topic=aus>; and USDA. Economic Research Service. <http://www.ers.usda.gov/FarmBill/2008/Titles/TitleI/Conservation.htm>

There are, however, some cases in which the need to link demand and supply of ecosystem services required amendments to laws. In the case described in Box 6, introducing market mechanisms implied trade in environmental rights that had not previously been recognized and thus could not be protected. This required establishing new rights and duties for existing agencies responsible for regulating the trade in offsets. A review of legislation in the United Kingdom (UK) has also found that amendments to the wording of existing laws may be required to enact biodiversity banking in the UK.³⁹

Box 6: Legal and Policy Framework for Innovative Payments for Environmental Services Schemes in Australia

On its independence, Australia was founded as a federation of states and territories. Most taxes go to the Commonwealth (federal) government, so states depend in large part on Commonwealth transfers. In the 1980s, the National Action Plan for Salinity and Water Quality (NAPSWQ), which was jointly funded by the Commonwealth and the states, led to the establishment of catchment management authorities which have played a key role in supporting the Landcare movement. Through one-off grants to Landcare groups and individual landowners, the Landcare program supports initial adoption of improved land uses and land management practices. Given the distribution of fiscal revenue between federal and state governments, the federal government has played key roles in supporting the Landcare movement by making grants for Landcare groups available. A number of factors led to an increasing interest in market-based instruments, which was picked up within the framework of the NAPSWQ and materialized in the form of the National Market-Based Instruments Pilots Program, again funded jointly by the Commonwealth and state governments (2003–2005). These pilots and the decentralized planning system, which empowers states and territories to develop their own sustainable development plans within the national framework, have provided the basis for the plethora of innovative payments for environmental services (PES) schemes now taking shape in Australia, such as BushTender and EcoTender in Victoria and BioBanking in New South Wales (NSW).

The NSW State Plan, a state document outlining targets and priorities for a given implementation period, provides the policy framework within which BioBanking has been adopted as a tool to address biodiversity loss. Design of the tool, however, required amendments to the Threatened Species Conservation Act 1995 No. 101 (a state legislation which previously regulated aspects of biodiversity conservation in NSW), and the passing of the state Threatened Species Conservation (Biodiversity Banking) Regulation 2008, which required coordination of the regulations governing biobanking with existing laws such as the Crown Lands Act, National Parks and Wildlife Act, and so on. These amendments and new regulations provide the legal framework within which local government agencies responsible for management of the BioBanking PES scheme, private landowners, and purchasers of biodiversity offsets can operate. The NSW BioBanking PES scheme officially began in 2008, and to date has registered 80 hectares of eligible land. For most land managers, therefore, it is still the Landcare program implemented within the framework of the NAPSWQ that supports them to improve land use for enhanced ecosystem services.

Sources: T. Nabben. 1999. Funding to Community Landcare Groups in Western Australia. In D. Sanders, P. Huszar, S. Sombatnapit, and T. Enters, eds. *Incentives in Soil Conservation: From Theory to Practice*. Enfield, NH: Science Publishers; and S. Whitten, M. Carter, and G. Stoneham. 2004. *Market-Based Tools for Environmental Management*. Barton, Australia: Rural Industries Research and Development Corporation.

³⁹ J. Treweek. 2009. *Scoping Study for the Design and Use of Biodiversity Offsets in an English Context*. <http://www.defra.gov.uk/evidence/economics/foodfarm/reports/>

Discussion

Monitoring, Measurement, Costs, and Targeting

Most PES schemes reviewed do not directly pay for the delivery of increased flows of environmental services. Most PES schemes reward landowners for performing management practices that are assumed (mostly on the basis of previous research or consensus among stakeholders) to provide environmental benefits. Monitoring is, therefore, of the adoption of activities by landowners, not of their impacts. Two of the three PES schemes that did employ intensive on-site field measurements as the main basis for calculating reward payments to land users were both small-scale pilot projects. Some research has shown, however, that the assumed environmental outcomes may not always be delivered.⁴⁰ In the case of carbon accounting methodologies, the scientific credibility of estimation methods required by certification standards and the credibility of certifiers impact on the price of the ecosystem service traded.⁴¹

Many PES schemes apply measurements or field assessments of land plots and land management practices at the stage of enrolling land plots and land users in a program. For example, land condition and specific land management practices can be scored according to an index of the desired environmental benefits (Boxes 1 and 2). Such indexing has been used by several programs to help target the program's funds and thus increase the likelihood that the PES scheme will be cost-effective. For large programs, it is perceived that this delivers higher cost-effectiveness than no targeting or general geographical targeting. Some PES schemes combine both geographical and index-based targeting by setting limits on the enrollment eligibility of land in different locations. A further method used for targeting PES schemes is reverse auctions. Farmers appraise their own costs and desired benefits, and put in bids for how much they would want in order to implement certain improved management practices. The implementing agency can then select the bids that provide the most benefits per unit of cost. The success of such approaches in realizing improved budget efficiency depends in part, however, on how environmental benefit indexes are devised. It has been argued, for example, that some European agri-environment PES schemes that use ex ante assessment metrics mostly enroll land plots that already exhibit a high value of the targeted ecosystem service, but this does not mean the PES scheme can increase additional provision of the target service.⁴² Most environmental benefit indexes appear to be applied to measure the state of rangeland

⁴⁰ (a) D. Kleijn, F. Berendse, R. Smit, and N. Gilissen. 2001. Agri-Environment Schemes Do Not Effectively Protect Biodiversity in Dutch Agricultural Landscapes. *Nature*. 413. pp. 723–725; (b) D. Kleijn and W. Sutherland. 2003. How Effective Are European Agri-Environment Schemes in Conserving and Promoting Biodiversity? *Journal of Applied Ecology*. 40 (6). pp. 947–969; (c) A. Breeuwe, F. Berendse, F. Willems, R. Foppen, W. Teunissen, H. Schekkerman, and P. Goedhart. 2009. Do Meadow Birds Profit from Agri-Environment Schemes in Dutch Agricultural Landscapes? *Biological Conservation*. 142 (12). pp. 2949–2953.

⁴¹ M. Conte and M. Kotchen. 2009. Explaining the Price of Voluntary Carbon Offsets. *Center for the Study of Energy Markets Working Paper*. No. 193. Berkeley, CA: University of California Energy Institute.

⁴² A. Münch. 2010. Agri-Environmental Schemes and Grassland Biodiversity: Another Side of the Coin. *Jena Economic Research Papers*. No. 7. Jena, Germany: Friedrich Schiller University.

vegetation, although some allocate points on the basis of the estimated value of the change in vegetation in response to management options.

Other PES schemes, such as the CDM and voluntary carbon market projects, have developed complex methodologies in order to estimate—on the basis of minimal field measurement—the carbon benefits achieved. However, particularly in agricultural contexts, the cost-effectiveness of monitoring methodologies themselves is a critical issue, since accurately measuring carbon flows may cost more than the market value of the carbon itself.⁴³

Payments and Payment Levels

The PES schemes reviewed include those that (i) compensate for the costs of increased environmental service provision (e.g., wildlife damages), (ii) incentivize land users to avoid adverse land use conversions (e.g., avoided deforestation) that would lead to reduced environmental service provision, (iii) incentivize landowners to adopt improved management practices to increase provision of ecosystem services, and (iv) link incentives for land users with requirements for those who damage ecosystems to invest in improved land management practices (i.e., offsets).

In their implementation, most PES schemes are not seen as compensatory schemes. For example, EU and North American agri-environment incentive schemes are often seen as a producer subsidy or incentive. Seeking to incentivize adoption of new behaviors, many such schemes consider in their design process the costs (including opportunity costs) of adopting improved management practices. Some systems set payment levels based on calculations by the responsible agency of implementation and opportunity costs, while others set payments on the basis of the rental value of a hectare of land. Some operate on the basis of bid offers by land users, so that the final price reflects the opportunity costs perceived by the land users themselves.

In the various environmental banking schemes (e.g., US wetland banking or Australian biodiversity banking), for suppliers of wetlands or biodiversity, the income received can compensate their direct and opportunity costs of providing these environmental services; for developers, paying these costs is lower than the costs of abandoning the development proposal. In this way, government action to set up a market for offsets is intended to promote the efficient allocation of resources.

The Roles of Government and Markets

One reason for the rising interest in PES is their potential to mobilize new sources of finance for improved environmental management. Most of the Type 2 PES schemes which provide one-off grants to landowners to implement improved management practices require some degree of co-funding from the landowners themselves. State funds may also be used to leverage private funding of conservation actions. Leveraging private funding is not the only target of federal incentive programs. Many federal incentive schemes in Australia and some in the US require co-funding agreements between the federal and subnational state governments. The Brazilian ICMS Ecológico scheme is explicitly designed to encourage state governments to expand the area of lands under protected status.

⁴³ W. Galinsky. 2010. Ecological Economy of Measured Field Δ SOC Data. Presentation at the World Bank BioCarbon Fund Soil Carbon Round Table. Washington, DC. 4 May.

Private entities were buyers of environmental services in about a quarter of the PES schemes reviewed in this report. Examples include tour operators paying communities to maintain wildlife habitats and wildlife populations, and private buyers of carbon credits from afforestation projects. Several cases show, however, that leveraging private investment also implies major roles for government in initiating and regulating markets. The examples of offsets for wetland habitat (US) or threatened species (Australia), or offsets to meet compliance with GHG emission caps, show that governments can play key roles in both setting the rules regulating private actors and establishing the markets through which trade can take place.

Despite the hope that PES mechanisms can leverage private finance, this review—which is not based on a comprehensive census of rangeland PES schemes—suggests that governments have been the main purchasers of ecosystem services in rangelands across the world. Private finance is concentrated in smaller-scale projects, most likely reflecting the willingness of private buyers to pay for environmental services with local benefits, or their desire for specific charismatic environmental services. At the same time, however, we can also see that some PES schemes in which the public sector has invested heavily (e.g., CDM, BioBanking) have relatively limited coverage. This may suggest that public involvement in the development of these incentive schemes is directed more at helping resolve problems of supply than promoting third-party demand. If one understands loss of rangeland ecosystem services to be a sign of underinvestment in environmental services by private landowners, government support through incentive payments or provision of market infrastructure can be seen as an attempt to improve this resource allocation.

Challenges and Risks in Payments for Environmental Services Schemes in Rangelands

Although the basic principle behind the PES concept appears simple, design of effective and equitable PES schemes is not easy and incurs a variety of costs, including transaction costs (e.g., baseline surveys, design, stakeholder negotiation, institution building, monitoring, etc.), implementation costs, and the opportunity costs of foregone alternative land uses. Some of the risks and constraints commonly reported in relation to PES schemes in developing countries, as well as general and practical lessons, are likely to remain relevant in rangelands.

With regard to PES schemes in rangelands, there has been little analysis and few systematic reviews or evaluations. A comprehensive review has been conducted in the US (footnote 36). Several reviews of practitioners' experience have also been produced in relation to the rapid growth of market-based instruments in Australia's rangelands,⁴⁴ and an assessment of some PES schemes in the PRC was made in an Asian Development Bank (ADB) study.⁴⁵ The ADB study found that two large-scale government programs improved vegetation characteristics (e.g., height, coverage, and yield) and, in many situations, sequestered soil organic carbon. However, adoption of promoted practices remained low due to barriers, such as low payment levels, which are standardized across large regions in these schemes,

⁴⁴ For example, (a) S. Whitten, M. Carter, and G. Stoneham. 2004. *Market-Based Tools for Environmental Management*. Barton, Australia: Rural Industries Research and Development Corporation; (b) A. Smyth, J. Davies, R. J. Gorrard, S. Whitten, R. Brandle, A. Coggan, R. Edwards, J. Fleming, N. Gambold, J. Maloney, J. Read, and F. Yunus. 2007. *Enabling the Market: Incentives for Biodiversity in the Rangelands*. Alice Springs, Australia: Desert Knowledge Cooperative Research Centre.

⁴⁵ Asian Development Bank. 2014. *Strengthening Carbon Financing for Grassland Management in the People's Republic of China: Incentive Mechanisms and Implications*. Manila.

and limited investment in livestock management practices or alternative income-generation activities that could support improved grassland management. In Australia and the US, evaluations and reviews have primarily been driven by the need to ascertain and justify the cost-effectiveness of public investments in rangeland PES schemes. Most Australian schemes have opted for reverse auction mechanisms in which land users submit bids to participate in the scheme, enabling scheme managers to select the most cost-effective bids (footnote 44b), which can improve the cost-efficiency of the whole scheme.⁴⁶ Considering increased demand for accountability in publicly financed schemes, the systematic review of rangeland conservation schemes in the US (footnote 36) highlighted the importance of increased investments in monitoring to better understand both short- and long-term environmental impacts of the schemes at different scales (e.g., from plot to landscape) and from different stakeholders' perspectives.

Drawing on these and other sources, we summarize some of the main challenges and risks that have been identified with PES schemes in rangelands, with a focus on the underlying issues that may present challenges and risks that are likely to be relevant in other rangeland contexts.

The knowledge basis. Scientific knowledge of biophysical processes and the effects of management on biophysical processes can usefully inform the design of PES schemes. In rangelands in many developing countries, a robust knowledge base is either absent or thin. Even in the US, where rangeland science is relatively advanced, a review of the effects of incentive programs concluded that given limited past investment in assessment and monitoring “it was not possible to determine the magnitude or trend of conservation benefits originating from these investments” (footnote 37). In the absence of robust knowledge, PES schemes can be designed on the basis of assumptions regarding the effects of changes in management on rangelands. One precondition for PES schemes is that all stakeholders agree on the basic relationship between changes in management and the desired outcome (footnote 5b), but identifying measurable impacts of these schemes may be difficult.⁴⁷

Different stakeholders have different knowledge systems and make use of knowledge in different ways. In the US, scientists emphasize knowledge produced through hypothesis testing and experiments, while land users base their decisions on other forms of observation and rules of thumb (footnote 36). In developing countries, indigenous knowledge is largely ignored by official knowledge systems,⁴⁸ so the potential for divergence in understanding between herders and other stakeholders about basic socio-ecological processes is greater. In particular, official discourses stressing the effects of overgrazing may not reflect herders' perceptions of the major challenges affecting grasslands.⁴⁹ Ensuring that land users' perspectives are heard in stakeholder negotiations may need to be explicitly considered in negotiation support (footnote 5b).

⁴⁶ J. Windle and J. Rolfe. 2008. Exploring the Efficiencies of Using Competitive Tenders over Fixed Price Grants to Protect Biodiversity in Australian Rangelands. *Land Use Policy*. 25 (3). pp. 388–398.

⁴⁷ K. Farley, W. Anderson, L. L. Bremer, and C. P. Harden. 2011. Compensation for Ecosystem Services: An Evaluation of Efforts to Achieve Conservation and Development in Ecuadorian Paramo Grasslands. *Environmental Conservation*. 38 (4). pp. 393–405.

⁴⁸ A. Agrawal. 1995. Dismantling the Divide between Indigenous and Scientific Knowledge. *Development and Change*. 26 (3). pp. 413–439.

⁴⁹ M. Bollig and A. Schulte. 1999. Environmental Change and Pastoral Perceptions: Degradation and Indigenous Knowledge in Two African Pastoral Communities. *Human Ecology*. 27 (3). pp. 493–514.

Prescriptive recommendations and adaptive management. Figure 8 showed that private funds tend to support smaller-scale PES schemes, while most of the large-scale PES schemes are generally funded by governments. Smaller PES schemes suggest greater potential for face-to-face negotiation and development of site-specific practices in PES scheme design. In contrast, many of the larger PES schemes funded by governments provide prescriptive lists of management practices to be promoted through the PES mechanism. Rangelands are highly variable both over space and time. In particular, rainfall has a direct impact on rangeland plant communities. Land users respond to this variability through adaptive management.⁵⁰ An evaluation of conservation programs in the US concluded that “Benefits accruing from conservation programs are strongly influenced by landowner commitment, capability, and management decisions following program implementation. Management subsequent to adoption of conservation practices is as important to their success, as is the appropriate timing and location of initial installation. The complexity and variability of rangeland ecosystems make adaptive management imperative for conservation success”.⁵¹ In some contexts, it may be that extension support to adaptive management can have a significant impact irrespective of financial incentives. The potential for conflict between prescribed practices and the need for adaptive management may be a particular challenge for carbon sequestration projects, if project protocols do not allow land users sufficient flexibility to manage livestock and rangeland resources in response to changing conditions.

Incentives and behavior change. The market-based approach to PES generally assumes that financial incentives will be sufficient to change resource management practices. Even in the US, it has been found that adoption of improved management practices by rangeland users is often motivated and enabled by noneconomic factors, including personal goals and values, access to information and training, and collective interests among groups of land users.⁵² In developing country contexts, there are likely to be a range of reasons land users may not respond in predicted ways to incentive payments alone. First, some PES schemes designed in a top-down approach, offering land users fixed incentives to adopt prescribed management practices, have underestimated opportunity costs, which vary considerably between households, and either reduce herders’ incomes or lead to poor levels of compliance.⁵³ Second, the lack of well-functioning markets, such as markets for livestock products, credit, or off-farm labor, may constrain households in pursuing income generation through their livestock and alternative enterprises,⁵⁴ while lack of access to effective extension services has been identified as a major constraint in both PES schemes⁵⁵ and in rangelands.⁵⁶ Third, livestock keepers may not be primarily

⁵⁰ A. Pressland. 2011. Rain on the Rangelands: Adaptive Management Is Alive and Functioning. *The Rangeland Journal*. 33. pp. i–iii.

⁵¹ Footnote 36, p. 19.

⁵² J. Tanaka, M. Brunson, and L. Torell. 2011. A Social and Economic Assessment of Rangeland Conservation Practices. In D. Briske, ed. 2011. *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps*. Washington, DC: United States Department of Agriculture, Natural Resources Conservation Service.

⁵³ X. Li. 2006. Empirical Research on the Effect of the Grassland Retirement Program on Farmers’ Benefits in Inner Mongolia. *Agricultural Technology and Economy*. 3. pp. 63–68.

⁵⁴ J. Muller and H. Albers. 2004. Enforcement, Payments, and Development Projects Near Protected Areas: How the Market Setting Determines What Works Where. *Resource and Energy Economics*. 26 (2). pp. 185–204.

⁵⁵ A. Rios and S. Pagiola. 2009. *Poor Household Participation in Payments for Environmental Services in Nicaragua and Colombia*. <http://mpra.ub.uni-muenchen.de/13727/1/PovertyPES-Draft20090212.pdf>

⁵⁶ J. Wu, D. Michalk, D. Kemp, Y. Lian, and G. Xuyin. 2011. Talking with [the People’s Republic of] China’s Livestock Herders: What Was Learnt about Their Attitudes to New Practices. In D. Kemp and D. Michalk, eds. *Development of Sustainable Livestock Systems on Grasslands in North-Western [People’s Republic of] China*. ACIAR Proceedings. No. 134. Canberra, Australia: Australian Centre for International Agricultural Research.

motivated by short-term profit maximization.⁵⁷ Especially where climatic and market risks are pervasive, herd management may be oriented more toward risk management than profit maximization⁵⁸ and incentive payments may not contribute to reducing the major sources of risk. Fourth, where rangeland tenure is not privatized, individual land user's decisions are not independent of the decisions of other land users. Capacities for collective action among land users are likely to dominate land users' estimation of the potential benefits of changing land management practices.⁵⁹

Considering these challenges and risks, in many developing country rangeland contexts, it is likely that direct payments for environmental services as commodities will be insufficient to change land users' behavior while also benefiting their livelihoods. Co-investment in land stewardship (footnote 5c), addressing land management practices in a broader rural development context, may be more appropriate to address the supporting conditions for improved rangeland management, with a gradual transition toward compensation for opportunity costs and environmental service transactions.

⁵⁷ For example, F. Costa and T. Rehman. 2005. Unraveling the Rationale of "Overgrazing" and Stocking Rates in the Beef Production Systems of Central Brazil Using a Bi-criteria Compromise Programming Model. *Agricultural Systems*. 83 (3). pp. 277–295.

⁵⁸ N. McCarthy, C. Dutilly-Diane, B. Drabo, A. Kamara, and J. P. Vanderlinden. 2004. Managing Resources in Erratic Environments: An Analysis of Pastoralist Systems in Ethiopia, Niger and Burkina Faso. *IFPRI Research Report*. No. 135. Washington, DC: International Food Policy Research Institute.

⁵⁹ C. Roncoli, C. Jost, C. Perez, K. Moore, A. Ballo, S. Cisse, and K. Ouattara. 2007. Carbon Sequestration from Common Property Resources: Lessons from Community-based Sustainable Pasture Management in North-Central Mali. *Agricultural Systems*. 94 (1). pp. 97–109.

Rangeland Payments for Environmental Services Schemes in Mongolia

Rangelands make up roughly three-fourths of Mongolia's land area, providing grazing land for around 40 million head of livestock, supporting the livelihoods of about 40% of the country's inhabitants and generating over a fifth of GDP.⁶⁰ The vast majority of rangelands are used for livestock production, which mostly involves low-input, extensive, seasonally migratory grazing. Estimates suggest about 75% of pastureland is overgrazed and overstocked with domestic livestock which, along with climate change, causes significant degeneration of pasturelands.⁶¹ The preservation, restoration, and sustainable use of Mongolia's rangelands are priorities in many national policy strategies. This section looks at the extent to which PES schemes have and could be used to increase the provision of environmental services demanded by stakeholders.

The Current Status of Payments for Environmental Services Development in Mongolia

PES is currently not widely practiced in Mongolia but has been included in the recent Green Development Strategy of the Government of Mongolia.⁶² Our review of international PES schemes in rangelands identified one operational PES scheme in Mongolia (see Box 7). Initiatives related to mining biodiversity offsets (see Box 8) and the development of a watershed PES scheme in the Upper Tuul River (see Box 9) have been instrumental in putting economic incentives for environmental management on the national policy agenda.

In 2006, a policy workshop on environmental issues addressed, among other topics, the values of Mongolia's ecosystems and natural resources. At that time, the Deputy Minister of Finance stated that no valuation was available to help assess investment needs for resource protection and management in the country.⁶³ As a result of the 2006 meeting, a comprehensive study titled "The Economic Value of the Upper Tuul Ecosystem"⁶⁴ was commissioned by the World Bank to address the sustainability of water supply to the capital city. Subsequent studies on the topic have been supported by the United Nations Environment Programme (UNEP), resulting in the publication of a study titled *Urban Water*

⁶⁰ FAO, United Nations Children's Fund (UNICEF), and United Nations Development Programme (UNDP). 2007. *Joint Food Security Assessment Mission to Mongolia*. <http://www.fao.org/docrep/010/j9883e/j9883e00.htm>

⁶¹ D. Dagvadorj et al. 2010. *Mongolia Assessment Report on Climate Change 2009*. Ulaanbaatar, Mongolia: Ministry of Nature, Environment and Tourism.

⁶² D. Dagvadorj. 2012. Mongolia's Perspective on Green Development. Presentation to the Organisation for Economic Co-operation and Development–Global Green Growth Institute (OECD-GGGI) Workshop on Green Growth Development Paths for a Better Future. Paris. 22 November.

⁶³ Sabine Schmidt, ADB consultant, personal communication.

⁶⁴ L. Emerton et al. 2009. *The Economic Value of the Upper Tuul Ecosystem*. Washington, DC: World Bank.

Box 7: Snow Leopard Enterprises in Mongolia

Snow Leopard Enterprises was set up in 1998 by the International Snow Leopard Trust to encourage herders in the Great Gobi Protected Area to protect snow leopards. Contracts committing individual herder families to conserve the snow leopard are signed, in exchange for which Snow Leopard Enterprises supports herders to make handcrafted wool products that sell at 15–20 times higher than the price for raw wool, and an additional 20% bonus is given if herders fulfill their commitments. If commitments are not fulfilled, a family loses its membership in the program; and if outsiders commit violations in the area, the bonus is not given to the program members. This gives families an incentive to prevent poaching by all land users in their area.

The contracts vary from site to site depending on local conditions and conservation needs, and are agreed through discussions with herders and the protected area management agency. Implementation of the contract is monitored by the protected area management agency. The program began with 80 households in 1998 and had grown to include 200 households by 2003.

Source: C. Mishra, P. Allen, T. McCarthy, M. D. Madhusudan, A. Bayarjargal, and H. H. T. Prins. 2003. The Role of Incentive Programs in Conserving the Snow Leopard. *Conservation Biology*. 17 (6). pp. 1512–1520.

Box 8: Oyu Tolgoi Biodiversity Offset Program

Ivanhoe Mines and Rio Tinto in collaboration with Flora and Fauna International are developing a landscape-level biodiversity offsets scheme for the Oyu Tolgoi copper mine—Mongolia’s biggest mine to date and expected to account for a third of gross domestic product by 2020. The offsets are typified by charismatic and easily quantifiable southern Gobi species such as the Asiatic Wild Ass and Houbara Bustard. A fund will be created in order to finance conservation activities in the mine’s neighboring *soums* (districts). The proposed activities may include reducing hunting levels, improving rangeland management, and strengthening protected areas. Herders will receive support in the transition to more ecologically sustainable stocking rates through the provision of incentives or compensation for opportunity costs, which may be made in the form of direct payments to households, community payments or noncash benefits such as education or health care. The full monitoring and evaluation system design is not yet complete, but has potential to link payments to either performance of conservation activities or to conservation outcomes.

Source: The Biodiversity Consultancy Ltd. and Flora and Fauna International. 2012. *Biodiversity Offsets Strategy for the Oyu Tolgoi Project*. http://www.ot.mn/sites/default/files/documents/ESIA_BA4_Biodiversity_Offset_Strategy_for_the_Oyu_Tolgoi_Project.pdf

Vulnerability to Climate Change in Mongolia.⁶⁵ More recently, a number of international conservation NGOs have been working with the Government of Mongolia and national and international mining companies to explore the potential for PES approaches to address the environmental impacts of mining operations in the country.⁶⁶

⁶⁵ P. Batimaa, B. Myagmarjav, N. Batnasan, N. Jadambaa, and P. Khishigsuren. 2011. *Urban Water Vulnerability to Climate Change in Mongolia*. Ulaanbaatar: Mongolia Water Authority.

⁶⁶ For example, The Biodiversity Consultancy Ltd. and Flora and Fauna International. 2012. *Biodiversity Offsets Strategy for the Oyu Tolgoi Project*. http://www.ot.mn/sites/default/files/documents/ESIA_BA4_Biodiversity_Offset_Strategy_for_the_Oyu_Tolgoi_Project.pdf

Box 9: The Economic Value of the Upper Tuul Ecosystem

The Tuul River watershed provides water to Ulaanbaatar City, which houses more than 40% of Mongolia's inhabitants, providing water services worth at least MNT90 billion (roughly \$65 million at 2013 exchange rates). The watershed also has several conservation areas and is a major domestic and international tourist destination, which, combined with herding activities, also generates revenues for the area. However, degradation of rangelands and forests in the watershed has been ongoing and poses a threat to the environmental functioning of the watershed.

A study supported by the World Bank estimated that if degradation trends continue, the loss to the economy would be about MNT400 billion over the next 25 years. By contrast, every MNT1 invested in conserving the Upper Tuul ecosystem could generate MNT15 in environmental and resource use benefits. However, the costs and benefits would be unequally distributed between stakeholders, with more economic benefit for downstream water users than for the stewards of the watershed, hence the potential for environmental service payments to enable adoption of conservation activities. The study did not go so far as to outline the specific design of a watershed PES scheme, but it is clear that some form of payment from public and private water users downstream would be needed to effect conservation outcomes in the upper watershed.

Sources: World Bank. 2009. *Mongolia: The Economic Value of the Upper Tuul Ecosystem*. Washington, DC. http://www.wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2011/07/12/000356161_20110712010137/Rendered/PDF/628210WP0Upper00Box0361494B0PUBLIC0.pdf; and L. Emerton. 2012. Financing Wetlands through Payments for Ecosystem Services: The Tuul River, Mongolia. Presentation at the 11th Meeting of the Conference of Contracting Parties (COP11) to the Ramsar Convention. Bucharest, Romania. 6–13 July.

At present, there are no regulations that require compensation payments for ecological damage or that enable or regulate compensation for preservation or restoration of resources or ecosystems by resource users. However, developing economic mechanisms for environmental management have been listed as a priority action area in the current government's Green Development Strategy (footnote 62).

Existing and Potential Payments for Environmental Services Schemes in Mongolia

A review of published and internet sources as well as e-mail and telephone interviews with a number of experts on environmental issues in Mongolia were conducted to identify existing PES schemes currently in operation in Mongolia. As with the international review, candidate initiatives were categorized as PES schemes if payments were conditional on performance of some kind.

While there have been a large number of projects funded by international development agencies and conservation organizations over the years, in the terminology of Figure 1, the vast majority of those for which sufficient information could be obtained appear to be Type 1 or Type 2 projects—that is, projects providing technical or financial support, but support is not conditional on either delivery of ecosystem services or performance of actions likely to increase ecosystem services provision. A large number of rangeland management, livestock, or rural development projects fund technical assistance for herder households or herder groups and, in many cases, make grants or loans to herder

Table 5: Emerging Payments for Environmental Services Schemes in Mongolian Rangelands

Scheme	Service Demanded	Buyer	Seller	Status
Oyu Tolgoi Biodiversity Offset Program ^a	Wildlife biodiversity	Mining company	Herding communities in “hot spot” area	Close to entering implementation
Ihk Nart Nature Reserve Reduced Herd Payment Scheme ^b	Biodiversity	Tourism company	Herding communities near nature reserve	Under consideration by buyer and sellers
Reforestation of Grassland in Khyalganat of Selenge Soum of Bulgan Province ^c	Carbon	International buyer (to be identified)	Nongovernment organization	Project designed
Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat ^d	Carbon	International buyer (to be identified)	Organized herder groups	Project designed
Upper Tuul Hydrological Services Payment Scheme ^e	Water	Urban water users	Herding communities in upstream watershed	Project concept

Sources:

^a The Biodiversity Consultancy and Flora and Fauna International. 2012. *Biodiversity Offsets Strategy for the Oyu Tolgoi Project*. http://www.ot.mn/sites/default/files/documents/ESIA_BA4_Biodiversity_Offset_Strategy_for_the_Oyu_Tolgoi_Project.pdf

^b Richard Reading, personal communication.

^c See http://www.cdm-mongolia.com/files/ARPDD_final.pdf

^d Unique. Project Idea Note: Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat. Unpublished.

^e L. Emerton et al. 2009. The Economic Value of the Upper Tuul Ecosystem. http://www.wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2011/07/12/000356161_20110712010137/Rendered/PDF/628210WP0Upper00Box0361494B0PUBLIC0.pdf

households or herder groups, with some grants requiring cofinancing from beneficiaries. Many of the supported actions are intended to improve management of natural resources and, in some cases, to deliver specific ecosystem services (e.g., biodiversity protection), but the manner in which payments are made is not conditional upon performance. Rather, these investments are typically made to enable performance. In some cases, support is linked to process-related conditions (e.g., the condition that a *soum*⁶⁷ has an annual pasture management plan, that beneficiaries contribute 5% of the cost, or that collective institutions for range management are established), but these conditions refer to eligibility for support, not ex post, results-based conditions for payment as is generally associated with PES schemes.

⁶⁷ *Soum* is a mid-level administrative division, equivalent to a district or county.

Only one ongoing conditional PES scheme could be identified. This is the Snow Leopard Enterprises program described in Box 7. Additionally, five PES schemes or concepts were identified that are at different stages in the progression from concept to negotiated deals between ecosystem service suppliers and purchasers. These five schemes are summarized in Table 5, and three of them are summarized in Boxes 8, 9, and 10. The five potential or emerging PES schemes cover ecosystem services with local and global benefits, namely hydrological services of value to downstream users, biodiversity and GHG sequestration, storage, or emission reductions, which have global benefits as well as co-benefits that are of high value to local stakeholders. In four of the five PES schemes identified, herding communities or organized groups of herders are the (proposed) providers of services; while in one PES scheme, access to grassland has been secured by an NGO through a land title provided by the local government. The (proposed) buyers of environmental services include downstream water users, tourism, and mining companies with a particular interest in preservation of biodiversity in the PES scheme areas, as well as unidentified purchasers on the international carbon markets.

Box 10: Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat Soum

Field surveys have found that more than 90% of summer pastures in Tariat *soum* (district), Arkhangai *aimag* (*aimag* is equivalent to a province), are either moderately or heavily degraded. Average stocking rates in the pastures are high, leading to removal of over 80% of available biomass each year. Degradation is, thus, very likely driven by overgrazing. The resulting poor grassland quality limits the productivity of animal husbandry in the area and increases the vulnerability of herds and households to the impacts of extreme climate events such as the snow disasters, or *dzud*, that regularly affect Mongolia.

Since 2010, the Green Gold project funded by the Government of Switzerland has organized herders in the area into pasture user groups, whose main function is to collectively plan and manage their pastures. While reducing stocking rates to sustainable levels is not profitable for herders in their current situation, analysis suggests that it would be profitable if investments in livestock productivity and livestock product marketing are made (e.g., breed selection, improved supplementary feeding, collective marketing of livestock products, etc.). Reducing stocking levels would sequester carbon in grassland soils. Quantification of the carbon sequestered using a methodology undergoing approval by the Verified Carbon Standard would enable herders to sell certified emission reductions, with carbon revenues contributing to savings and loan funds established in each pasture user group, thus reducing the dependence of households on livestock holdings for their access to cash for livelihood needs.

Source: Unique. Project Idea Note: Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat. Unpublished.

Constraints and Opportunities for Rangeland Payments for Environmental Services Schemes in Mongolia

The large number of rangeland-related development and conservation projects funded in Mongolia contrasts with the small number of PES schemes that have been identified. On the one hand, this may be understandable since PES is still a relatively new concept, and, given the limited number of examples in relevant settings, proof of concept may still be required before Mongolian stakeholders would have reason to engage. In addition, the transaction costs of designing, negotiating, and setting up PES schemes may be a

potential constraint. On the other hand, some issues specific to the Mongolian rangelands context may present obstacles to supporting environmental service provision through conditional reward schemes, and this may explain why most interventions in the rangeland sector promote improved land stewardship, providing support with little conditionality. These constraints and opportunities are explored in the following sections.

Land Tenure and Herder Organization

The legal framework for land use and herder organization can potentially, but not in all situations, present obstacles to developing and implementing effective PES schemes. Land in Mongolia is owned by the state. The Land Law (2002 revision) provides provisions for allocating land use rights and regulating grazing in specific types of rangeland, but the provisions of this law have not been widely implemented.⁶⁸ As a result, most rangelands are de facto open access and even where rangelands are customarily used by a well-defined group of herder households, exclusion and control of resource use by third parties is often an issue. This presents challenges for environmental service transactions. In particular, without exclusive control over resource use, it is difficult to ensure that changes in management practice by a particular group of users will result in the intended environmental outcomes. With little assurance over the causal link between one's actions and the environmental outcomes, herders have little incentive to adopt management practices that improve rangeland condition. One reason for the weak implementation of existing laws that might support improved rangeland management is that the Land Law does not clearly define who the legally empowered resource users are, and rangeland users are not recognized as a collective legal entity. Collective land tenure does not prevent the establishment of ecosystem service transactions, but a clearly recognized legal entity is required to engage in legally established transactions. Two of the emerging PES schemes in Table 6 propose to make use of the Land Law in order to secure land use rights for ecosystem service providers: (i) the grassland afforestation project in which land use rights have been secured by a registered NGO, and (ii) the Tariat grassland soil carbon project in which it is proposed to grant land use rights to pasture user groups.

The importance of this issue explains, perhaps, the large number of international projects in Mongolia which focus on supporting the development of community-based institutions for rangeland management. Such support may help create the institutional conditions within which collective actions that deliver improved environmental service outcomes can be implemented. In a very small number of cases, the environmental outcomes of collective rangeland management have been documented. Leisher et al., for example, show that one donor project supporting collective rangeland management was able to demonstrate significantly higher rangeland biomass than control sites.⁶⁹ There are, however, also documented cases where collective institutions remain dependent on donor finance, and fail to function when donors withdraw.⁷⁰ The absence of strong support from the legal framework for collective rangeland management institutions makes the results of bottom-up institution-building processes indeterminate. Hence, the focus of many existing interventions is on supporting institution building rather than providing results-based rewards. Once these institutions are in place, however, it is assumed that

⁶⁸ M. Fernandez-Gimenez and B. Batbuyan. 2004. Law and Disorder: Local Implementation of Mongolia's Land Law. *Development and Change*. 35 (1). pp. 141–166.

⁶⁹ C. Leisher, S. Hess, T. M. Boucher, P. van Beukering, and M. Sanjayan. 2012. Measuring the Impacts of Community-Based Grasslands Management in Mongolia's Gobi. *PLoS ONE*. 7 (2). e30991. doi:10.1371/journal.pone.0030991

⁷⁰ C. Upton. 2012. Managing Mongolia's Commons: Land Reforms, Social Contexts, and Institutional Change. *Society and Natural Resources: An International Journal*. 25 (2). pp. 156–175.

economic incentives (mostly provided in the form of technical support for livestock raising or livestock product marketing) can influence households' and communities' natural resource management decisions. It is not clear in all contexts within Mongolia whether there is a sufficiently robust knowledge base regarding technical and economic practices that can be fairly certain to provide improved environmental service flows, although there are some locations where this knowledge exists (e.g., due to past pilot projects). Box 11 describes one emerging approach to systematically documenting the environmental impacts of changes in rangeland management practice.

Box 11: Advances in Rangeland Monitoring in Mongolia

Mongolia's National Agency for Meteorology, Hydrology and Environment Monitoring has recently adopted a new rangeland health assessment method based on the Ecological Site Descriptions method which is widely applied in the United States. This method is used to collect field data that can be used to describe the ecological potential and ecosystem dynamics of areas of rangeland. Once the system is fully developed in the Mongolian context, as an ex ante targeting tool, an ecological site description may provide information on the potential responses of a site to changes in management, and thus provide information on the potential environmental benefits of adopting the related management practices in a particular ecological site. As an ex post monitoring tool, repeated collection of data using the field methodology may provide information on actual changes in ecosystem characteristics in response to changes in management. As the method is more widely applied and over time, a database will be developed which describes the responses of ecological site types to different management practices.

Source: Asian Development Bank. 2013. *The Rangeland Monitoring and Evaluation System in Mongolia: Current Status and Key Challenges*. Consultant's report. Manila (TA 7534-REG).

Where collective resource management institutions exist and have a strong basis in community institutions, they may well provide a suitable framework for collective action to improve environmental service provision. For example, the Oyu Tolgoi mining company has hired experienced NGOs to assist in organizing pasture user groups as part of its biodiversity offset strategy.⁷¹ Pasture user groups established through the Green Gold project supported by the Swiss Agency for Development and Cooperation (SDC) also provide the institutional basis for adoption of improved management practices in the proposed "Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat" grassland soil carbon sequestration project.⁷²

Costs and Challenges in Developing Payments for Environmental Services Schemes

The transaction costs of developing PES schemes can be significant. Experience in the development of the Upper Tuul River watershed PES scheme illustrates that PES scheme development may need to overcome a number of challenges in the supporting environment. In 2006, a valuation study was conducted that showed strong economic benefits of investing in environmental management in the watershed and significant losses

⁷¹ Ts. Enkh-Amgalan, personal communication.

⁷² Unique. Project Idea Note: Sustainable Grassland Management for Climate-Resilient Livelihoods in Tariat. Unpublished.

if ecosystems degrade (footnote 64). The study highlighted that, before beginning work on technical design of measures to protect ecosystems, it was important to convince decision makers of the need for investments in the “natural infrastructure” of Ulaanbaatar City’s water supply. The study noted that ecosystem conservation was persistently accorded a lower priority in policies, planning, and budgets compared to other sectors that were perceived to be more valuable in economic terms or capable of yielding more immediate development benefits. The required awareness raising, education, and consensus building among all stakeholders are challenging. A needs assessment on institutional capacity for water governance in Mongolia refers to stakeholder participation in integrated water resource management decision making as one of the main obstacles in the water sector.⁷³ Many decisions require the understanding of highly technical information and scientific knowledge. This information must be translated and communicated effectively to the public and stakeholders so that they are fully informed and supported by information provision through broadcast media.

Demand and Supply

It is notable that one existing and five potential PES schemes in Mongolia all involve international support for their development. The Snow Leopard Enterprises scheme has been developed by the Snow Leopard Trust, an international conservation NGO. Technical support is being provided for the Ikh Nart Nature Reserve PES scheme by Denver Zoological Foundation and Earthwatch, a US NGO. Financial and technical support to development of two carbon projects has been given by ADB and SDC, respectively. The two carbon projects are most likely seeking international carbon market buyers for credits generated by the projects, since Mongolian companies have no regulatory requirement to offset their GHG emissions. International carbon markets, and potentially other climate finance, may provide a source of demand for the environmental services provided. Tourism-related PES payments are also most likely targeting international tourism markets.

However, two of the five emerging PES schemes clearly propose domestic sources of demand: a mining company in one case and urban water users in another. These have the potential to become key sources of future demand. The Tuul River project is an example of how PES schemes may enable Mongolian stakeholders to meet their own demands for increased environmental services. The PES scheme focuses on ensuring water supply to Ulaanbaatar, which is home to 42% of Mongolia’s population, a figure expected to rise to more than 50% by 2030. Increasing urban populations in Ulaanbaatar, as well as other cities, may be expected to increase the demand for certain environmental services affecting the population, of which water is likely to be a priority.

The mining sector also has the potential to emerge as a source of demand for environmental services in Mongolia. Benefiting from a global commodity boom, aggregate economic development has been driven primarily by the mining sector which now accounts for 30% of GDP, 80% of export earnings, and an increasing share of employment across the economy. Translating revenue from the mining boom into inclusive, equitable, and sustainable development is one of Mongolia’s major challenges. Exploration and mining licenses currently cover almost 14% of the national land area.⁷⁴ At present, although

⁷³ A. Livingstone, C. Erdenechimeg, and A. Oyunsuvd. 2009. *Needs Assessment on Institutional Capacity for Water Governance in Mongolia*. http://www.un-mongolia.mn/publication/Needs_assessment_on_institutional_capacity_for_water_governance_in_mongolia.pdf

⁷⁴ <http://en.mongolianminingjournal.com/content/35014.shtml>

there is a range of environmental regulations pertaining to mining,⁷⁵ mining operations are not legally required to offset their environmental impacts. However, an option is reportedly under consideration by the government in which part of the taxes on the mining sector could then go to funding environmental service provision.⁷⁶ The mining sector is undergoing rapid expansion in Mongolia, and mining companies are increasingly realizing that they need to demonstrate their adherence to social and environmental safeguards and commitment to foster sustainable development (footnote 75). This is due both to domestic demand for environmental services and to international expectations of mining companies to operate responsibly.⁷⁷

Payments for Environmental Services as One Policy Tool Among Many

The review of international PES experiences suggested that governments play major roles in the development of PES schemes. Governments are not only the major purchaser of environmental services for larger PES schemes, but they also play key roles in setting the legal and institutional framework for environmental transactions. In the Mongolian context, as described earlier, land tenure laws and laws affecting herder organizations are important in supporting improved environmental management by herders. Amendments to existing laws or enactment of new laws may also be necessary to facilitate investment in environmental assets by the mining sector.

The Government of Mongolia, with support from many international donors, already makes investments in grassland management, livestock production, and livestock product value addition and marketing through various lines of budgetary support, such as the Mongolian Livestock Program. International experience also suggests that rather than focusing solely on private payments for environmental services, it is more practical to identify the appropriate mix of market, hierarchical, and cooperative systems for improving resource management (footnote 18a). Where valuation of environmental services can help leverage resources to involve herders and other stakeholders in improved environmental management activities, supporting such initiatives through national and sector development plans will also be necessary.

In the Mongolian context, in addition to feasibility and design questions, a key question to consider is: What is the expected value added of conditional payments for environmental services? The answer to this question will vary depending on the environmental service in question, as the potential for PES is analyzed in relation to other relevant existing interventions. Linking with ongoing initiatives may also help reduce the transaction costs involved.

⁷⁵ Bird Life Asia. 2009. *Safeguarding Important Areas of Natural Habitat alongside Economic Development*. http://www.wscc.org.mn/pubs/Safeguarding_important_areas_ENG.pdf

⁷⁶ J. Wigsten, personal communication.

⁷⁷ See Bird Life Asia, *Safeguarding Important Areas of Natural Habitat*, Chapter 9, for summaries of the environmental policies of selected major mining companies and other international initiatives.

Recommendations

PES mechanisms are relevant in Mongolia for several reasons:

- (i) Many environmental services from rangelands (e.g., those related to soil and vegetation characteristics) are most likely to have significant co-benefits of value to local stakeholders, including improvements in livestock productivity and health and thereby potentially on incomes.
- (ii) PES schemes make conditional payments for environmental services or for actions that deliver environmental services. Currently, no other finance tool is in operation in Mongolia which provides direct rewards for environmental service provision.
- (iii) PES schemes have the potential to make incentive payments over long periods, while most current government and donor funding sources are typically available only for specified project implementation periods. Given the importance of community-based institutions for effective environmental management, PES may provide a revenue stream to ensure institutional sustainability.
- (iv) PES schemes have the potential to leverage both public and private finance for investment in environmental service provision, thus contributing to meeting public policy as well as private stakeholders' needs.

The following recommendations are made in relation to the knowledge base to support PES scheme development and in relation to the potential mechanisms through which PES may be made.

Improving the Knowledge Base for Payments for Environmental Services in Mongolia

Synthesize past experience on technical options. Over the past decade, many government- and donor-supported interventions as well as citizen actions have addressed improved grassland and livestock management and livelihood development. Many of these interventions have had positive impacts on environmental services of value to stakeholders at the local, national, and global levels. This past experience could provide a wealth of qualitative and semiquantitative information on what works, what doesn't work, and what trade-offs there may be between different approaches to achieving environmental management and livelihood development objectives in different contexts within Mongolia. Assessment of a broad range of past experiences would identify types of measures suitable for further promotion through PES mechanisms, the contexts where benefits are likely to be achieved, and preconditions for successful adoption.

Identify and assess options for PES modalities. This review suggests that direct payments for environmental services are only likely to provide effective incentives to change land users' behavior when supporting conditions (e.g., land tenure, livestock product markets, effective extension support) are in place. There have been many government- and donor-supported projects that have targeted these supporting conditions. A systematic assessment of past experience would identify situations in which alternative PES approaches are most relevant—e.g., where integrated approaches

to supporting improved land stewardship are required, where compensation for the opportunity costs of changes in management are likely to be sufficient, and where market-based payments for environmental services are feasible. Assessment of existing environmental and economic policies affecting resource use by herders may highlight existing policies that are not consistent with providing incentives for environmental outcomes. Assessments of past experience and existing policies would inform the development of appropriate government-supported or market-based PES mechanisms suited to a range of environmental services in different contexts within Mongolia. Assessment should also consider the models and approaches adopted in other countries, some of which may provide useful guidance for potential PES mechanisms in different contexts in Mongolia.

Improve the scientific knowledge base. Although there have been some scientific assessments of the effects of changes in management on some grassland environmental services in Mongolia, further research is needed to better understand the distribution, resilience, and value of environmental services and how management can improve environmental service provision. Documentation of these effects can be important in providing a convincing case for both public and private investment in environmental services. Where specific environmental priorities have already been identified (e.g., key watersheds, nature reserve buffer zones), targeted research should be supported to provide better evidence on the effects of management on environmental service provision. Efforts in recent years to improve land use planning and grassland monitoring can also provide evidence on the effects of management. One approach to collection of systematic data based on the Ecological Site Description approach that has been adopted by the environmental monitoring agency has been described in Box 11. Monitoring of the implementation of *soum* land management plans across the country may also provide a source of data. Where scientific data are lacking, systematic collection of land users' observations of the effects of change in management practice on environmental variables can be a valuable and accurate source of information.⁷⁸ Improvements in both scientific and local knowledge will require targeted investment in research and stakeholder participatory research processes and research capacity.

Developing Payments for Environmental Services Mechanisms in Mongolia

Link public investments in livestock and grassland management with environmental outcomes. The National Livestock Program, approved by Parliament in 2010, represents a major investment of public resources in the livestock sector. While the program includes action areas that address several aspects of livestock production and marketing as well as grassland management, program investments in livestock productivity and marketing are not closely linked to improved grassland management outcomes, and there is even potential for perverse environmental outcomes if livestock production is promoted without consideration of environmental impacts. At the same time, improved grassland management requires investments in both livestock productivity and improved marketing of livestock products. There is, therefore, potential to maintain and increase the provision of grassland environmental services by linking the investments of the National Livestock Program to inputs or activities that improve grassland management. This can be done by making investments conditional on adopting management activities that increase

⁷⁸ K. Kakinuma and S. Takatsuki. 2012. Applying Local Knowledge to Rangeland Management in Northern Mongolia: Do 'Narrow Plants' Reflect the Carrying Capacity of the Land? *Pastoralism: Research, Policy and Practice*. 2. 23. doi:10.1186/2041-7136-2-23

inputs to grassland management, that improve the status of grasslands, or that result in increased delivery of specific environmental services. This may be done either by adding conditionality to existing funding instruments or by making dedicated budget lines available to supplement existing budget lines. In addition to the National Livestock Program, other forms of transfer payment made through the fiscal system may also be a potential source of conditional funding where environmental service markets are not feasible or effective.

Learn from pilot action. Improved public policy frameworks can help diversify funding sources and attract private sector financing. Developing sustainable financing mechanisms for protected areas and economic mechanisms for environmental management, including offset mechanisms in mining restoration, are among the key objectives of Mongolia's Green Development Strategy (footnote 62). A number of pilot initiatives are under development to explore feasible approaches to PES in relation to biodiversity, water, and carbon in Mongolia. Learning from pilot actions with PES mechanisms has been a key input into policy development in a number of countries. Public funding for pilot PES schemes can provide proof of concept for new market-based mechanisms and generate significant practice-based knowledge to inform the development of upscaled programs, including operational procedures for prior informed consent, contracting monitoring and enforcement, and capacity building needs, as well as changes required to create enabling financial, management, policy, and legislative conditions.

Ensure community benefits. Communities are an integral part of any grassland PES scheme. Any PES scheme that is developed will need to fully assess community resource requirements, and provide appropriate incentives and sufficient benefits to offset any losses caused by loss of access or use of specific resources. Community stakeholders should be fully informed and consulted in the PES design process.

Annex 1

List of Rangeland Payments for Environmental Services Schemes Reviewed and Sorted by Type

Type 2 Schemes: Supporting Initial Costs of Implementing Improved Land Management Practices	
Landcare Australia	Organizes groups and individuals to adopt improved land management for which grants can be accessed (now named Caring for our Country) Federal and state co-funded
ICMS Ecológico (Ecological Tax on Circulation of Goods and Services) Brazil	Tax revenue-sharing scheme, designed to provide county governments with incentives for conservation and management of protected areas
National Farm Stewardship Program Canada	Funds 30%–50% of cost of adopting provincially defined BMPs for improved land management Federal and state co-funded
Greencover Canada	Funded provincially defined BMPs for eligible land types
Swiss Foundation for the Conservation of Cultural Landscapes Switzerland	Provides grant funding for improved land management, environmental, and cultural–historical preservation Federal budget funded
Landscape Auctions The Netherlands	Private auction scheme enabling buyers to fund conservation actions and easements offered by landowners
Farm and Ranch Lands Protection Program United States	Co-funds purchase of lands at risk of development or land use change to conserve agricultural uses Federal program with state co-funding
Wildlife Habitat Incentives Program United States	Co-funds management practices set according to state priorities for habitat and species conservation Land parcels are ranked against set criteria to enable targeting of most valuable plots Federal program with state co-funding
Environmental Quality Incentive Program United States	Co-funds management practices set according to state priorities that deliver environmental benefits Ranks applications against benefits index to target most worthy applications Federal program with state co-funding

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Table continued

Landowner Incentive Program United States	Grant funds support activities on private lands that complement state wildlife conservation strategies Federal program with state co-funding
Grassland Retirement Program China, People's Republic of	Annual payments for exclosure, seasonal, or rotational grazing Central government funding, minor local government funding
Type 3 Schemes: Recurring Payments for Implementing Improved Land Management Practices	
Sloping Farmland Conversion Program China, People's Republic of	Annual payments for afforesting or planting grass on degraded lands Central government funding, minor local government funding
Grassland Conservation Rewards China, People's Republic of	Annual payments per hectare for not exceeding stocking capacity of grasslands Central government funded
Kitengela Wildlife Conservation Lease Program Kenya	Annual payments to residents in national park for not fencing, not farming, not selling their farms NGO operated
Integrated Silvo-Pastoral Program Colombia Costa Rica Nicaragua	Pilot project providing annual payments for improved silvo-pastoral practices Land plots and practices quantified ex ante using carbon and biodiversity index Funded by multilateral agencies
Vittel–Nestlé Water Scheme France	Owner of mineral water factory paid landowners in watershed to change their management practices in favor of extensive livestock and agriculture practices, including funding buyouts of farms
Chicago Climate Exchange (CCX) Rangeland Offset Program United States	Farmers can generate carbon credits for planned grazing and sell them to companies that are CCX members
Heredia Public Services Enterprise (ESPH, or Empresa de Servicios Públicos de Heredia) Costa Rica	Based on site-specific needs, farmers upstream of ESPH water company can receive payments for forest protection and reforestation of underused land or land currently used for livestock farming Funded from surcharge on water fees, private scheme
San Pedro del Norte Water Co. Nicaragua	Based on site-specific needs, farmers receive annual payments for restoration of degraded pastures and other land management practices in critical watershed Funded from water fees, municipal budget, and donor seed funds
Pimampiro Watershed Services Scheme Ecuador	Landowners paid to protect native vegetation from deforestation and land conversion based on farm-specific agreements Funded from trust fund and water fees, operated by municipal government

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Conservation Reserve Program United States	Rewards farmers and/or ranchers for conservation practices Applications are ranked based on an environmental benefits index, and a nationwide reverse auction is used to identify best applications Annual payments made within a 5-year contract Federal program with state co-funding
Payments for Hydrological Environmental Services Program (PSAH, or Programa de Pagos por Servicios Ambientales Hidrológicos) Mexico	Federal program rewards farmers for forest protection in target watershed areas Scheme funded from water fee surcharge
Simanjiro Community Conservation Area Tanzania	Tour companies make annual payment to community to prevent agricultural encroachment and poaching in wildlife habitat
West Arnhem Fire Abatement Project Australia	Aboriginal communities paid to revive traditional methods of preventing destructive fires that release GHGs Federal, state, private funding
Environmental Stewardship Scheme United Kingdom (UK)	Annual payments to farmers for performing prespecified management practices in farmland in environmentally sensitive areas Management activities ranked by environmental benefits index, need minimum score for farm to be eligible EU and UK funded
MEKA (a program of agri-environmental schemes) Germany	Annual payments for extensification and environmentally sensitive agriculture practices Payments per hectare with payment levels based on points assigned to different practices EU and State funding
Spiti Valley Predator Incentive Scheme India	Community receives annual payment from NGO for agreeing not to graze in one wildlife habitat location 5-year contract
Snow Leopard Program Mongolia	NGO established a company, which agrees to purchase wool from herders in exchange for a ban on wildlife poaching
High Nature Value Grasslands Program Romania	Annual payments per hectare for extensive management practices to maintain high biodiversity grassland and land use types EU and central government funded
Alternative Land Use Services Canada	Pilot project—supporting demonstration farms to conserve and enhance uplands, wetlands, and riparian area—provides annual incentive payment and variable payment based on costs and foregone income Central government funded

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Agro-Environmental Grassland Payment (PHAE) France	Annual payments on condition of compliance with specified practices, such as sustainable stocking levels, maintenance of areas as permanent pasture limitations on fertilizer use, etc. National government funded
Meadow Bird Agreements The Netherlands	Agreements signed with farmers to delay dates of plowing and mowing to allow time for rare birds to hatch One option allows for payment per clutch of eggs found Monitoring by farmers, farmer groups, and volunteers National, later with EU funding
Traditional Meadows and Pastureland Scheme Sweden	In response to declining pastureland area, annual payments at a set rate per hectare made to maintain pastures Requires a detailed pasture management plan National government funded
Conservation Stewardship Program United States	Rewards for performing predefined conservation practices that meet state-set priorities Payment levels tiered to reflect different levels of conservation benefit Federal and state program
Bushtender Australia	Reverse auction held to identify landowners for contracts to improve biodiversity, reduce salinity, promote water health, etc. Bidders' proposals are ranked by environmental benefits, and most cost-effective proposals accepted; annual payments made on successful implementation of plan Federal and state funded
South Australian Multiple Ecological Communities Project Australia	Targeting endangered vegetation types, the scheme rewards farmers for implementing 3-year management plans over a 15-year period Farmers enroll through a reverse auction Land plots assessed against preset criteria for eligible lands Federal funded
Woodland BushBids Australia	Pays rewards to farmers who submit successful bids in a reverse auction to undertake management practices that meet predefined minimum standards which are scored based on their environmental value Federal funded
Communal Areas Management Program for Indigenous Resources (CAMPFIRE) Zimbabwe	Tour operators pay local authorities (which pay communities) in return for access to wildlife habitat and bans on poaching, etc.

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Type 4 Schemes: Recurring Payments for Delivery of Ecosystem Services	
Performance Payments For Carnivore Reproduction Sweden	Indigenous communities paid for new offspring of wolverine and lynx Each community devises its own use of the funds Animal populations monitored by government staff with field surveys Central government funded
Desert Uplands Committee Landscape Linkage Auction Australia	Reverse auction held to identify landowners for contracts to protect biodiversity by maintaining or improving land condition as measured by an index reflecting biodiversity, land condition, and landscape connectivity Federal-funded pilot project
Wetland Banking United States	Federal government run scheme in which developers damaging wetlands pay land users to put other wetlands under long-term easement
EcoTender Australia	Reverse auction to identify landowners for contracts to improve biodiversity, reduce salinity, promote water health, etc. Bidders' proposals are ranked by environmental benefits, and most cost-effective proposals accepted Federal and state funds used to make annual payments on successful implementation of plan
BushBroker Australia	Landowners undertake conservation actions as part of a 10-year management plan that provide native vegetation credits issued by the state government that can be traded to offset native vegetation lost elsewhere due to land development State-run scheme
New South Wales BioBanking Scheme Australia	State-run program in which landowners offer land for threatened species conservation and receive payments funded by land developers to maintain the site creating a species or ecosystem offset for losses due to development
Clean Development Mechanism (CDM) Reforestation Project Paraguay	Reforestation of croplands and grasslands Project development funded by the Government of Japan Japanese and Paraguay forestry institutes to get income from sale of CERS, farmers to get income from sale of forest products Uses CDM-approved carbon accounting methodology
Verified Carbon Standard (VCS) Afforestation Project Tanzania	Afforestation in grassland areas Private company operates carbon sequestration project and will give 10% of revenue to community Uses VCS-approved carbon accounting methodology

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Project Terraprima Portugal	Pays farmers for 3 years to sequester carbon by cultivating mixed species pastures on degraded or unimproved pasturelands Funded by Portugal's national carbon fund
Thicket Restoration Project South Africa	Aims to sequester carbon by planting saplings of native thicket species in nature reserves Carbon accounting is done according to VCS Revenues from sale of carbon credits will go to a new entity established by nature reserve management agencies
Nordheim Plant Diversity Pilot Germany	Farmers provide competitive bids to provide plant diversity Plots measured annually and payments made according to bid and performance Pilot funded with federal research funds and local government funding
Salinity Benefits Trading Scheme Australia	Land management practices ranked according to salinity benefits Farmers' actions create credits which can be traded with other farmers Pilot scheme funded through joint federal and state initiative

BMP = best management practice, CER = certified emission reduction, EU = European Union, GHG = greenhouse gas, NGO = nongovernment organization.

Source: Literature review.

Annex 2

Summary of Case Study Characteristics and Information Sources

A. Case Study Characteristics

Project Name	Country	Scale (ha) ^a	Environmental Services Targeted	What Is Being Paid For	Who Is Paid ^b	Who Pays
Landcare	Australia		Unspecified	Management practices	Community groups	Federal and State government
ICMS Ecológico	Brazil		Unspecified	Management practices	Local government	State government
National Farm Stewardship Program	Canada	(5.18 million ha target)	Multiple specific	Management practices	Landowners	Federal and State government
Greencover	Canada		Water quality and quantity, biodiversity in riparian areas	Management practices	Landowners	Federal government
Swiss Foundation for the Conservation of Cultural Landscapes	Switzerland		Historical, cultural and natural landscapes, traditional agricultural practices	Management practices	Landowners	Federal government
Landscape Auctions	The Netherlands		Varies for each auction item	Management practices	Landowners	Private investors
Farm and Ranch Lands Protection Program	United States	215,359	Originally topsoil, later “agricultural use and related conservation values”	Management practices	Landowners	Federal and State government
Wildlife Habitat Incentives Program	United States	1,000,000	Wildlife habitat	Management practices	Landowners	Federal and State government
Environmental Quality Incentive Program	United States	(5.26 million ha target)	Habitat, carbon, pollution, etc.	Management practices	Landowners	Federal and State government
Landowner Incentive Program	United States		Biodiversity	Management practices	Landowners	Federal and State government
Grassland Retirement Program	China, People's Republic of	30,000,000	Unspecified	Management practices	Land users	Central and subnational government (later central only)

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Table continued

Project Name	Country	Scale (ha) ^a	Environmental Services Targeted	What Is Being Paid For	Who Is Paid ^b	Who Pays
Sloping Farmland Conversion Program	China, People's Republic of		Soil erosion	Management practices	Land users	Central government
Grassland Conservation Rewards	China, People's Republic of	288,000,000	Multiple	Management practices	Land users	Central government
Kitengela Wildlife Conservation Lease Program	Kenya	4,646	Wildlife habitat	Management practices	Landowners	International and national NGOs
Integrated Silvo-Pastoral Program	Colombia, Costa Rica, Nicaragua	12,262	Biodiversity, carbon	Management practices	Landowners	Multilateral agencies
Vittel-Nestlé Water Scheme	France	4,000	Water quality and quantity	Management practices	Landowners	Private water firm
CCX Rangeland Offset Program	United States		Carbon	Estimate of environmental services	Landowners	Private firms
ESPH	Costa Rica	1,900	Water quality and quantity	Management practices	Landowners	Water users
San Pedro del Norte Water Co.	Nicaragua	39	Water quality and quantity	Management practices	Landowners	Local government, user fees, international NGO
Pimampiro Watershed Services Scheme	Ecuador	638	Water	Management practices	Landowners	User fees with international start-up investment
Conservation Reserve Program	United States	15,000,000	Wildlife habitat, water quality, soil erosion, air quality	Management practices	Landowners	Federal and State government
PSAH	Mexico	477,756	Water	Management practices	Landowners	User fees
Simanjiro CCA	Tanzania		Wildlife	Management practices	Communities	Tour companies
West Arnhem Fire Abatement Project	Australia	2,800,000	Carbon	Management practices	Communities	Energy company
Environmental Stewardship Scheme	United Kingdom	(60% of agricultural land)	Multiple	Management practices	Landowners	EU and national government
MEKA	Germany	7,466	Multiple	Management practices	Landowners	Federal and State government
Spiti Valley Predator Incentive Scheme	India	500	Wildlife	Management practices	Community	International NGO
Snow Leopard Program	Mongolia		Wildlife	Management practices	Land users	International NGO

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Project Name	Country	Scale (ha) ^a	Environmental Services Targeted	What Is Being Paid For	Who Is Paid ^b	Who Pays
High Nature Value Grasslands Program	Romania	1,450,000	Biodiversity	Management practices	Landowners	EU and national government
Alternative Land Use Services	Canada	607	Multiple	Management practices	Landowners	Federal government
Agro-Environmental Grassland Payment (PHAE)	France	3,160,000	Multiple	Management practices	Landowners	EU and national government
Meadow Bird Agreements	The Netherlands	20,000	Bird diversity	Measured environmental service	Landowners	National government
Traditional Meadows and Pastureland Scheme	Sweden	294,900	Multiple	Management practices	Landowners	National government
Conservation Stewardship Program	United States	12,688,937	Multiple	Management practices	Landowners	Federal and State government
Bushtender	Australia	4,000		Management practices	Landowners	Federal and State government
South Australian Multiple Ecological Communities Project	Australia		Biodiversity	Management practices	Landowners	Federal government
Woodland BushBids	Australia	5,336	Biodiversity, weed control	Management practices	Landowners	Federal government
CAMPFIRE	Zimbabwe	24,400,000	Wildlife		Communities	Tour companies
Performance Payments for Carnivore Reproduction	Sweden		Wildlife	Measured environmental service	Communities	National government
Desert Uplands Committee Landscape Linkage Auction	Australia	84,992	Biodiversity	Management practices	Groups of landowners	National government
Wetland Banking	United States	67,198	Wetlands	Management practices	Landowners	Private firms
EcoTender	Australia	520	Biodiversity, salinity, water, carbon	Management practices	Landowners	Federal and State government
BushBroker	Australia	700	Vegetation	Management practices	Landowners	State government
New South Wales BioBanking Scheme	Australia	280	Biodiversity	Management practices	Landowners	Private firms

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Project Name	Country	Scale (ha) ^a	Environmental Services Targeted	What Is Being Paid For	Who Is Paid ^b	Who Pays
CDM Reforestation Project	Paraguay	215	Carbon	Estimated environmental services	Community	International government
VCS Afforestation Project	Tanzania	18,379	Carbon	Estimated environmental services	Landowners	Private firms
Project Terraprima	Portugal	42,000	Carbon	Estimated environmental services	Landowners	National carbon fund
Thicket Restoration Project	South Africa	24,054	Carbon	Estimated environmental services	Landowners (national park)	Private firms
Nordheim Plant Diversity Pilot	Germany	527	Biodiversity	Measured environmental services	Landowners	National research agency and local government
Salinity Benefits Trading Scheme	Australia	372	Salinity	Estimated environmental services	Landowners	Federal and State government

CAMPFIRE = Communal Areas Management Program for Indigenous Resources; CCA = community conservation agreement; CCX = Chicago Climate Exchange; CDM = Clean Development Mechanism; ESPH = Empresa de Servicios Públicos de Heredia (Heredia Public Services Enterprise), Costa Rica; EU = European Union; ha = hectare; ICMS = Imposto sobre Circulação de Mercadorias e Serviços Ecológico (Ecological Tax on Circulation of Goods and Services); NGO = nongovernment organization; PSAH = Pagos por Servicios Ambientales Hidrológicos (Payments for Hydrological Environmental Services Program), Mexico; VCS = Verified Carbon Standard.

^a Data on scale from various years in some cases include accumulated enrolled area which may differ from area enrolled in any one year.

^b In some cases, landowners are groups.

B. Information Sources for Each Case Study

Landcare Australia	http://www.landcareonline.com.au http://www.coastcare.com.au http://www.juniorlandcare.com.au Center for International Economics. 1997. <i>Sustainable Natural Resource Management in the Rangelands</i> . Sydney, Australia.
ICMS Ecológico Brazil	M. Grieg-Gran. 2000. Fiscal Incentives for Biodiversity Conservation: The ICMS Ecológico in Brazil. <i>Discussion Paper</i> . No. 00-01. London, UK: International Institute for Environment and Development (IIED); and P. May, F. Veiga Neto, V. Denardin, and W. Loureiro. 2002. Using Fiscal Instruments to Encourage Conservation: Municipal Responses to the "Ecological" Value-Added Tax in Parana and Minas Gerais, Brazil. In S. Pagiolo, J. Bishop, and N. Landell-Mills, eds. <i>Selling Forest Environment Services Market-Based Mechanisms for Conservation and Development</i> . London: Earthscan.
National Farm Stewardship Program Canada	http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1181580600540&lang=eng http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1181580519716&lang=eng
Greencover Canada	http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1181580137261&lang=eng

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Swiss Foundation for the Conservation of Cultural Landscapes Switzerland	O. Schleske. 1998. Financial Innovations for Biodiversity: The Swiss Experience. Paper presented at a workshop on Financial Innovations for Biodiversity. Bratislava, Slovakia. 1–3 May.
Landscape Auctions The Netherlands	http://landscape-auction.com/home.htm http://www.tripleee.nl/projecten_o.htm#Management%20Planning
Farm and Ranch Lands Protection Program United States	http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/FRPPPrDs.pdf
Wildlife Habitat Incentives Program United States	http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/WHIPPrDs.pdf http://www.nrcs.usda.gov/programs/farmbill/2008/pdfs/whip_factsheet.pdf http://www.nrcs.usda.gov/programs/farmbill/2002/index.html http://www.nrcs.usda.gov/programs/whip/
Environmental Quality Incentive Program United States	http://www.usda.gov/oig/webdocs/10099-18-KC.pdf http://www.tpwd.state.tx.us/landwater/land/private/farmbill/eqip/ http://www.nrcs.usda.gov/programs/farmbill/2008/pdfs/eqip1-15-09.pdf http://www.nrcs.usda.gov/programs/eqip/index.html#intro
Landowner Incentive Program United States	http://wsfrprograms.fws.gov/Subpages/ToolkitFiles/LIP2007.pdf http://wsfrprograms.fws.gov/
Grassland Retirement Program China, People's Republic of	http://www.grassland.gov.cn/grassland-new/index.aspx
Sloping Farmland Conversion Program China, People's Republic of	http://www.tghl.gov.cn/
Grassland Conservation Rewards China, People's Republic of	http://www.grassland.gov.cn/grassland-new/index.aspx
Kitengela Wildlife Conservation Lease Program Kenya	International Livestock Research Institute. n.d. <i>Conservation in Kitengela: Keeping Land Open for People, Livestock and Wildlife</i> . Nairobi. FAO. 2009. <i>Sustaining Communities, Livestock and Wildlife</i> . Rome.
Integrated Silvo-Pastoral Program Colombia, Costa Rica, Nicaragua	http://www.apps.oas.org/pes/default.aspx?ProjectListChangePage=5 http://frameweb.org/CommunityBrowser.aspx?id=2217 http://www.watershedmarkets.org/casestudies/Silvopastoril_Central_America.html S. Pagiola et al. 2004. Paying for Biodiversity Conservation Services in Agricultural Landscapes. <i>World Bank Environment Department Paper</i> . No. 96. Washington, DC: World Bank.
Vittel-Nestlé Water Scheme France	D. Perrot-Maitre. 2006. <i>The Vittel Payments for Ecosystem Services: A "Perfect" PES Case?</i> London: IIED.

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CCX Rangeland Offset Program United States	http://www.chicagoclimatex.com/content.jsf?id=1101
ESPH Costa Rica	L. Gamez. n.d. <i>Economic-Ecological Valuation of Water Resources in Costa Rica: A Practical Application in the Internalization of Environmental Benefits</i> . http://www2.gsu.edu/~wwwcec/special/SCBGamez.pdf http://www.watershedmarkets.org/casestudies/Costa_Rica_ESPH.html
San Pedro del Norte Water Nicaragua	http://www.watershedmarkets.org/casestudies/Nicaragua_San_Pedro.html http://www.apps.oas.org/pes/default.aspx?ProjectListChangePage=5
Pimampiro Watershed Services Scheme Ecuador	M. Echavarria, J. Vogel, M. Albán, and F. Meneses. 2004. <i>The Impacts of Payments for Watershed Services in Ecuador</i> . London: IIED. http://www.watershedmarkets.org/casestudies/Ecuador_Pimampiro_E.html
Conservation Reserve Program United States	http://www.nrcs.usda.gov/programs/crp
PSAH Mexico	C. Muñoz, A. Guevara, J. Bulas, J. Torres, and J. Braña. n.d. <i>Paying for the Hydrological Services of Mexico's Forest</i> . http://www.cifor.org/pes/publications/pdf_files/Mexico_paper.pdf http://www.conafor.gob.mx/portal/index.php/english http://www.ecosystemmarketplace.com/D22
Simanjiro CCA Tanzania	F. Nelson. 2008. <i>Developing Alternative Frameworks for Community-based Conservation: Piloting Payments for Environmental Services (PES) in Tanzania's Simanjiro Plains</i> . Washington, DC: Wildlife Conservation Society.
West Arnhem Fire Abatement Project Australia	http://savanna.cdu.edu.au/information/arnhem_fire_project.html S. Heckbert, J. Russell-Smith, J. Davies, G. James, G. Cook et al. 2009. Northern Savanna Fire Abatement and Greenhouse Gas Offsets on Indigenous Lands. http://nalwt.gov.au/files/Chapter_25-Northern_savanna_fire_abatement.pdf
Environmental Stewardship Scheme United Kingdom	http://www.naturalengland.gov.uk/ourwork/farming/funding/es/default.aspx
MEKA Germany	C. Retter. 2000. <i>A Comparison of Agri-Environmental Schemes in Great Britain and Germany</i> . Freiburg, Germany: Oko-Institut e.V
Spiti Valley Predator Incentive Scheme India	C. Mishra, P. Allen, T. McCarthy, M. Madhusudan, A. Bayarjargal, and H. Prins. 2003. The Role of Incentive Programs in Conserving the Snow Leopard. <i>Conservation Biology</i> . 17 (6). pp. 1512–1520.
Snow Leopard Program Mongolia	C. Mishra, P. Allen, T. McCarthy, M. Madhusudan, A. Bayarjargal, and H. Prins. 2003. The Role of Incentive Programs in Conserving the Snow Leopard. <i>Conservation Biology</i> . 17 (6). pp. 1512–1520.
High Nature Value Grasslands Program Romania	http://www.efnecp.org/events/conferences/hnv-grasslands/session1/
Alternative Land Use Services Canada	http://www.whc.org/conservation/conservation-projects/alberta/alus-demonstration-project-in-the-county-of-vermillion-river-cvr-alberta-2009-10

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Agro-Environmental Grassland Payment (PHAE) France	http://www.terresdeurope.net/en/agro-environmental-grassland-bonus-phae-farming-france.html
Meadow Bird Agreements The Netherlands	D. Kleijn, F. Berendse, R. Smit, and N. Gillisen. 2001. Agri-environment Schemes Do Not Effectively Protect Biodiversity in Dutch Agricultural Landscapes. <i>Nature</i> . 413. pp. 723–725; A. Breeuwer, F. Berendse, F. Willems, R. Foppen, W. Teunissen, H. Schekkerman, and P. Goedhart. 2009. Do Meadow Birds Profit from Agri-Environment Schemes in Dutch Agricultural Landscapes? <i>Biological Conservation</i> . 142. pp. 2949–2953.
Traditional Meadows and Pastureland Scheme Sweden	K. Hasund. 2010. Indicator-Based Agri-Environmental Payments for the Efficient Supply of Public Goods. http://www.ucl.ac.uk/bioecon/12th_2010/Hasund.pdf
Conservation Stewardship Program United States	http://attra.ncat.org/guide/a_m/csp.html http://www.nrcs.usda.gov/programs/new_csp/2010rp-one-results.html http://www.nrcs.usda.gov/programs/new_csp/special_pdfs/2010-12699.pdf
Bushtender Australia	http://www.dse.vic.gov.au/conservation-and-environment/biodiversity/rural-landscapes/bushtender
South Australian Multiple Ecological Communities Project Australia	http://www.nrm.gov.au/stewardship/mecp/mecp-sa.html http://www.environment.gov.au/epbc/publications/pubs/peppermint-box-iron-grass.pdf
Woodland BushBids Australia	http://www.samdbnrm.sa.gov.au/Biodiversity/DrylandBiodiversity/WoodlandBushbidsProject.aspx
CAMPFIRE Zimbabwe	D. Roe et al. 2000. Evaluating Eden: Exploring the Myths and Realities of Community-Based Wildlife Management. London: IIED; R. Hasler. 1999. An Overview of the Social, Ecological, and Economic Achievements and Challenges of Zimbabwe's CAMPFIRE Program. London: IIED.
Performance Payments for Carnivore Reproduction Sweden	A. Zabel and K. Holm-Müller. 2008. Conservation Performance Payments for Carnivore Conservation in Sweden. <i>Conservation Biology</i> . 22 (2). pp. 247–251.
Desert Uplands Committee Landscape Linkage Auction Australia	http://resourceeconomics.cqu.edu.au/FCWViewer/getFile.do?id=7479
Wetland Banking United States	http://www.epa.gov/owow/wetlands/facts/fact16.html http://www.oecd.org/dataoecd/35/34/35026777.pdf http://www.ecosystemmarketplace.com/documents/acrobat/sbdlmr.pdf
EcoTender Australia	http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/F18669E8E2A4C02FCA256FDB00031592DC837B2FCBEF4B4BCA2573B6001A9728
BushBroker Australia	http://www.dse.vic.gov.au/conservation-and-environment/biodiversity/rural-landscapes/bushtender

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New South Wales BioBanking Scheme Australia	http://www.environment.nsw.gov.au/biobanking/landowners.htm
CDM Reforestation Project Paraguay	http://cdm.unfccc.int/Projects/DB/TUEV-SUED1245074838.6/view
VCS Afforestation Project Tanzania	http://www.climate-standards.org/projects/files/tanzania/ufp_mfp_combined_validation_VCS_PDD-1.pdf
Project Terraprima Portugal	http://www.se2009.eu/polopoly_fs/1.27540!menu/standard/file/10_Dec_Grassland_soil_carbon_management_Project_Terraprima.pdf
Thicket Restoration Project South Africa	https://s3.amazonaws.com/CCBA/Projects/Kuzuko_Lodge_Private_Game_Reserve_Thicket_Restoration_Project/Kuzuko_PD_C4ES_31_August_2012%5B1%5D.pdf
Nordheim Plant Diversity Pilot Germany	S. Klimek, A. Kemmermann, H. Steinmann, J. Freese, and J. Isselstein. 2008. Rewarding Farmers for Delivering Vascular Plant Diversity in Managed Grasslands: A Transdisciplinary Case-Study Approach. <i>Biological Conservation</i> . 141 (11). pp. 2888–2897.
Salinity Benefits Trading Scheme Australia	J. Conner, J. Ward, C. Clifton, W. Proctor, and D. MacDonald. 2008. Designing, Testing and Implementing a Trial Dryland Salinity Credit Trade Scheme. <i>Ecological Economics</i> . 67. pp. 574–588.

Making Grasslands Sustainable in Mongolia: International Experiences with Payments for Environmental Services in Grazing Lands and Other Rangelands

Payments for environmental services (PES) are a potential mechanism to provide incentives for sustainable management of grasslands and reduction of greenhouse gas emissions. PES is not widely practiced in Mongolia, but has been included in the Green Development Strategy of the government. This paper reviews 50 PES schemes operating in grasslands and other grazing lands globally, including Mongolia. It discusses key issues related to the design of PES schemes in Mongolian grasslands, including potential benefits, risks, constraints, and trade-offs.

About the Asian Development Bank

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