Three Rivers Rangeland Carbon Sequestration Project

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TRANSFORMING LIVES AND LANDSCAPES

Project goal

The goal of this project is to develop and demonstrate practical methodologies for enabling small-holders in rangelands to access carbon markets.

Project rationale

Agricultural management practices in rangeland areas have great influence on the fluxes of greenhouse gases (GHGs). The incorporation of GHG emission reduction objectives into farming practices, can generate several public and private benefits

Improving farming system productivity can contribute to sustaining rural livelihoods.

GHG emission reduction practices can also increase the provision of other environmental services. The market for GHG emission reductions is the largest environmental services market, and likely to keep growing. However agriculture has had very little participation in this market. In degraded and extensively managed rangelands, the largest potential source of emission reductions – soil carbon sequestration – is not eligible for the CDM. Soil carbon would be eligible for some voluntary market standards, but at present there are no approved methodologies suitable for accounting for emission reductions from activities implemented by small holders in rangelands in developing countries.

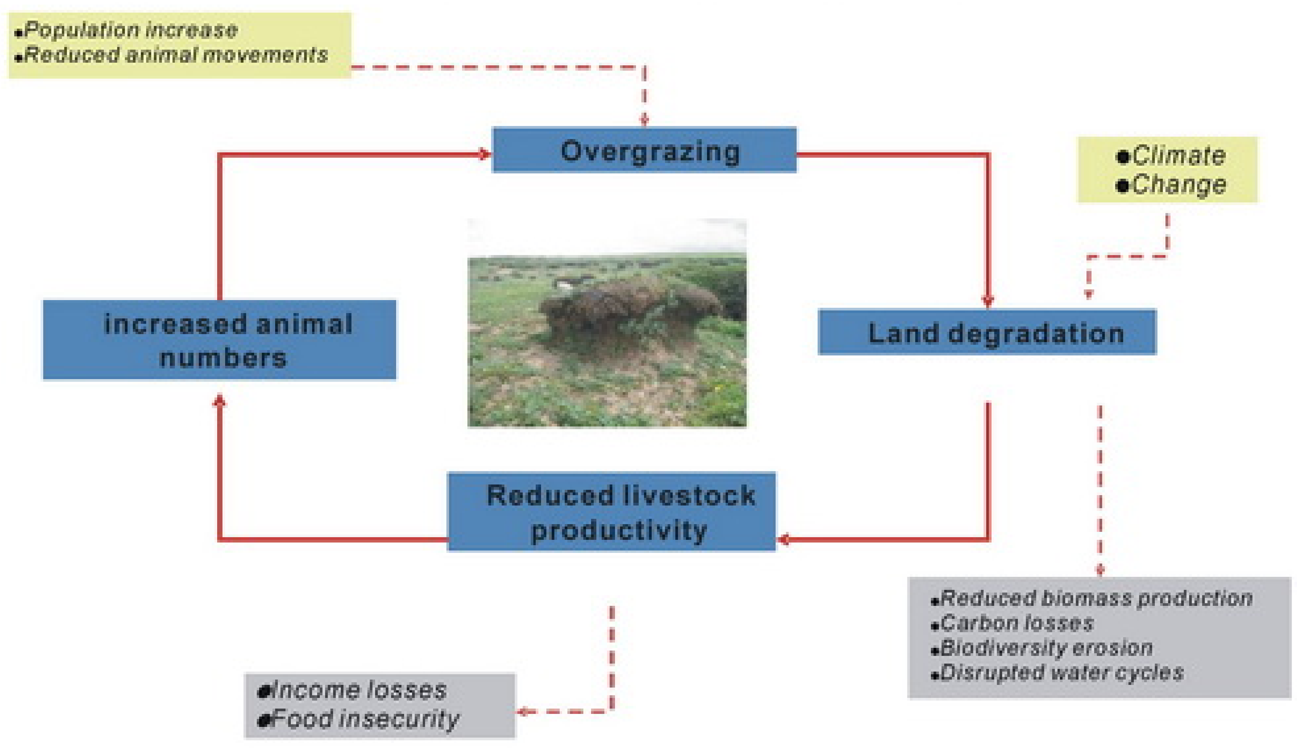
With the goal of supporting the development and subsequent implementation of an operational carbon sequestration project, this project will not only provide some practical lessons from experience, but will also enable ICRAF-China and its partners to identify scientific research questions of direct value to stakeholders in the growing carbon market.

Project partners

The project is funded by UN FAO. ICRAF China programme has undertaken site identification, land use and project activity planning, and modeling of economic impacts of project implementation. The Chinese Academy of Sciences (CAS) is responsible for carbon modeling to determine ex-ante emission reduction estimates. Together with national advisors nominated by the Ministry of Agriculture, ICRAF China and CAS will contribute to development of a methodology for validation by a respected international carbon standard.

Project outline

High potential for soil carbon sequestration has been identified in degraded rangelands in alpine areas of the Tibetan Plateau. A site covering around 13,000 ha has been identified in the Three Rivers Source Area of Qinghai Province, China. The area is the source of the Yangtze, Yellow and Mekong Rivers, providing hydrological services to more than a billion downstream inhabitants. It is also an area of high endemic biodiversity. About 50% of the land area in the project site is heavily or severely degraded. Degraded plots have poor soil water retention capacity and low levels of biodiversity. Restoring degraded rangelands and promoting improved land management will improve ecosystem service provision. Land restoration and improved livestock management and product marketing will ensure that herders' incomes increase over the longer-term, providing incentives for participation by around 260 households in the project. Revenue from sales of emission reductions will support implementation of improved land and livestock management practices. Methodology and project design will be complete by Spring 2011.



Experiences to date

(1) Feasible methods for measuring changes in roots and soil carbon

Changes in carbon stocks in vegetation roots and soil pools are estimated to account for more than 80% of emission reductions from project implementation. Ex ante estimates of measurement costs suggests that direct measurement using sampling protocols like those required for CDM/AR projects would be prohibitively expensive. By contrast, an approach based on monitoring of activity adoption by herders, with root and soil carbon stock changes estimated using carbon models (e.g. Century), would be much more cost effective (Table 1). Table 1 shows that with activity monitoring, a much larger proportion of total revenues is available to support project implementation, which includes both direct costs (e.g. seeds etc) as well as incentive payments for herders.

If a herder cannot know in advance what level of payment will be received for implementing activities over a long period (e.g. 10 or 20 years), it is unlikely that they will commit to activity adoption. Since land restoration and changes in management practices require significant up-front costs, investments will have to be made ex ante. This means that investors (or buyers of ex post emission reductions) will face significant risk if emission reductions cannot be estimated in advance. Another significant advantage of activity monitoring approaches is that herders and buyers face much less uncertainty over the emission reductions that activity implementation can deliver.

Table 1: Costs of different monitoring approaches as a % of total carbon revenues

	Direct measurement	Activity monitoring	
	% of C revenues	% of C revenues	
Project development	7%	7%	Project development
Monitoring costs	28%	5%	Monitoring costs
Implementation costs	65%	87%	Implementation costs
ER issuance costs	3%	4%	ER issuance costs
	100%	100%	

Notes: Direct measurement costs estimated on basis of (i) CDM A/R sampling method and (ii) assumed CV of SOC in soils derived from literature values.

(2) Critical issues for an activity monitoring approach

Carbon models cannot possibly provide 100% accurate predictions of carbon stock changes at every location in a project area. Validated models perform better than unvalidated models. Methods for quantifying the uncertainty of model outputs exist. But critical questions, such as 'how much uncertainty are market actors willing to accept?' and 'what methods for addressing uncertainty (e.g. discounting) would be acceptable within the context of a market trade?' are still being discussed by market actors (e.g. carbon standards and their scientific advisors, and potential buyers). Once uncertainty associated with carbon models has been addressed, there is also the problem of uncertainty in reporting of activity adoption. CDM sample survey guidance requires sample based estimates to have a 90% probability of falling in a range ± 10% of the true population value (i.e. '90/10 precision'). Methods for achieving this in the context of sample surveys on small holder adoption of management activities have yet to be specified.

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