Sustainable grazing management & soil C sequestration

- **Focus area:** FA2 – Restoring value to grasslands
- **Country(ies):** tbd – currently scoping for Uruguay, Brazil, Central Asia, Mongolia, Ethiopia,
- **Agency(cies):** FAO, others tbd
- **Project duration:** 10 years
- **Indicative grant amount ($):** $2 million
- **Key stakeholders:** Relevant: MoA; producers associations; extension agencies; carbon market broker / private sector buyer of carbon credits

PROJECT FRAMEWORK (i)

Objectives

- *Environmental objective:* climate change mitigation and adaptation in the livestock sector, via adoption of sustainable grazing management practices on overgrazed grassland areas.
  - Alignment, where possible, with NAMA commitments under UNFCCC.

- *Development objective:* improve food security, incomes, and resilience of herding communities in the project area.

PROJECT FRAMEWORK (ii)

On-ground activities

- Enclosure and protection of degraded grassland plots from grazing.
- Management of degradation around water points.
- Maintain/increase forage availability, by cultivation of suitable plots with perennial forage grasses.
- Implement sustainable grazing plans on remaining usable grasslands.
- Supply chain development and improved marketing of livestock products

PROJECT FRAMEWORK (iii)

Enabling activities

Research & planning

- Natural resource inventory & benchmarking of pastoral enterprises
- Carbon accounting surveys for soil, above and below ground biomass.
- Develop land use plans for on-ground activities
- Model/evaluate management scenarios in terms of their financial, environmental, and social impacts
- Develop MRV plan for the project, which meets the requirements of relevant carbon market.
- Market survey and supply chain analysis

PROJECT FRAMEWORK (iv)

Enabling activities

Implementation

- Adoption of suitable validated carbon accounting methodology
- The establishment of transparent payment mechanisms, linked to carbon relevant market
- Seek/screen potential investors/buyers of carbon credits
- Extension program to support on-ground activities
- Education program to outline long-term socio-economic benefits of sustainable grazing management plans

PROJECT FRAMEWORK (v)

Expected outcomes:

- Knowledge generated about the technical and economic potential for carbon sequestration on degraded grasslands in the study area(s)
- Sustainable grazing management plans are adopted and:
  - X tonnes of carbon sequestered and X tonnes of non-CO_2 GHG emissions reduced
  - resilience of production system to climate change enhanced.
- Access to carbon market funds are secured
- Productivity, product diversification and herder incomes are increased
- Improved institutional capacity for sustainable management, engagement with carbon markets, monitoring, and marketing

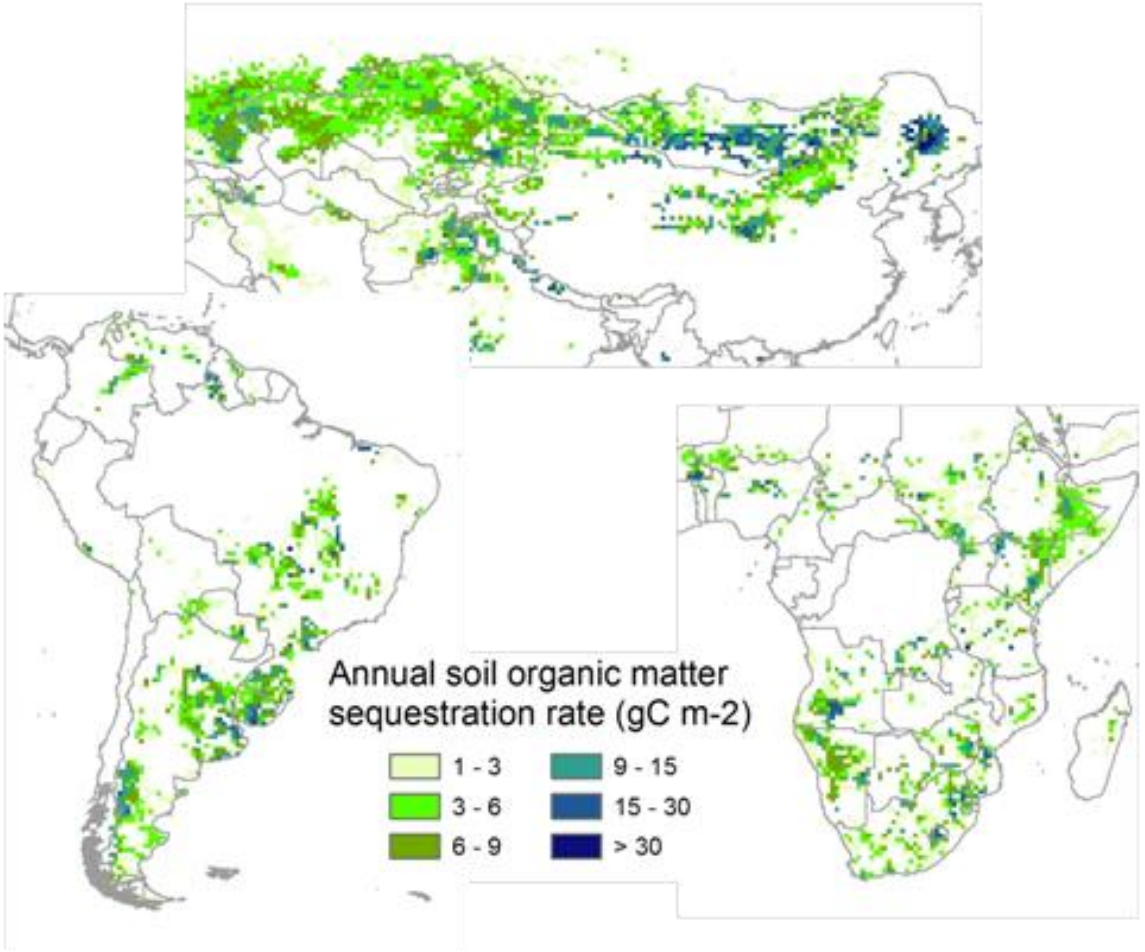
Grassland degradation & sequestration potential

Continent	Grassland, 10^6 ha	Overgrazed Grassland, 10^6 ha	Percent Overgrazed
Africa	838.2	87.7	10.4
Australia/Pacific	437.1	49.1	11.2
Eurasia	1385.9	85.6	6.2
North America	353.7	14.0	4.0
South America	402.2	26.2	6.5
Total	3417.1	262.5	7.7

Source: Conant & Paustian (2002)

Continent	Rate $tCO_2eq\ ha^{-1}\ yr^{-1}$	Ha to sequ. $50{,}000tCO_2eq\ yr^{-1}$
Africa	0.77	64,935
Eurasia	0.18	277,778
South America	2.53	19,763
North America	0.59	84,746
Australasia	0.33	151,151

Heterogeneity matters (i)



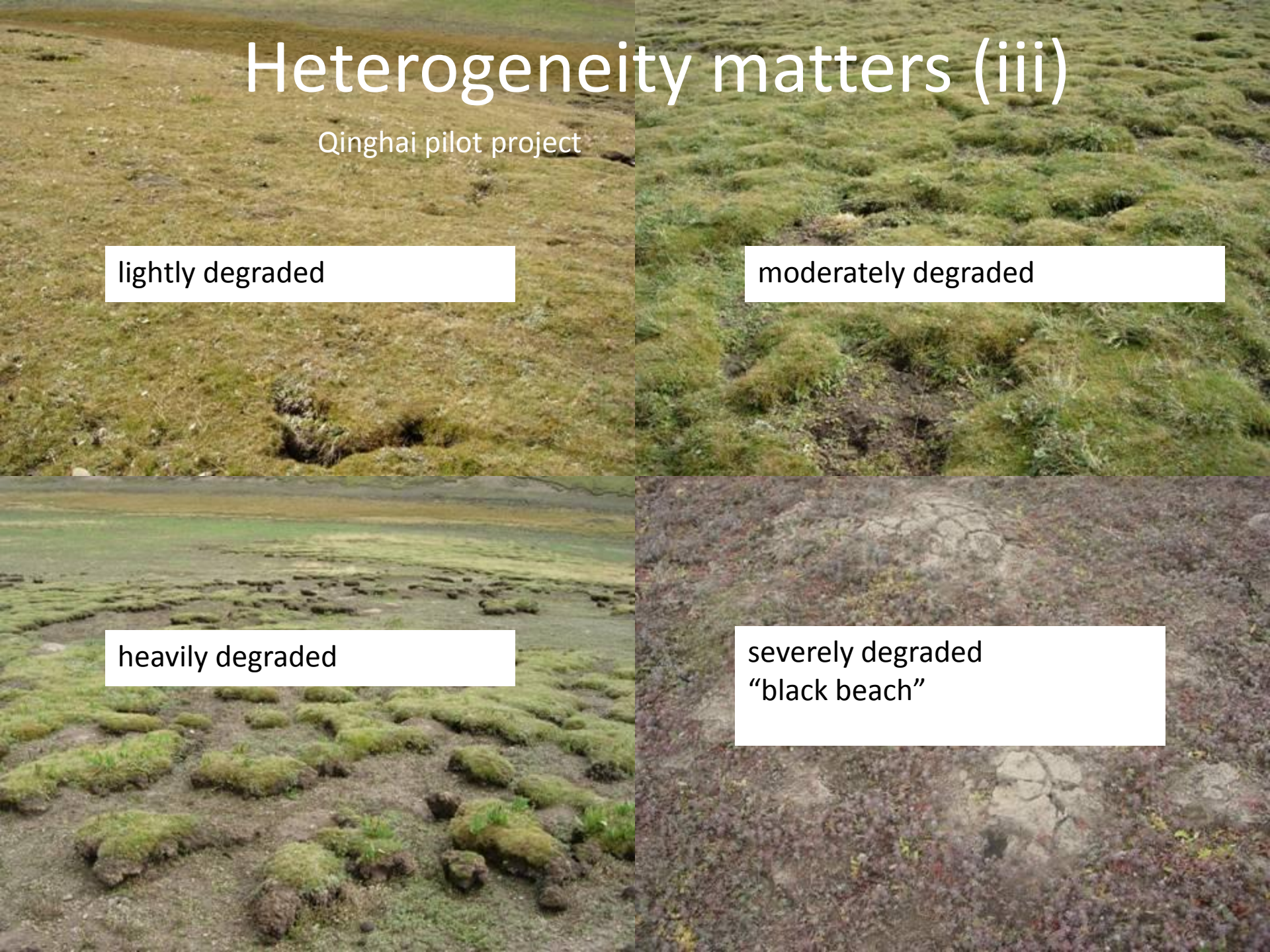
Source: Preliminary results, global Century analysis

Heterogeneity matters (ii)

- Eurasian continental average sequestration rate = 0.18 $tCO_2eq\ ha^{-1}\ yr^{-1}$
- In FAO's Qinghai pilot, annual average sequestration rate over 22,615 ha was 3 $tCO_2eq\ ha^{-1}\ yr^{-1}$
  - Total annual mitigation = 66,700 $tCO_2eq\ yr^{-1}$
  - further variation within project area, from 0.1 to 7.3 $tCO2eq\ ha^{-1}\ yr^{-1}$

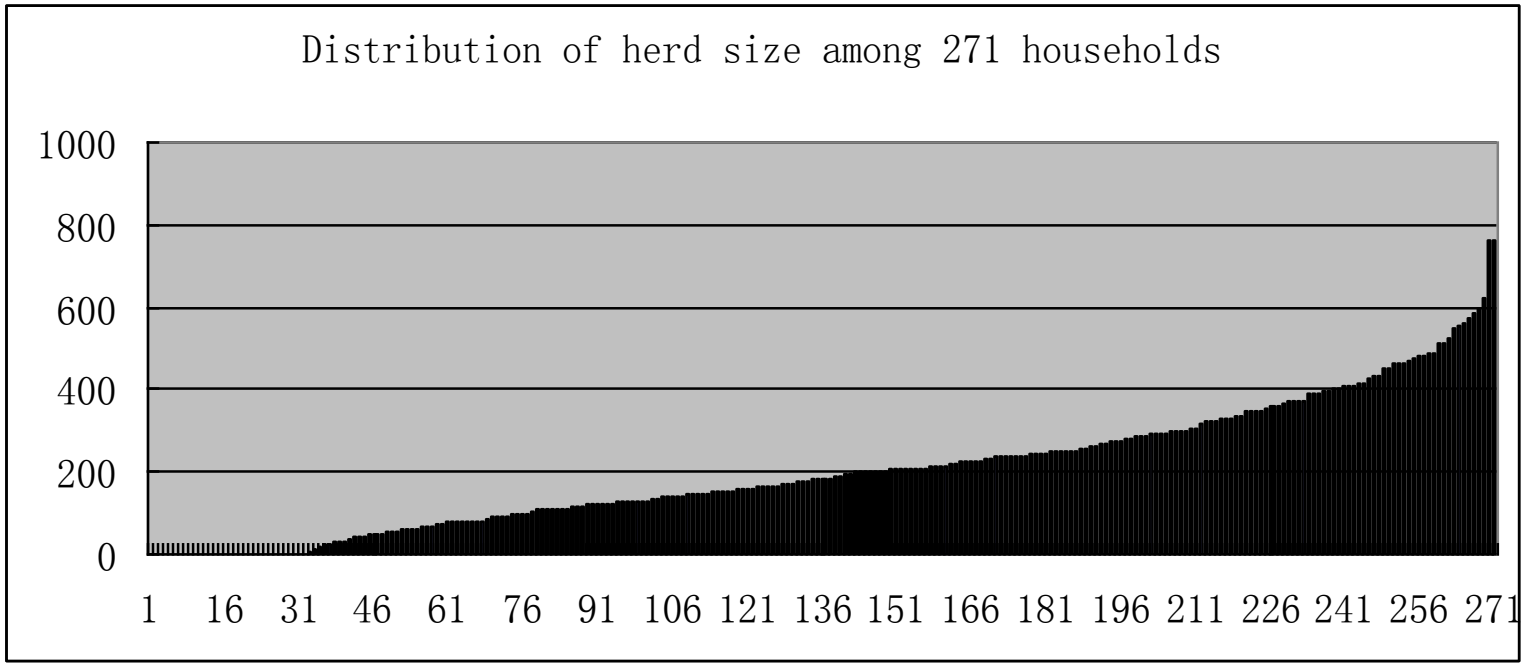
Heterogeneity matters (iii)

Qinghai pilot project



- Qinghai pilot project summary

- 271 households
- 22,615 ha
- 14,354 sheep
- 9,216 yaks



Qinghai Project Activities (1)

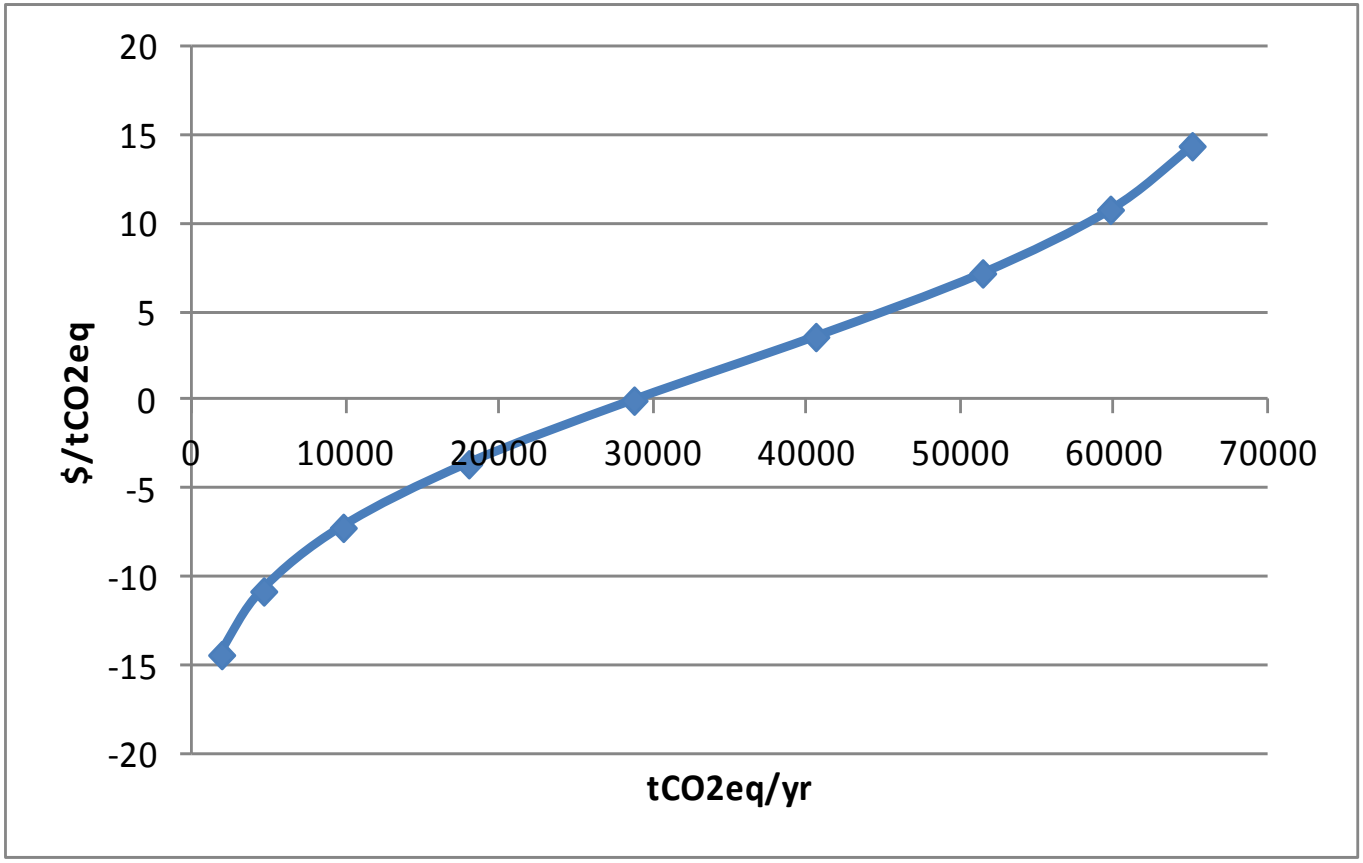
Tailored measures to restore grasslands (household by household basis):

- Moderately & lightly degraded areas
  - Delay grazing of summer grasslands
  - Adopt more sustainable stocking rates
- Severely & heavily degraded areas
  - Reseeding & cultivating grass
- ➢ *Average de-stocking rate in years 1-10 : 33%*
- ➢ *Stocking rates return to baseline levels yrs 11-20*

- Improve animal husbandry
  - Winter housing
  - Winter feeding supplementation
- Livestock product marketing

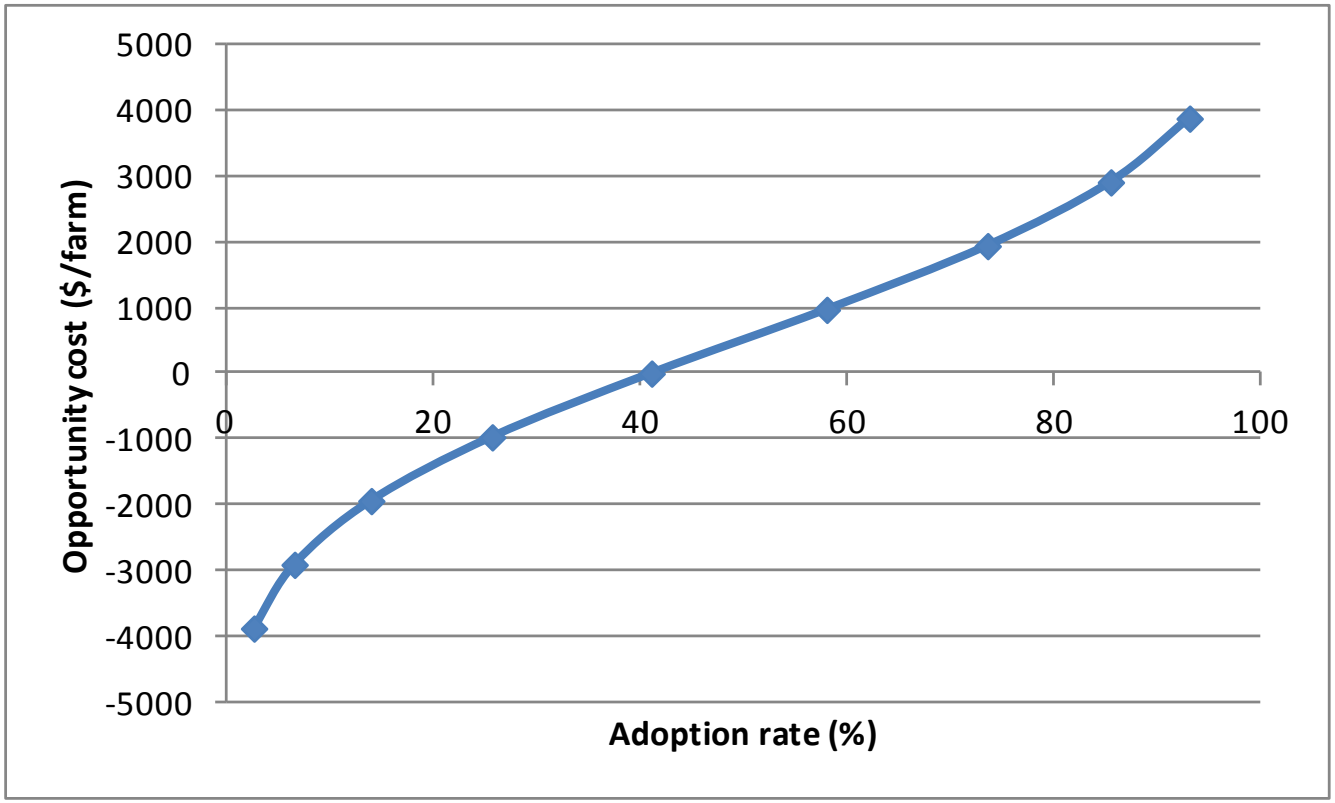
Marginal sequestration costs

- Qinghai pilot



Adoption and opportunity costs

- Qinghai pilot



Project preparation costs

- Qinghai pilot
  - Preparation costs: $550,000
    - Site selection & land use plan: $168,000
    - Methodology development: $215,000
    - Project design: $167,000
  - Approx. $ 1 million to fund up front investment in fencing, pasture establishment and warm shed development.

Conclusions

- Grassland degradation status, and consequent sequestration potential highly heterogeneous
  - Finding high potential sites is critical in piloting/demonstration phase
  - But low average rates, suggest steeply diminishing marginal returns for some countries
- Restoration costs are highly heterogeneous
  - Moderately degraded grasslands recover faster than heavily degraded. But opportunity costs higher on moderately degraded
  - Both high sequestration potential and grassland productivity +ve correlated with precipitation levels
    - ∴ opportunity costs per ha increase with rainfall, but costs per tonne of carbon may not
- Project preparation costs can be high, but will be cheaper following completion of FAO methodology on SGM

Methodology for Sustainable Grassland Management (i)

Applicability conditions

a) Land is **grassland** at the start of the project;
b) Grassland to be sustainably managed is **degraded**;
c) There is no displacement of manure from outside the project boundary to within the project boundary;
d) There is no significant increase of use of fossil fuels, fuel wood from non-renewable sources;
e) There is no significant change in manure management systems within the project boundary;
f) The project activity **does not include land use change**.
g) Where **biogeochemical models** can be demonstrated to be applicable in the project region, they may be used to estimate SOC pool changes. Where such models are not applicable, the methodology provides using direct measurement methods to estimate of SOC pool changes.
h) Regions where precipitation is less or equal to potential evaporation in same period.

Methodology for Sustainable Grassland Management (ii)

	Baseline	**Project**
N2O emissions due to fertilizer use	Tier 1	Tier 1
Emissions due to the use of N-fixing species	Tier 1	Tier 1
Emissions due to burning of biomass	Tier 1	Tier 1
CH4 emissions due to enteric fermentation	Tier 1	Tier 1
N2O emissions from manure and urine deposited on grassland soil during the grazing period	Tier 1	Tier 1
CO2 emissions due to the use of fossil fuels for grassland management	Tier 1	Tier 1
Removals from existing woody perennials	Tier 1	Tier 1
Removals due to changes in SOC	0	Modelling or measurement
Total emissions and removals	**∑ above**	**∑ above**