Climate change and livelihoods

Managing and mitigating climate change through pastoralism

Jonathan Davies and Michele Nori

Abstract. Mobile pastoralists are amongst those most at risk to climate change, yet they are amongst those with the greatest potential to adapt to climate change, and they may also offer one of the greatest hopes for mitigating climate change.

The vulnerability that is associated with climate change in some pastoral environments has its roots in the restriction of tried and tested pastoral coping strategies. Pastoral adaptation faces a myriad of challenges, of which climatic change is but one, and indeed, the challenge of climate change seems insignificant to many pastoralists who are faced with extreme political, social and economic marginalisation: relax these constraints and pastoral adaptive

Pessimistic views of pastoralism in the face of climate change are particularly rife in Africa south of the Sahara, where food insecurity is widespread and where many pastoral communities are regularly confronted with drought, which is said to be increasing. Yet it is important to examine this 'drought' more closely before it is simplistically attributed to climate change. Scientific predictions and computer simulations suggest that in the short term the Sahel might actually benefit from climate change, through a greening of the Sahel and southern Sahara.[4] Pastoral areas of southern Kenya and northern Tanzania may also be getting wetter.[5] Yet food insecurity appears to have increased in the pastoral areas of both East and West Africa over the past 10 years. To simplistically put this down to increasing drought would be misleading.

The scale of movements that some pastoralists have made in the past, to cope with climate change, insecurity and other challenges, are no longer possible in many countries, and pastoralists must be enabled to identify new coping strategies that are appropriate to their current situation.

There are many factors that could be influencing food security besides climate change, including demographic growth, loss of land and sustained underinvestment and marginalisation. Additionally, rather than facing meteorological drought, many pastoralists may be faced with a form of agricultural drought: a phenomenon that is evidently man-made and is influenced by poor policy and mismanagement. As a result, even if there is a silver lining in the cloud of climate change and levels of precipitation rise in parts of Africa, pastoralists are not in a good position to take advantage.

In reality, climate change will not favour pastoralists if they do not recover the ability to adapt. Policies and investments frequently favour crop growers over livestock keepers, particularly in the drylands where crops are being made more and more resistant to drought. The land rights of crop growers are usually more secure than those of livestock keepers, and the tendency over the past 50 years has been incursion of cultivators into grazing lands. Even if the projected "greening of the Sahara" does take place, under the current conditions it is likely to be crop growers that benefit at the expense of pastoralists.

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Climate change will therefore affect pastoralists differently in different parts of the world, and according to the extent of their marginalisation and under-development. Although pastoralists may cite other threats to their livelihood as of greater importance, there is good reason to be concerned about the risks that climate change presents, and to assist pastoralists to be aware of those risks and to develop new adaptive strategies. Above all, pastoralists risk being caught out by the rate and the scale of climate change, and if their adaptive strategies are already failing to move with the times, then climate change is likely to increase that failure, with huge social and environmental consequences (Box 1).

1. **Livestock mobility** optimises the use of the range, enables pastoralists to access seasonally available resources and buffer zones, and enables herders to evade disease-prone areas;
2. **Livestock diversity** (grazers and browsers) reduces risk from disease, droughts and parasites;
3. **Maximizing stocking densities** helps to ensure long term survival after drought stock loss;
4. **Grazing reserves** (swamps, highlands and riverine areas) are of critical importance to pastoralist risk management strategies;
5. **Herd splitting** spreads risk and enables systems of strong social relations and security to be maintained;
6. **Redistributing assets** and mutually supportive relationships and support networks are critical for coping with crises;
7. **Livelihood diversification** allows pastoralists pursue a number of activities that can be seasonal or permanent, and may be complementary to pastoralism, or a temporary alternative to pastoralism;
8. **Labour migration** enables pastoralists to mitigate risk from drought

The term captures a wide range of social phenomena and outcomes that need to be unpacked. In many countries, marginalisation is reflected in the widespread lack of rec-

irrational and environmentally damaging. Positive impacts of livestock on range ecosystem health include: grazing and browsing, which removes ligneous pasture, diminishes fire risk and promotes tillering of many grasses; hoof action which breaks soil crusts and improves water infiltration, embeds seeds and mulches dead vegetation; gut-scarification and transportation of seed; manuring which fertilises the soil and distributes seeds.

Many rangelands are considered "grazing dependent", and research in the USA has shown that appropriate cattle grazing can improve the quality of seasonal rangeland forage available to elk during critical periods of nutritional stress.[14] Similar observations have been made for North American sagebrush grasslands and in Mongolia.[15] In recent centuries there may have been a shift from wild ungulates to domestic stock, with livestock replicating the animal impact of wild herds (grazing, manuring and trampling).[16] Evidently such impact relies on managed livestock mobility, which explains the extremely low performance of steady-state stocking systems that have been prescribed in the past by development practitioners.[17]

Just as pastoralists have adapted to their environment, so rangeland environments have adapted to pastoralism, over thousands of years of management.

w **Pastoralism and soil carbon capture**

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Grasslands store approximately 34 per cent of the global terrestrial stock of CO2 and cover 1.5 times more of the globe than forest. Although the standing carbon store of forests is much greater than that of grasslands, some forests add only about 10 per cent to their total weight each year, whilst savannas can reproduce 150 per cent of their weight annually,[19] and tropical savannas have a greater potential to store carbon below ground than any other ecosystem.[20] Since effective herd management has been shown to increase primary productivity of the rangelands,[21] and given the scale of pastoralism, and the obvious importance of the rangelands to global environmental health, it is vital that Carbon Financing mechanisms are developed to promote this significant environmental service of pastoralism.

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However, it is also argued that pastoralism is part of the global livestock sector, which contributes more to global carbon emissions than almost any other industry (9 per cent of all CO^2 deriving from human-related activities, and an even greater share of even more harmful greenhouse gases such as nitrous oxide and methane). Furthermore livestock now uses 33 per cent of the global arable land to produce livestock feed, plus a large area of pasture land that has been created through the felling of forests, especially in Latin America where, for example, some 70 per cent of former forests in the Amazon have been turned over to grazing.[22]

The true extent of the contribution of pastoralism to climate change is therefore hard to assess, considering that these global figures are not disaggregated. Yet many of the main emissions of greenhouse gases come either from intensive production systems, or from commercial extensive systems that have been created through the clearance of extensive tracts of forest (in South America). Considering the steady growth in demand for livestock products around the world, there is an urgent need to disaggregate the environmental impacts of different livestock systems, to understand which systems are least costly to the environment, and to promote the most environmentally friendly practices.

enabling them to use such resources as needed, is vital to reducing their vulnerability and to supporting their capacity to tackle the sustainable development challenge in marginal areas.[29]

Current subsidy schemes and technological distortions encourage livestock production in ways that are contributing to climate change and greater recognition is needed of

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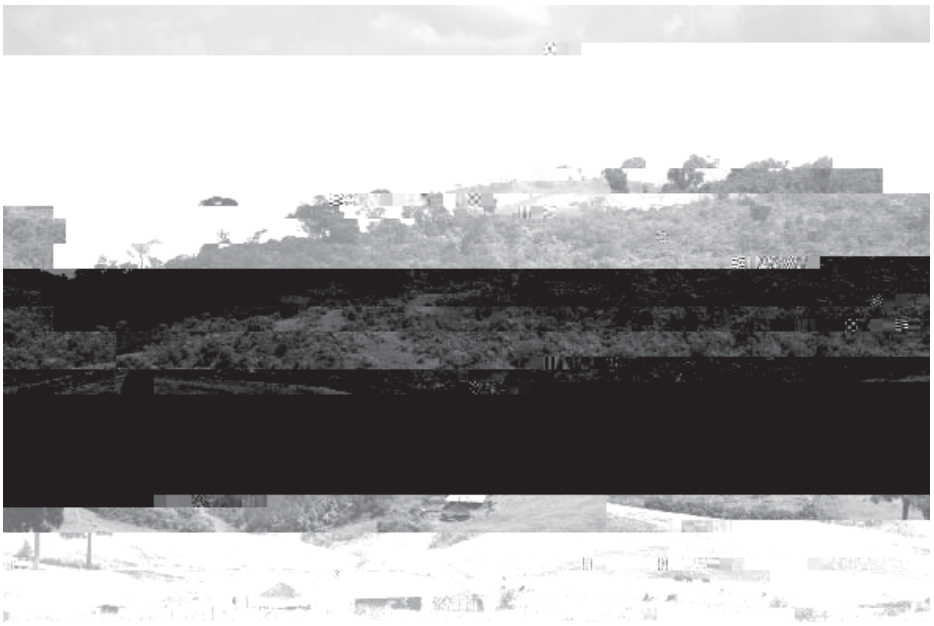
Climate

With climate change riding high on the political and economic agenda, more and more attention is being paid to different mechanisms for offsetting, reducing and preventing carbon releases into the atmosphere. The UK's 2006 [1] estimated that land use change— and deforestation in particular— is responsible for 18 per cent of global emissions. Yet so-called "avoided deforestation" or "reduced emissions from deforestation and degradation" (REDD) projects were not recognised under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) during the first commitment period (2008-2012) of its Kyoto Protocol.

The exclusion of standing forests from the CDM stemmed from a number of concerns, including:

1. The risk of deflecting attention from the need to curb industrial emissions
2. Technical issues relating to whether forests can deliver robust carbon benefits. For example, forest carbon stores can succumb to disease, fire or logging, making them less than permanent, with a risk that emissions from forest conversion are often displaced to other locations.

Discussions on the development of a new post-2012 Kyoto framework reignited debate on whether to include REDD projects. This is in large part due to the increasing recognition of the significance of emissions from deforestation and also to the technical improvements in monitoring carbon stocks— for example



Picture 1. Mount Elgon, Uganda ( )

through better satellite imagery. As a result the 2007 Conference of Parties to the UNFCCC held in Bali concluded that any future agreement under the UNFCCC to combat climate change must include measures seeking to reduce deforestation in tropical countries.

Along with climate change, biodiversity loss is another environmental issue of international concern. The Millennium Ecosystem Assessment (MA) highlights how biodiversity underpins the delivery of a range of "ecosystem services" on which human well-being depends but is being degraded at an unprecedented rate. Although the complex links between biodiversity loss and climate change are not yet well understood, there are some clear overlaps:

1. Land conversion contributes to greenhouse gas emissions and has been identified by the MA as a major driver of biodiversity loss.
2. The MA estimates that by the end of the century, climate change will be the main driver of biodiversity loss.

So efforts to tackle climate change are becoming increasingly entwined with efforts to address biodiversity loss. As a result, carbon emissions are a concern within both issues.

This should be good news for biodiversity. For a number of years, conservation organisations have been lamenting the decline in available funding. Carbon funds, however, are growing at a phenomenal rate, and offer the potential to make up some of the shortfall. Forest carbon provides a tool for mitigating climate change and financing forest conservation. Because conservation, development and climate change goals are inevitably closely linked, it is vital that any mechanism provides a robust carbon benefit, while ensuring protection of biodiversity and attending to socio-economic goals.

Different mechanisms for linking carbon emissions and biodiversity conservation

Carbon trading

Under the Kyoto Protocol, industrialised countries in Annex B to the Protocol are able to address emission reduction obligations through three mechanisms:

1. Trading carbon credits with other Annex B countries (emissions trading)
2. Offsetting emissions through investment in emission-reduction projects in other Annex B countries (Joint Implementation)
3. Offsetting emissions through investment in emission-reduction projects in developing countries (CDM).

In addition to these so-called "compliance" mechanisms, a "voluntary" carbon market has emerged through which individuals and organisations can choose to offset their carbon emissions for various purposes, often linked to individual or corporate responsibility. These include:

1. Government-led mechanisms such as the New South Wales GHG Abatement Scheme
2. Schemes run by specialist carbon brokers and/or retailers. Carbon funds operate like any project-based investment fund: a set of partners invests in the fund, the fund invests in a portfolio of emissions-reducing projects (for example, renewable energy and energy efficiency projects) and the fund manager or broker sells the carbon credits generated, with profits going to investors.
3. Individual carbon-offset projects run by NGOs.

Although many schemes purport to offer sustainable development benefits in addition to carbon offsetting, some have been criticised for lack of transparency, accountability and rigorous carbon measurement systems. There is a strong need for voluntary emission reductions to be verified against clear standards to ensure that they provide a robust carbon benefit, alongside any additional co-benefits they promote.

A number of means exist through which investments in either compliance or voluntary mechanisms can link payments for carbon emissions with biodiversity conservation:

1. Individual projects can be designed to meet CDM criteria, registered with the CDM and sold on the international market. Sellers include government agencies, conservation organisations and community groups. CDM projects are intended to secure firm carbon reductions and also contribute to sustainable development, and have to meet certain standards to be eligible.
2. Outside the CDM, retailers may invest in a portfolio of biodiversity-based projects for sale to individuals or organisations on a "pay as you go" basis— for example, planting trees to offset emissions from air

funding going towards industrial and energy projects. Under the CDM, for example, only one such project has been registered. This is largely to do with problems of guaranteeing the "permanence" of forest stock and of "leakage" or "displacement"— that is, displacing the carbon-emitting activity elsewhere.

Dialogue within the UNFCCC is be-

Connecting carbon, conservation and community benefits

While there are certainly risks to local communities from the rapidly growing interest in carbon conservation, there are an increasing number of fledgling schemes that could benefit local communities and generate income streams in areas with very little alternative economic potential, particularly where explicitly designed to do this.

Little attention has been paid to such "bottom-up" approaches to date, but some good examples exist of projects which provide both carbon and biodiversity benefits.[9] The BioCarbon Fund portfolio includes a number of community-based projects. In Niger, for example, local communities enter into a partnership agreement with a private company to grow for the production of gum arabic.

Plan Vivo is a good example of a scheme specifically designed with community benefits in mind, and supports small-scale initiatives with local communities that can be used to generate tradable carbon credits. One is a Community Carbon Project in the N'hambita community in the buffer zone of the Gorongosa National Park, Mozambique. The project improves the livelihoods of this very poor community by introducing agroforestry systems that provide income from carbon finance and a range of other benefits such as fruit, timber, fodder, fuelwood and improved soil structure. The community also benefits from improved organisational capacity, education and awareness about forest stewardship and conservation, and the introduction of novel income through beekeeping, cane rat production and craft making. The Forest Stewardship Council (FSC) provides accreditation for sustainably managed forest products, which takes into account the rights of indigenous people, local communities

Next steps: Beyond carbon conservation?

The urgent need to reduce carbon emissions is generating exciting new initiatives. While these offer a big increase in investment flows for conservation, there are a number of criti-

shrimp and molluscs while increasing In Sudan, local farmers harvest gum from gum arabic trees. The trees seed themselves naturally on farmland, and the farmers leave the seedlings to grow for five years until they can be tapped for gum. Local people are also selecting varieties with greater resistance to drought and hotter temperatures, both associated with climate change. These activities enhance livelihoods, help local people adapt to a changing climate, sequester carbon in tree growth and support good land management and biodiversity conservation.[11] The UNFCCC Adaptation Fund will expand the number of such projects.

For new carbon funds to succeed, they must bridge local and international interests, and engage with local people to ensure these partnerships for sustainable forest management

The wise development of carbon funds offers a major opportunity to respond to climate change in ways that blend mitigation and adaptation. However, for these new carbon funds to succeed, they must bridge local and international interests, and engage with local people to ensure these partnerships for sustainable forest management are transparent and accountable. They need to deliver tangible livelihood benefits, maintain biodiversity and ensure long-term gains from forests, rather than rapid disbursement of funds.

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and plant species from extinction and maintaining resilient and productive natural life-support for humankind.

Exemplary land management projects can address the global problems of climate change, biodiversity loss and poverty simultaneously and in a cost-effective way. Multiple-benefit projects are also more likely to attract a diverse portfolio of investors. For example, a reforestation project with obvious environmental and social co-benefits may attract private investors for the carbon credits, government money for sustainable development and philanthropic grants for biodiversity conservation.

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Conversely, poor quality land management can result in negative tradeoffs between various outcomes. For example, a non-native plantation may sequester carbon, but bring negative impacts in other spheres if it blocks migratory routes of key species or excludes traditional use of ecosystems by communities. Although major international agreements call for integrated approaches to global problems, there is little concrete guidance on how to develop such holistic projects.

The Climate, Community & Biodiversity (CCB) Standards[3] were created to foster the development and marketing of projects that deliver credible and significant climate, community and biodiversity benefits in an integrated, sustainable manner. They enable identification of land-based carbon projects that are designed using best practices to deliver robust and credible greenhouse gas reductions while also delivering net positive benefits to local communities and biodiversity. The CCB Standards were created by the Climate, Community & Biodiversity Alliance (CCBA), a partnership between some of the world's leading companies and NGOs: BP, Intel, SC Johnson, Sustainable Forestry Management, Weyerhaeuser and GFA

project design to achieve robust multiple-benefits. This early project support and funding can be of particular importance for multiple-benefit land-based carbon projects which often require considerable investment and effort for project development before greenhouse gas emissions reductions can be generated.

w **Multiple-benefi**

The following scorecard shows all twenty-three Standards criteria for the First Edition of the CCB Standards, consisting of fifteen required criteria and eight optional "point scoring" criteria. To earn CCBA approval, projects must satisfy all fifteen required criteria. Exceptional projects that go beyond basic approval may earn a Silver or Gold rating, depending on the number of points scored.

General section		
G 1	Original conditions at project site	Required
G 2	Baseline project	Required
G 3	Project description and goals	Required
G 4	Management capacity	Required
G 5	Land tenure	Required
G 6	Legal status	Required
G 7	Adaptive management for sustainability	1 point
G 8	Knowledge dissemination	1 point
Climate section		
CL 1	Net positive climate impact	Required
CL 2	Offsite climate impact ("leakage")	Required
CL 3	Climate impact monitoring	Required
CL 4	Adapting to climate change and climate variability	1 point
CL 5	Climate benefits withheld from regulatory markets	1 point
Community section		
CM 1	Net positive community impact	Required
CM 2	Offsite community impact	RequiredCM 2e communit(ariability)-5

Adapting to climate change and why it matters for local communities and biodiversity— the case of Lake Bogoria catchment in Kenya

Musonda Mumba

Abstract. Climate change is already threatening ecosystems with severe consequences in Africa. Poor people that are dependent on these ecosystems need help to strengthen their capability to adapt to this change. Thus adaptation to climate change is essential and especially for the vulnerable millions. This paper reviews a case study in the Lake Bogoria catchment where WWF has been actively engaged on a project on integrated water resources management. It discusses how the local communities are adapting to climatic variability within the area, indicating the interventions undertaken and providing recommendations and the way forward.

Introduction and background

Science has provided clear evidence that climate change is real and is happening. Within Africa there is growing acknowledgement that climate change impacts are inevitable. Poor people's livelihoods are more threatened than ever by this change and thus their ability to adapt to these changes is necessary. In Eastern Africa reliance of communities on land for agriculture, rivers and other natural resources is very high. However, these resources are climate-sensitive and are likely to be affected. Most parts of the region are already water scarce and hence even more vulnerable. Therefore adaptive capacity of the local communities dependent on these resources is very critical.[1]

Its note worthy that non-climate changes may have greater impact on water resources than climate change. Thus climate change presents an additional challenge to water resources management. The impact of climate on water resources not only depends on climate itself but also the characteristics of the system, how the management of that system evolves over time and eventually how it adapts to the change.[2]

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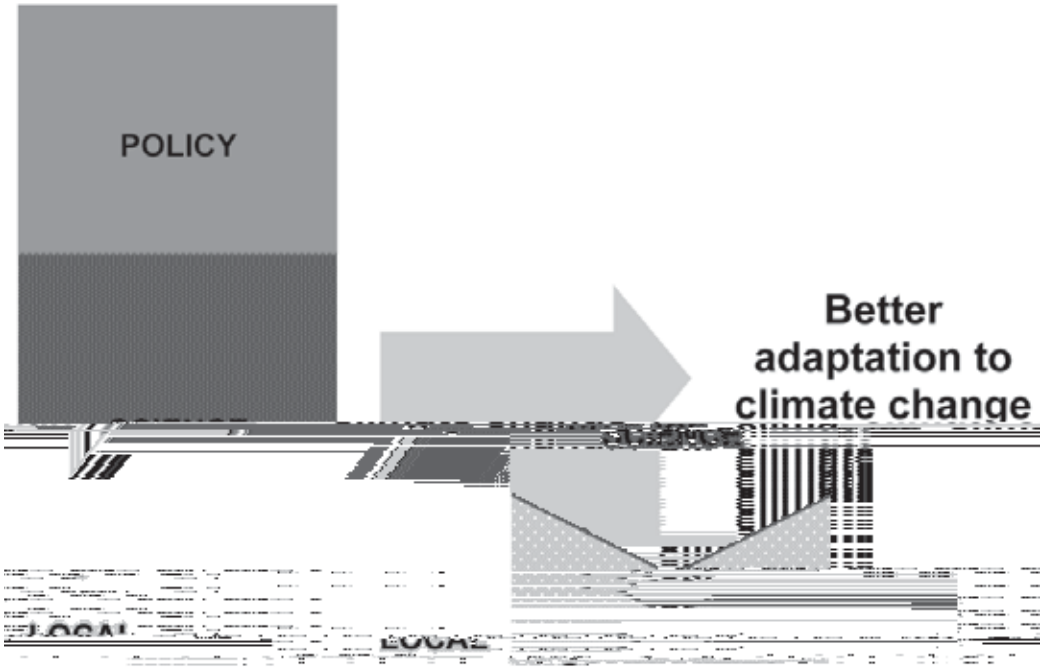
focus was more at the catchment level were several farmers were engaged. There was general recognition that climate change also had a role to play in the reduced availability of water resources, Integrated Water Resources Management (IWRM) was deemed as an environmentally sustainable approach with the different stakeholders.

Over-abstraction of water from the Waseges River, mostly illegal, inefficient water use, combined with variable rainfall, resulted

Communities in and around the scheme area through their engagement with WWF and Department of Irrigation were influenced to dig pan dams for water storage and use during the dry period so as to let the river flow. One requirement for getting a water permit is to have 90 day water storage on the farm. The irrigation department in partnership with WWF and the

Figure 4. Making linkages between Policy, Science and Local community engagement in climate change adaptation.



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Notes

1 Smit and Wandel, 2006; Huq, 2007

2 Burton and May, 2004

3 Mogaka, ., 2006

4 Yamin, ., 2005

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