Climate change and livelihoods

Managing and mitigating climate change through pastoralism

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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 strategies might enable pastoralists to manage climate change better than many other rural inhabitants.

The capacity to adapt is something intrinsically pastoral, and sustainable pastoral development must be founded on the understanding that adaptive capacity is what makes pastoralism work: restoring and enhancing adaptive capacities must therefore be central to development plans. The flexibility, mobility and low-intensity use of natural resources afforded by pastoralism may increasingly provide livelihood security in environments where sedentary production fails.

Along with the moral imperative to enable pastoralists to take control over their own development comes a new imperative to recognise and promote the environmental services of mobile pastoralism. Soil organic carbon is one of the largest terrestrial carbon reservoirs, and much of this soil is in open grazing lands that cover over 45 per cent of the earth's surface—1.5 times more of the globe than forest. Whilst forests may add only about 10 per cent to their total weight each year, savannas can reproduce 150 per cent of their weight annually, and tropical savannas have a greater potential to store carbon below ground than any other ecosystem. Enabling sustainable rangelands management by pastoralists is therefore now of global significance as well as of local importance.

Where the wind blows

Take the world's most hostile and unpredictable terrains, and look at who you find there: the chances are they will be pastoralists. In cold arctic tundra and on the Asian steppe, in the hot drylands of Africa and West Asia, and in the high altitudes of the Himalayas, the Andes and the world's other mountain regions, pastoralism provides a means to manage climatic extremes and unpredictability. Pastoralism is practiced in some 25 percent of the global land area, predominantly in places where constraining soil, rainfall and temperature conditions render the land unsuitable for crop cultivation.

"There are strong commonalities in livelihood strategies of pastoral groups inhabiting and exploiting distant and diverse drylands or highlands of the world (from Sub-Saharan African dry lowlands to cold Asian plateaux, from the tropical savannah to the cold northern steppe)— a feature that is much less evident among other population groups across the globe"[1]

Pastoralism is the finely-honed symbiotic relationship between local ecology, domesticated livestock and people in resource-scarce, climatically marginal and often highly variable conditions. It represents a complex form of natural resource management, involving a continuous ecological balance between pastures, livestock and people. The livelihood patterns of pastoral communities hinge upon strategies that continuously adapt to a limited, highly variable and often unpredictable resource endowment. The range of strategies that pastoralists use results from and is affected by the larger geo-political system.[2]

The adaptive capacity of pastoralists is what has made them so resilient throughout history and has enabled them to sustainably exploit their natural environment. Their adaptive management skills have enabled pastoralists to create and maintain biodiversity in many environments of extraordinary natural beauty, which are enjoyed by consumers worldwide. Yet pastoral development over the past century has been characterised by the loss of this adaptive capacity, and the outcome has been a vicious cycle of impoverishment, resource depletion and environmental degradation, which further erodes adaptation.

Changing environments may provide suitable conditions for an expansion of pastoralism, as the flexibility and mobility afforded by pastoralism can increasingly provide security where other more sedentary models fail. More than once in our history, pastoralism provided a means through which sedentary populations could adapt to survive in the face of deteriorating climatic conditions. Archaeological evidence indicates that pastoralism in Africa developed about 6000 years ago in direct response to long-term climate change and variability, and spread throughout northern Africa as a means of coping with an increasingly unpredictable and arid climate.[3] Current climate changes are predicted to bring rising temperatures and erratic precipitation, which increase the likelihood of both drought and flood: changes to which pastoralism, more than any other rural land use system, has traditionally been well adapted.

Are pastoralists truly at risk from Climate Change?

Opinions over what the future holds in store for the world's pastoralists are polarised, with some experts considering pastoralists to be the "canaries

in the coal mine" of climate change, whilst others consider that, since pastoralism is an adaptation to climate change, pastoralists will be amongst the best equipped to deal with such a threat. Such diametrically opposed points of view characterise the broader discourse and they reflect a widespread lack of understanding of pastoralism, and a systematic failure to listen to the opinions of the pastoralists themselves. This divergence of opinions has created major challenges for policy makers and development planners and has contributed to development failures in pastoral regions.

During an e-conference, held in February 2007, many agencies that work closely with pastoralist groups around the world felt that the challenge of climate change seems insignificant to many pastoralists who are faced with extreme political, social and economic marginalisation. The general consensus was that, if this multitude of constraints to pastoralism were relaxed, their adaptive strategies might enable pastoralists to manage climate change better than many other rural inhabitants. 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, including the ability to move through different territories, to access critical livelihood resources, to trade across borders, to benefit from appropriate investments, and to participate in relevant policy decision-making. As is so often the case in developing regions, the main concern for pastoralists is the accessibility, rather than the availability or variability, of resources.

It would be wise not to overstate the importance of traditional coping strategies, since some of them may have become permanently out of reach for pastoralists. Growing population pressure, together with the shrinking of effective rangelands, poses an important challenge to the sustainability of pastoral livelihoods, and places constraints on one of the most familiar pastoral coping strategies: migration into new regions. 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. However, the technical possibilities for raising productivity in the rangelands are limited and tend to be more resource-degrading than in higher rainfall areas, which compounds the challenge of population growth for pastoralists.

Picture 1. Masia in Kenya (*Courtesy Sue Stolton, Equilibrium Research*)

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.

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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).

Box 1. reasons to be fearful

Although the phenomenon of climate change is not a new one, three main factors justify the current growing concern over this critical challenge: the rate and the scale of its occurrence and the magnitude of its social impact.[6]

1. *The fast pace of the process compromises adaptation strategies*: When the pace of change is too fast, some organisms face extinction, as they will not have the necessary time to adapt, leading to important ecosystem changes and biodiversity loss. Recent estimations indicate a 20 to 30 per cent biodivesity loss in the coming years at this pace of change. The UN Framework Convention on Climate Change (article 2) explicitly recognises the critical link between climate change and the natural capacity of ecosystems to adapt.
2. *Major changes in resource availability at the global scale*: Critical resources are becoming scarcer for the mounting population of the world, with freshwater particularly at stake as the immediate effects of climate change have important consequences on its availability (less, and more variable precipitation in some areas; lower glacial reserves; higher sea levels). Important freshwater reserves that are diminishing include Lake Turkana in East Africa and the Chad Tog Lake in West Africa; as well as other West African lakes such as the Daouna, Faguibine, Tanda et Kabara.
3. *Poorer countries bear the biggest burden*: Climatic variability increases with the degree of aridity[7], and many of the world's poorer countries own a significant share of the drylands. In these countries livelihoods are more reliant on the natural resource base and on environmental goods and services, but their capacity to invest in adaptive technologies, such as improved varieties or water system, is lower.

Pastoralists already face an overwhelming challenge to adapt to an array of forces that threaten their livelihood, and their means of adaptation must change to keep up with the times. Whilst the dominant discourse remains on pastoralists' vulnerability, there is a slow but steady shift in emphasis towards their capabilities. This shift in emphasis is critical if the benefits of pastoralism with regard to climate change are to be realised. By focusing on building capacities and empowering people, pastoral development can ensure that poverty is reduced and capacities for sustainable natural resource management are strengthened within the rangelands.

Pastoral resilience

Pastoralist resilience depends heavily on indigenous knowledge: of the environment and of the production system, and the customary institutions that enable pastoralists to capitalise on this knowledge. Strong social organisation and customary institutions are common features of many successful pastoral societies and have been critical for the effective management of unpredictable environments. These institutions enable herd mobility, pooling of labour for production or security, and spreading of risk through systems of reciprocity and obligation (see Box 2).

In the drylands, low and unpredictable rainfall means that the only effective management system is an opportunistic one: to go where the resources are. This means spatial flexibility (being mobile) and temporal flexibility (having variable herd sizes and risk management strategies). This flexibility depends on the functioning of effective institutions to govern mobility, resource use and redistribution.

Customary institutions are also integral to the social safety nets and shared claims over productive assets that characterise pastoralist systems.

Rangeland policies of the past 50 years have been driven by an entirely inappropriate theory: the tragedy of the commons. This theory explains the impact that resource users have on their environment when unconstrained by any management control. Yet most rangelands are anything but unmanaged, and intricate management mechanisms and institutions found in communally managed rangelands enable pastoralists to manage them effectively whilst maintaining the economic efficiency of mobility and resource pooling. In terms of grazing management, informal rules ensure that herds avoid grazing areas that are already in use, maintain an appropriate distance from other herds, and avoid grazing areas recently vacated. Such practices are critical for the rest and recovery of pastures and for maintaining the long-term viability of pastoralism.

Box 2. Pastoralist risk management strategies at a glance[8]

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** (*e.g.* 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 by moving into distant labour or trading markets;
9. **Use of wild foods** allows households to supplement reduced productivity during droughts;
10. **Opportunistic cultivation** through rain-fed or flood recession agriculture spreads risk.

Constraints to pastoral adaptation

A combination of "*colonial governance, scientific homogenisation, and simplistic economic theories about the use of the commons*"[9] is largely responsible for the history of misguided and failed pastoral development interventions. The perception of pastoralism as intrinsically self-destructive[10] led to efforts to introduce 'modern' systems of governance and natural resource management, which have deliberately or inadvertently eroded traditional governance structures and have undermined the fabric of pastoral society and the foundations of the pastoralist economy. Faced with growing external interference and a rising

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pressure on rich-but-fragile environments, pastoral societies have become increasingly unable to retain control over resources.[11]

As nation states have developed, the lands inhabited by pastoralists have been widely viewed as great natural frontiers, and pastoral territories and peoples have been left at the geographic margins of countries, and often divided from their kin by international frontiers and their territories parted by internal administrative boundaries. Ethnic differences have led to further marginalisation of many pastoralists in their respective countries and have compounded the widespread misunderstanding, often bordering on contempt, towards their livelihood. Scientific misunderstandings, inappropriate policies, power plays and resource grabbing have further fuelled the conflict between centralised government structures and pastoral citizens.

Under current conditions pastoralists are more vulnerable to the political and economic environment than to climate change *per se* as it is pastoralists' political marginalisation that constrains them from employing their adaptive strategies and denies them adequate investments for their sustainable development. Under such conditions, even changes that could be nominally positive for pastoralists become a burden, as pastoralists are unable to capture the benefits on offer. Globalisation of trade, growing urban population, increased decentralisation and democratisation, and even climate change as discussed above, all offer benefits to pastoralists, but only if they have the capacity and the freedom to make pragmatic choices over how they develop their livelihoods (Box 3).

Box 3. Global trends that influence pastoralism

A number of major processes currently reshaping the global society present important consequences for pastoral livelihoods and for their overall adaptive capacities:

- ▷ Expansion of trade, integration of markets and increasing regional interconnectedness;
- ▷ High and increasing demand for animal proteins all over the world;
- ▷ A political setting comprising state retrenching and economic liberalisation and implying shifts towards decentralisation, devolution and local participation;
- ▷ Technological developments enhancing mobility and telecommunications, but also improvements in genetics, which enable 'new' animal and plant organisms, that challenge traditional pastoral systems;
- ▷ Growing investments in the extraction of valuable resources and related conflicts, such as oil and uranium in the Sahelian region;
- ▷ Regional stability, security and geopolitical interests, which are particularly critical in marginal regions.

The term *marginalisation* 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 recognition for pastoralism, and a low level of social acceptance. One of the outcomes of this lack of recognition is that many pastoralists are routinely excluded from decision making, at both local and national (not to mention regional and global) levels. As a result of this exclusion they are not afforded an input to policy and planning, and they cannot influence public spending, which means that public investments either fail to serve the interests of pastoralists, or promote competing interests over pastoral resources. Low public spending means that many pastoralists have poor access to basic services (health and education), and poor access to financial institutions, which together create obstacles to diversification of their livelihoods. Many of these outcomes of marginalisation, such as illiteracy or failure to adopt complementary livelihoods, act to reinforce the negative perceptions of outsiders towards pastoralists, and serve to reinforce the marginalisation.

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Pastoralism as a tool for mitigating climate change

▷ *Pastoralism and biodiversity*

None of the misunderstandings surrounding pastoralism seems as deeply entrenched as that regarding the impact of pastoralism on its environment, and any debate over the role of pastoralism in sequestering atmospheric carbon hinges on understanding the positive environmental externalities of extensive livestock production. Although many commentators still mention pastoralism and land degradation in the same breath, there has been a major change in understanding overgrazing in the rangelands, at least at an academic level, over the past 20 years.[12] Most informed commentators now acknowledge that overgrazing is found where livestock congregate in one place for too long, but in the wider rangelands, where mobility and customary institutions for resource allocation remain effective, overgrazing is less evident.[13] Overgrazing, therefore, is an outcome not of too many animals, but of restrictions to their effective management

The rich biodiversity that characterises many rangelands is often the result of pastoral management patterns, which is directly linked to the critical reliance of herding systems on the natural resource base and its sustainable regenerative capacities. This ecological wealth has often been created and maintained by pastoralists and these areas have been coveted by conservationists and the tourist industry, resulting in numerous protected areas and national parks located within pastoral areas, such as the Serengeti-Mara region of East Africa, the Three Riverheads area of China and the National Parks of Abruzzi and of the Picos de Europa in Europe.

Just as pastoralists have adapted to their environment, so rangeland environments have adapted to pastoralism, over thousands of years of management. The precise impact of livestock on their environment is complex and has defied scientific replication, which is why science-based solutions to rangelands management usually recommend low and steady stocking rates: a recommendation that is both economically

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.

Picture 2. Pastoralists in Tanzania (*Courtesy Sue Stolton, Equilibrium Research*)

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]

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▷ Pastoralism and soil carbon capture

"The broad figures are that we can store enough carbon in the living biosphere of our planet, to offset all of the carbon emissions since the beginning of the industrial revolution."[18]

Grasslands store approximately 34 per cent of the global terrestrial stock of CO^2 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]

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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 (*e.g.* 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.

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Policies in support of sustainable pastoralism

In marginal environments characterised by resource variability mobile pastoralism can be the best way to mitigate risk and it may be part of the solution to climate change, just as enhancing mobile pastoralism is part of the solution to overcoming poverty and reducing drylands degradation. Improving pastoralists' entitlement to a wider range of resources and enabling them to use such resources as needed, is vital to reduce their vulnerability and to support their capacity to tackle the sustainable development challenge in marginal areas. Sustainable pastoral development must be founded on the understanding that adaptive capacity is what makes pastoralism work, and the adaptive capacity of pastoralists needs to be seen not as something different to, but as a primary indicator of, pastoral development.

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The effect of climate variations in pastoral areas remains uncertain: huge new habitats may be created, whilst competing land uses may be compromised to a greater degree than pastoralism. Higher variations in temperature and humidity levels could affect the conditions of typical drylands animals and temperature increases may improve access to highland areas, changing seasonal access to grazing and water resources. Growing population, shrinking lands and shifting rain patterns may aggravate resource conflict, and availability of fresh water will be one of the main points of concern. The new balance between land, water and pasture that climate change will

reshape has implications for the adaptive capacities of pastoralists, vis-à-vis other groups. Clearly defined rules and increased negotiating power concerning the access, control and management of such resources is therefore critical to mitigate conflict as well as to enhance development and adaptation.
The effect of limited and sometimes contradictory scientific understanding over the diverse implications of climate change translates into a variety of recommendations, which give little indication about what to do. Climatic models, early warning mechanisms, scenario analysis and other tools are sometimes used to pay lip-service to the concerns about climate change, but are often unconvincing to local communities.
At the same time the UN Framework Convention on Climate Change warns explicitly that *'lack of full scientific certainty should not be used as a reason for postponing measures to mitigate impacts of climate change'*.

Reacting to climate change

So what is to be done, when we do not fully know what will happen? The answer is not so much a technical one as a political one. Pastoralists hold many of the skills and capacities needed to respond to changing climate patterns and related ecological consequences, and they need to be enabled to adapt accordingly. Pastoralist resource management could in this respect provide important lessons for society: as climate change involves higher degrees of uncertainty, rather than struggling to achieve certainty in an uncertain world, the best response may be to embrace the consequences of uncertainty and rethink responses accordingly.[23]

Not only do pastoralists need to innovate, but the overall society is in critical need of new resource management paradigms to tackle the challenge of climate change. Within this context, renegotiating knowledge and power represents a most critical factor. The political will to acknowledge the effectiveness of pastoral traditional practices, both at institutional and at scientific levels, represents the starting step of any process aimed at enhancing societal adaptation to increasing climatic variability. In this respect, it is worth fostering dialogue to enable development of innovative and complementary skills and forms of knowledge.

Pastoralism is changing and must innovate accordingly; policy, science and market contributions are all needed to make achieve this sustainably. The wider society is facing an unprecedented challenge, as shifts in climate patterns are likely to represent the main force driving social change in coming times. The skills and the capacities different human systems have developed show degrees of complementarity which are vital to synergise and exploit. The leap forward should enable overcoming the traditional-modern, sedentary-mobile, public-private, local-central dichotomies which have so far contributed to patterns of unsustainability.

Adaptive capacity is the potential of a social system to adapt to external stressors; it is the ability to cope with impacts of climate variability and change.[24] It would be meaningless to analyse the consequences of climate change without considering the range of adaptive responses a specific society is capable of putting into practice.[25] Three important areas need to be addressed in order to understand the capacity of pastoralists to change and adapt to climatic variations: institutions and power; science and technology and; economy and market.

▷ *Institutions and power*

Social institutions are crucial in shaping the way that environmental stress affects communities and individuals.[26] Formal statutory institutions have often contributed to undermining customary institutions and have fuelled conflict, while failing to deal with the complexity of range ecosystems and pastoral resource management. Nowadays the importance of pastoral institutions and their capacity to enhance proper management of a scarce and variable resource base is increasingly recognised, but at the same time it is acknowledged that traditional institutions may not be enough to enhance pastoralists' adaptive capacities in the future: alliances and synergies with more formal institutions must be developed, from community to national, regional and global levels. Clear evidence of the importance of governance systems has been documented in Central Asia, where satellite imagery of grasslands in China, Mongolia and southern Siberia reveal large differences in degradation processes under different resource access right patterns. In particular, grazing resources in Mongolia, where pastoralist institutions had been kept in place, are much less degraded than those administered through Russian and Chinese policies, where different degrees of government ownership and privatisation of lands had taken place.[27]

▷ *Science and knowledge*

Science has all too frequently been used to turn a political problem into a technical one, and technological solutions have been used as a cover for inaction by those who want to abdicate responsibility. However, this is not to denigrate the role of science and technology: action-oriented research approaches could yield a range of options for adaptation to climate changes in pastoral environment. Science must look beyond early warning systems, which are poorly trusted by rural inhabitants, and should learn from traditional capacities to understand and monitor climate changes. Scientists need to explore the synergy between indigenous knowledge and external response mechanisms, rather than imposing an externally driven, science-based culture of prediction and control.

The time is long overdue for scientists must adopt, enhance and disseminate new understanding in rangeland ecology and pastoral economics, and to recognise pastoralism's capacity to sustainably produce valuable goods in marginal lands. The challenge that was raised during the 1990's by the "New Rangeland Ecology"[28] has not permeated far enough to actively influence the way pastoralism research and development is carried out and more coordination is required between the natural and the social sciences.

Economy and market

Pastoralists everywhere are steadily integrating into market dynamics, with implications for their adaptive capacities as resource access and use inexorably shifts, whilst their livelihoods diversify accordingly. Economic integration and diversification bring positive benefits of spreading risk, but also introduce pastoralists to new areas of uncertainty, such as market forces, consumer demand, financial services and institutions, and rent-seeking behaviour of market agents. Discussions around adaptation to climate change cannot overlook the fact that some pastoralists are failing to adapt to more immediate changes related to their economy. To make this adaptation more effectively, pastoralists need recognition of the value of the diverse

goods and services that they provide, commensurate public investment in marketing infrastructure, better conditions for effective private investment, and legal protection to ensure equity in the marketplace.

Box 4. Policy recommendations

1. Climate change will be less damaging to pastoralists than to other rural societies, but only if development assistance addresses the political roots of pastoral marginalisation. Strengthening the capacity of pastoralists to claim their rights will be more effective than investing in costly technical solutions.
2. The complete re-think of rangeland ecology in recent years must urgently start to influence policy in developing countries so that the positive environmental externalities of pastoralism can be recognised and promoted. New markets and other payment mechanisms must be developed to promote the environmental services of pastoralism, particularly biodiversity conservation and soil-carbon capture.
3. The vital role of pastoral institutions, in both enabling pastoral adaptation and in sustainably managing rangeland resources, must be recognised and promoted by the State, and innovative ways are needed to enable State and customary institutions to operate complementarily. Policies that have proven particularly effective at enabling pastoralism are those which have promoted customary governance, and those which have afforded pastoralists a degree of security over their land.
4. Science and technology must accept the validity of mobile pastoralism and of pastoral knowledge, and must work with pastoralists to determine the best way that technology and science can serve them.
5. Markets, both domestic and international, must be made to work for pastoral development and pastoralists need assistance to adapt smoothly to the new opportunities that markets offer. This includes intervention by government to reduce marketing and transaction costs and rent seeking behaviour, and relaxation of punitive tariffs and laws at national, regional and global levels.
6. With increasing climate-related risk, particularly in the context of growing demographic pressure, customary systems of insurance are coming under strain and innovative systems of insurance need to be developed that complement, and perhaps build on, existing social insurance systems.

Conclusions

Climate change may be affecting many of the world's pastoralists, but the climate-related shocks that characterise some of the world's drylands regions must not be simplistically attributed to climate change. When those shocks lead to livelihood failure, it reflects the failure to understand and support pastoralism: attributing development failures to climate change will only serve to divert attention from the responsibility to address those failures.

In reality pastoralists are sophisticated managers of risk whose capacities are being eroded, but who, with appropriate support, can teach us a lot about how to manage uncertainty. Reducing pastoralists' vulnerability requires building strengthening of their capacity to innovate and to put into practice their livelihoods strategies. Enhancing pastoralists' entitlement to a wider range of resources, agro-ecological as well as socio-economic, and

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 the advantage of pastoral livestock production from a sustainable development perspective. Incentives that value and remunerate the environmental services of pastoralism represent a way to strengthen pastoral resource management and the burgeoning market for carbon finance offers a great opportunity to simultaneously alleviate poverty, protect biodiversity, reverse desertification, and mitigate climate change.

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The challenge of climate change forces our society to rethink resource management, and pastoralists possess skills, knowledge and capacities to deal with scarce and variable resource endowment, from which lessons can be learnt. Pastoralism might indeed provide a perfect setting where participatory processes and indigenous, traditional knowledge could really be used to find appropriate solutions, leading us to learn from herders how to deal with a scarce and unpredictable resource endowment. While efforts must be made to integrate these skills into our development patterns, pastoralists must also be enabled to articulate themselves, and non-pastoralists must be enabled to listen, so as to enhance their capacity to adapt to changes over which they have no control.

This paper was written by **Jonathan Davies** (Jonathan.davies@iucn.org) and **Michele Nori** of the World Initiative for Sustainable Pastoralism (WISP) a global knowledge network that supports the empowerment of pastoralists to sustainably manage drylands resources. WISP is a programme of IUCN, the International Union for Conservation of Nature, currently funded by the GEF and IFAD. For more information go to: www.iucn.org/wisp

Notes

1 Nori, 2007.
2 Pratt *et al*., 1997.
3 Climate Change, Adaptation and Pastoralism, available on the WISP website: www.iucn.org/wisp/wisp-publications
4 Brooks 2007.
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Climate, carbon, conservation and communities

Dilys Roe, Hannah Reid, Kit Vaughan,
Emily Brickell and Jo Elliott

Abstract. The growing market for carbon offers great opportunities for linking greenhouse gas mitigation with conservation of forests and biodiversity, and the generation of local livelihoods. For these combined objectives to be achieved, strong governance is needed along with institutions that ensure poor people win, rather than lose out, from the new challenges posed by climate change. This paper explores the opportunities from and limitations to carbon-based funds for conservation and development. It highlights mechanisms that may help secure benefits for climate, conservation *and* communities.

The new generation of carbon funds must address the need for a sustained reduction in carbon emissions, while also building good governance and strengthening the resilience and adaptive capacity of ecosystems and local communities in the face of increased vulnerability to climate change. To tackle climate change effectively, we need to "join the dots" between biodiversity loss, local livelihoods and land use changes such as deforestation. There is a strong need for credible standards that link curbing emissions with forest conservation to ensure they provide robust carbon benefits while incorporating biodiversity conservation and benefits to local communities. Conservation-based strategies that address carbon emissions, which include afforestation, reforestation and curbing deforestation, must be made robust. Forest carbon stores are vulnerable to disease or fire, and carbon emitting activities can displaced elsewhere.

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 *Stern Review on the Economics of Climate Change*[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 (*Courtesy Intu Boedhihartono, IUCN*)

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).

Picture 2. Timber from a community forest near Hue, Vietnam (*Courtesy Nigel Dudley, Equilibrium Research*)

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 travel.
3. The development of standards can help ensure optimal benefits: The Climate, Community and Biodiversity Alliance— a partnership convened under the Center for Environmental Leadership in Business— has developed a set of standards for land-based carbon projects that simultaneously address climate change, support local communities and conserve biodiversity. WWF helped develop the Gold Standard to measure sustainable development benefits (including biodiversity) of offset projects, but this does not currently include forestry projects. Both are applicable to the compliance and the voluntary markets.

4. The World Bank BioCarbon Fund is an example of a carbon fund specifically aimed at projects in forests and agro-ecosystems, with a view to securing climate and biodiversity co-benefits.

Conservation funds

Because of concerns over biodiversity loss, conservation organisations have long invested in projects that tackle tropical deforestation through the various sources of funding available to them. These include official development assistance, corporate donations, contributions from philanthropic foundations and member donations. With REDD included under the second commitment period of the Kyoto Protocol, funding for conservation could increase significantly. Estimates of likely revenue streams vary widely, depending on which costs and benefits are included and which carbon pools and mitigation options are assessed. One review noted that as much as US$43 billion could flow into developing countries for conservation if REDD projects are approved. A recent World Bank report[2] estimated that forested land could be worth between US$1,500 and US$10,000 per hectare if returns to forest land were funded through the carbon market.

Meanwhile, substantial conservation funds are already beginning to emerge alongside the carbon market. For example, as part of its £800 million Environmental Transformation Fund, the UK Department for International Development has established a £50 million UK contribution to a new fund to help conserve the Congo Basin rainforest. The World Bank is developing a Global Forest Alliance to address key international forestry challenges, including climate change mitigation. Linked to this, a new funding mechanism— the Forest Carbon Partnership Facility— is proposed to generate payments for efforts to reduce emissions from deforestation and to build national capacity to establish baselines, analyse drivers and monitor impacts of measures to reduce emissions from deforestation and degradation.

Other proposals also exist for various forms of conservation trust funds. The Brazilian government, for example, has called for the establishment of an international trust fund to which industrialised countries make voluntary contributions and which can be used to provide compensation for slowing or preventing deforestation.[3]

Conservation-based strategies to address carbon emissions

A wide range of forest-based projects can help reduce, prevent or offset carbon emissions. These include:

Afforestation

- ▷ Large scale commercial plantations
- ▷ Smaller scale tree planting schemes
- ▷ Agroforestry
- ▷ Community woodlots

Reforestation

- ▷ Large scale plantations on deforested land
- ▷ Tree planting on degraded land
- ▷ Forest restoration

Slowing or preventing deforestation

- ▷ Establishment, expansion or enforcement of
- ▷ Protected areas
- ▷ Sustainable forest management.

To date, afforestation and reforestation projects have attracted relatively little investment, with the bulk of carbon

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 beginning to move away from the term "permanence" towards "time bound sequestration agreements", whereby a resource owner commits to maintaining carbon stocks for an agreed period. Issues around displacement can be reduced through setting national and, where appropriate, regional targets (rather than a project-based approach) and gaining broad participation of countries with significant forest areas to avoid the potential risk of displacement between neighbouring countries. "Additionality" refers to the requirement that activities under the CDM project should be additional to those which would have happened without the carbon finance. This is a problematic concept with all CDM projects and is not specific to forests.

One criticism of many forestry projects is that the biodiversity value is the primary reason for the project and that, therefore, the activity would have taken place even without carbon finance. Projects can demonstrate "additionality" if they face barriers that cannot be overcome without carbon finance or when the activity without carbon finance is not financially the most attractive and, therefore, will not happen on its own.

Under the current CDM, assessment of "additionality" generally focuses on establishing whether a reforestation activity is economically viable without the CDM. The issue of economic viability is relevant to REDD projects, as the economic incentives to convert forests are often greater than the incentives to conserve or manage them responsibly. However, this is a complicated area. Overcoming concerns relating to "additionality" requires careful control to ensure that only projects proven to meet these requirements receive finance.

Who benefits from conservation-carbon projects?

Conservation-carbon projects have different implications for different stakeholders— national governments, conservation NGOs, private companies and local communities. Overall, the carbon trading market is dominated by large-scale projects with little community ownership and benefit. Large-scale monoculture plantations are an efficient way of sequestering carbon, due to their rapid growth rates and minimal management regimes, but they have negative impacts on biodiversity and ecosystem functioning. They present high barriers to entry for poor producers because they are capital intensive and scale dependent. These producers may also lose access to land that is designated for a plantation or other carbon-related activity. As noted by the Center for International Forestry Research (CIFOR), "A number of countries have targeted 'degraded areas' for CDM plantations. In many cases, however, these may be lands held under traditional common property systems that are used by local people for a variety of purposes."[4] With potentially high rates of return from carbon offset projects, opportunities are being seized by powerful elites, while local communities often lack the secure tenure and

The carbon trading market is dominated by large-scale projects with little community ownership and benefit.

resource rights to stake their claim. In Uganda, for example, a project entailing the planting of trees for carbon offsets in Mount Elgon National Park has been criticised for ignoring local people's land rights and exacerbating the conflict between the park authorities "guarding" the trees and adjacent communities claiming rights over the land.[5]

Projects aimed at reducing deforestation appear to have greater long-term potential for attracting investment, but again the likely distribution of costs and benefits raises concerns. It is estimated the largest income flows would accrue to only a few countries.

The *Stern Review* reports that eight countries are responsible for 70 per cent of emissions from land use change (Bolivia, Brazil, Cameroon, Democratic Republic of Congo, Ghana, Indonesia, Malaysia and Papua New Guinea), with Brazil and Indonesia accounting for 20 and 30 per cent respectively. A framework which also includes incentives for maintaining low levels of deforestation would expand the number of countries that could benefit from a forest carbon market, such as India, and also reduce the risk of transnational displacement.

Concerns have also been raised that benefits are likely to be captured by government ministries, private companies and conservation NGOs. Local communities will likely bear a disproportionate share of the cost in terms of restrictions on resource use while reaping little of the benefit. Simply increasing investment in forestry through funding for carbon storage and sequestration is unlikely to generate more sustainable forest management or greater benefits to biodiversity and poverty elimination, without first addressing critical governance issues.[6] A few of the common pitfalls are outlined below. Reducing emissions from deforestation, by reinforcing protected areas without the full participation of local communities, could be a form of "protectionism by the back door" and reopen decades of discussion on the livelihood and poverty impacts of protected areas. For these schemes, the Overseas Development Institute highlights two key concerns for local, forest-dependent people:[7]

Reducing emissions from deforestation, by reinforcing protected areas without the full participation of local communities, could be a form of "protectionism by the back door" and reopen decades of discussion on the livelihood and poverty impacts of protected areas.

1. How will incentive or payment schemes be targeted to ensure that the benefits reach those whose livelihoods are affected by changes in land use practice?
2. How will displacement be addressed and what are the implications for local resource rights and livelihood needs?

These concerns are echoed by the Forest Peoples Programme (FPP), which fears states may use REDD funds to reinforce state and private sector control over forests and revert to a "guns and guards" approach to forest protection. FPP also highlights the risk of REDD funds fuelling land speculation and the appropriation of community land— either by external actors or by more powerful individuals within a community.[8]

Picture 3. A community forest near Hue, Vietnam (*Courtesy Nigel Dudley, Equilibrium Research*)

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 *Acacia senegalensis* 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 and workers. FSC requires that:

1. The legal and customary rights of indigenous peoples to own, use and manage their lands, territories and resources are recognised.
2. Forest management operations enhance the long-term social and economic well-being of forest workers and local communities.

FSC's principles and criteria provide an example of how local community benefits can be linked to forest conservation.

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 critical concerns. Our preliminary review suggests the need to understand the role of biodiversity and impacts on local communities of carbon management within these initiatives: in their prioritisation of projects, and in the process of agreeing to include "avoided deforestation" as a legitimate carbon reduction approach. These new mechanisms have yet to include the lessons from the past few decades of biodiversity conservation and sustainable forest management. As yet, they pay scant attention to governance issues, and the rights of poor local people, particularly those with limited livelihood diversification options and those critically dependent on forest resources.

It is vital that biodiversity, social and cultural values are taken into account in the design and implementation of afforestation/reforestation (A/R) and REDD projects. The concept of High Conservation Value Forests (HCVFs) aims to ensure that forests of outstanding and critical importance are maintained, given their high environmental, socio-economic, biodiversity or landscape values. The aim is to identify HCVFs and ensure that management decisions are consistent with maintaining those attributes of high conservation value. The concept was originally developed within the Forest Stewardship Council certification process, but is increasingly being used by timber purchasers, land-use planners, conservation advocates and within policy debates. It would provide useful elements to incorporate in standards for A/R and REDD projects to ensure that these values were respected and maintained. Encouraging innovation through a "seed-bed" approach by supporting small-scale projects is part of the answer, as is greater attention to rights, equity and livelihoods within all initiatives.

Equally important is to recognise that sustainable resource management mitigates climate change through reducing carbon emissions, and also helps local communities adapt to the effects of climate change. In Vietnam, for example, tropical cyclones have damaged the livelihoods of those living near the coast, and climate change is likely to increase the frequency and severity of such tropical storms. Since 1994, the Vietnam National Chapter of the Red Cross has worked with local communities to plant and protect mangrove forests in northern Vietnam.[10] Nearly 12,000 hectares of mangroves have been planted, and the benefits have been remarkable. Although planting and protecting the mangroves cost US$1.1 million, it has saved US$7.3 million per year in dyke maintenance. During the devastating Typhoon Wukong in 2000, project areas remained unharmed while neighbouring provinces suffered huge loss of life, property and livelihoods. The Vietnam Red Cross estimates that 7,750 families have benefited from mangrove rehabilitation. The mangroves are also a reservoir for carbon sequestration and family members can now earn additional income from selling crabs,

Sustainable resource management mitigates climate change through reducing carbon emissions, and also helps local communities adapt to the effects of climate change.

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 are transparent and accountable.

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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Notes

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3 Griffiths 2007.
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5 FERN 2007.
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The climate, community and biodiversity standards—a mechanism to screen for and support projects that simultaneously deliver significant benefits to the global climate, local communities and biodiversity

Joanna Durbin

Abstract. One response to debates about carbon offsetting is to promote best practice. The Climate, Community & Biodiversity (CCB) Standards 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 agreed by a coalition of industry groups working with environmental and social NGOs. The standards were agreed in 2005 and as of June 2008 five projects had completed the validation process and four projects are in the public comment phase, mainly from the tropics. The current First Edition of the standards includes 23 criteria and has three levels: approved and silver and gold depending on how many of the criteria are met.

The Intergovernmental Panel on Climate Change's fourth assessment report[1] documents the impacts of human-induced climate change that are already occurring and which will worsen in coming decades, causing dramatic changes to ecosystems, to productivity and to the global economy. The effects will be particularly devastating for poor people who rely on natural resources and have minimal reserves and capacity to cope with the expected changes. To add to the problems, climate change will accelerate the ongoing loss of biological diversity that is the basis of healthy ecosystems on which all life depends.

Emissions from land-based activities like agriculture and deforestation are responsible for 30 per cent of total human greenhouse gas production. Well designed land-based activities are therefore an essential component of climate change mitigation. Reducing deforestation and forest degradation can help to reduce greenhouse gas emissions, while reforestation and agroforestry activities can remove carbon dioxide from the atmosphere. Land-based climate change mitigation activities also have exceptional potential to deliver additional benefits. When sensitively designed, they can help local people by generating sustainable livelihoods through the diversification of agriculture, soil and water protection, direct employment, use and sale of forest products and ecotourism, all of which can also help to build capacity to adapt to the effects of climate change. They can also make a substantial contribution to conserving biodiversity by restoring and protecting natural ecosystems throughout the world, saving threatened animal

Picture 1. The CCB Standards were tested in several countries including Costa Rica (*Courtesy Sue Stolton, Equilibrium Research*)

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.

Exemplary land management projects can address the global problems of climate change, biodiversity loss and poverty simultaneously and in a cost-effective way.

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

The CCB Standards identify land-based 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.

Envest, Conservation International, CARE, Rainforest Alliance, The Nature Conservancy and the Wildlife Conservation Society. The CCBA aims to foster the creation of a robust, global market for land-based activities that simultaneously benefit the global climate, local communities and biodiversity.

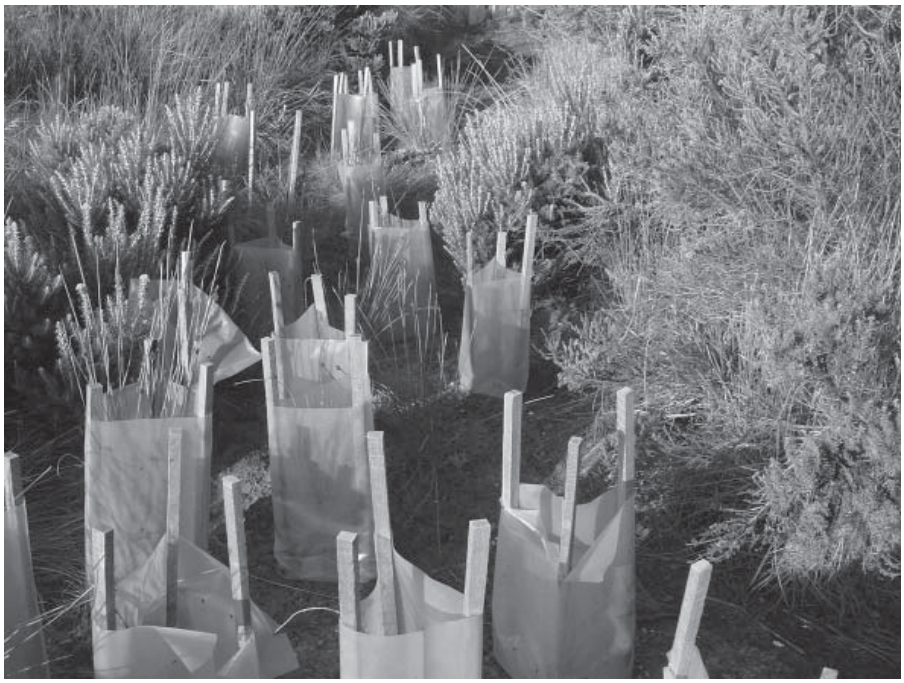
The CCB Standards identify land-based projects that are designed using best practices to deliver robust and credible greenhouse gas reductions while also delivering net positive benefits to local communities and biodiversity. They can be applied to any land-based carbon projects including those that reduce greenhouse gas emissions, for example from deforestation or forest degradation (REDD), and those that remove carbon dioxide by sequestering carbon, for example from reforestation, afforestation, forest restoration, agroforestry and sustainable agriculture.

The CCB Standards are beneficial to a variety of users, including:

1. *Project Developers and Other Stakeholders*— Communities, NGOs, agencies and others use the CCB Standards for guidance in developing projects that deliver a suite of environmental and community benefits and demonstrate the high quality and multiple benefits of their project to potential investors and other stakeholders from an early stage. Projects that meet the CCB Standards are likely to garner preferential investment and even a price premium from funders that support multiple-value projects and best-practices projects.
2. *Project Investors*— Private companies, multilateral agencies and other funders investing in carbon credits can use the CCB Standards as a project screen. The Standards help investors to minimise portfolio risks by identifying high-quality projects that are unlikely to become implicated in controversy. Multiple-benefit projects create valuable goodwill and other ancillary returns for investors. Social and environmental benefits and sustainability are also an important means to reduce risks to the permanence of the climate benefits.
3. *Governments*— Governments of countries hosting projects can use the CCB Standards to ensure that projects will contribute to national sustainable development goals. Also, donor governments can use the Standards to identify Official Development Assistance (ODA) projects that efficiently satisfy multiple international obligations, such as the Millennium Development Goals and the UN conventions on Climate Change and Biological Diversity.

The CCB Standards perform two important roles, as a:

- **Project design standard**: The CCB Standards can be applied early on during a project's design phase to validate projects that have been well designed, are suitable to local conditions and are likely to achieve significant climate, community and biodiversity benefits. This validation helps to build support for the project at a crucial stage and attract funding or other assistance from key stakeholders such as investors, governments or other important local, national or international partners. The CCB Standards are also useful as a design tool, offering rules and guidance to encourage effective and integrated



Picture 2. Well designed reforestation and agroforestry activities can remove carbon dioxide from the atmosphere and provide multiple local benefits
(*Courtesy Nigel Dudley, Equilibrium Research*)

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.

- **Multiple-benefit verification standard**: The CCB Standards can be applied throughout the project's life to evaluate the social and environmental impacts of a land-based carbon project. The CCB Standards can be combined very effectively with a carbon accounting standard as provided, for example, by the Clean Development Mechanism (CDM) or the Voluntary Carbon Standard (VCS). In this case, the CCB Standards evaluate the social and environmental impacts while the carbon accounting standard enables verification and registration of quantified greenhouse gas emissions reductions or removals. The CCB Standards verify the social and environmental benefits generated by a project, enabling investors to select carbon credits with additional multiple benefits and to screen out projects with unacceptable social and environmental impacts.

There is no geographical restriction or limit on project start date or limit on project size for use of the CCB Standards. The Standards can be used for projects funded with private and/or public investment and designed for regulatory or voluntary carbon markets. It is important to note that the CCBA does not issue quantified emissions reductions certificates and therefore encourages the use of a carbon accounting standard (such as CDM or VCS) in combination with CCB Standards.

The First Edition of the CCB Standards was released in May 2005 after a rigorous two year development process based on input from community and environmental groups, companies, academics, project developers and others with expert knowledge or affected by the standards. The Standards were then tested on projects in Asia, Africa, Europe and the Americas and peer reviewed by the world's leading tropical forestry institutes: the Center for International Forestry Research (CIFOR) in Indonesia, the Tropical Agricultural Research and Higher Education Center (CATIE) in

Costa Rica and the World Agroforestry Centre (ICRAF) in Kenya. The CCBA initiated a participatory review process in 2008 to develop a Second Edition of the standards that will integrate lessons learned from their use and ensure their continued effectiveness in the light of evolving policies and markets for forest carbon.

As of June 2008 five projects had completed the validation process and four projects are in the public comment phase. These nine CCB projects aim to reduce greenhouse gas emissions by a nearly 4 million tons of CO2e per year and cover 786,552 ha. Around 100 additional projects have indicated to the CCBA their intent to use the CCB Standards. Of these, approximately 40 per cent are in Latin America, 35 per cent in Africa, 20 per cent in Asia and a few projects each in Europe, Australasia and North America. Around 43 per cent of these projects will involve reduced emissions from deforestation or forest degradation (REDD), 30 per cent will include reforestation, 30 per cent will include native forest restoration, 16 per cent will include agroforestry, 14 per cent will include sustainable forest management and 3 per cent afforestation. Many projects are combining several of these project activities to help optimise their multiple benefits.

The relatively large number of REDD projects reflects the high potential multiple benefits associated with REDD and the growing interest in this project type in response to the increasingly favourable international policy environment.

The preponderance of projects in tropical developing country regions, and particularly in Africa, where there have been relatively few projects registered under the Clean Development Mechanism, suggests that the CCB Standards are playing a role to stimulate project and market development to channel carbon market investments to areas where funding is most greatly needed for sustainable development, improved livelihoods and biodiversity conservation. The relatively large number of REDD projects reflects the high potential multiple benefits associated with REDD and the growing interest in this project type in response to the increasingly favourable international policy environment. A number of investors have declared their intention to give a preference to, give a premium to, or exclusively purchase land-based carbon offsets derived from CCB projects. From the other side, some project developers are charging and receiving substantial price premiums for the carbon coming from their CCB projects compared to their non-CCB projects. Much remains to be done to further stimulate the multiple-benefit forest carbon market and bring these multiple-benefit projects to scale, but the rapid developments to date indicate that the CCB Standards are making important contributions towards their goal of catalyzing a robust carbon market for multiple-benefit forest carbon projects.

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Box 1. CCB Standards scorecard

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	Required
CM 3	Community impact monitoring	Required
CM 4	Capacity building	1 point
CM 5	Best practice in community involvement	1 point
Biodiversity		
B 1	Net positive biodiversity impact	Required
B 2	Offsite biodiversity impact	Required
B 3	Biodiversity impact monitoring	Required
B 4	Native species used	1 point
B 5	Water and soil resource enhancement	1 point

Scoring:

Approved = all requirements met

Gold standard = all requirements met plus one point from at least 3 sections

Silver standard = all requirements met plus 6 points, at least one point from each of three sections

Notes

1 IPCC 2007

2 WRI, undated

3 CCB 2005

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World Resources Institute, Climate Analysis Indicators Tool version 5.0, http://cait.wri.org/cait.php

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]

The Lake Bogoria case study aims to show how local farming communities in the upper catchment are adapting to climate change following highly variable rainfall patterns and reduced flows in the Waseges River. WWF has recognised the importance of adaptive strategies by local communities and why partnering with various stakeholders is environmentally sustainable especially for water resources which are climate sensitive.

Working within the Lake Bogoria catchment— history and objectives

Lake Bogoria is one of several rift valley lakes located within the East African Rift Valley (Figure 1). The lake and its wider catchment are rich in natural resources that include the lake itself, forests, wildlife and pastures. The upper catchment comprises forests where the source of the Waseges River (Figure 2)— the main freshwater inflow into the lake— starts. This part of the catchment has multiple land-use practices but mostly small-

Picture 1. Discussions held with Water Resources User Association (WRUA) (*Courtesy WWF-EARPO/Musonda Mumba*)

scale farm holdings where irrigation agriculture is the main practice. The middle and lower catchments on the other hand lie within a semi-arid to arid region where the main land-use practices are livestock production and irrigated agriculture. Originally dominated by nomadic groups, most of the livestock keepers are now sedentary. Both the upper and middle catchments have experienced an increase in population and changes in land-use over the years. Rainfall variability over the years has compounded the problem even further. However, like many agricultural zones of Kenya, the problems are further exacerbated by uncontrolled, illegal over-abstraction from the Waseges River.[3] These factors clearly have had enormous pressure and effects on the environment and particularly water resources.

Approach and intervention—community adaptation strategies to climate change

The Waseges River flows down to the middle catchment in Subukia, a semi-arid area with no more than 700 mm per annum. Communities here rely predominantly on irrigated agriculture for food and cash crops for subsistence. The Lari Wendani Irrigation Scheme was initiated by the irrigation department in 1984 as a way of enhancing food security and production. Currently it supports 94 families covering 25 ha. Over the years deforestation and over-abstraction within and upstream of the scheme resulted in less water available for the scheme, and downstream there was sometimes no flow for over 5 months.

Working with various partners and stakeholders such as the Department of Irrigation, the Water Resources Management Authority (WRMA), local community based organisations (CBOs), the Water Resources Users Associations (WRUA), WWF engaged with the local communities within the middle catchment to find a solution for better water resources management. The WRUA (Picture 1) was particularly a good entry point as this included different user within the community. The WRUA is a representative group consisting of members of various common interest groups and the community at large whose main interest is to discuss issues related to water. This forum presents itself as an effective medium for participatory management of conflicts that arise from water resource use.

In effect the process described above required the use of a nested approach (Figure 4) were participation was from a micro scale (farm level) to the macro scale (basin level). For the purpose of this case study,

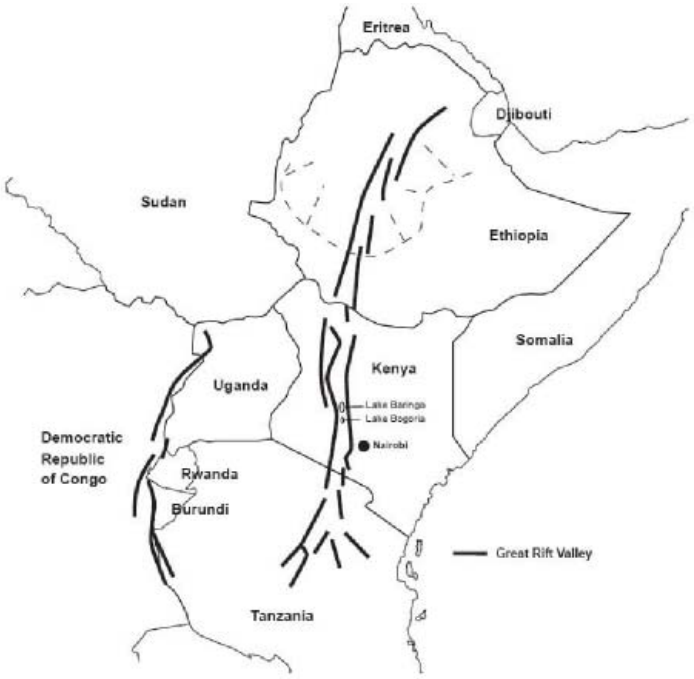

Figure 1. Location of the Lake Bogoria within the East African Rift Valley.

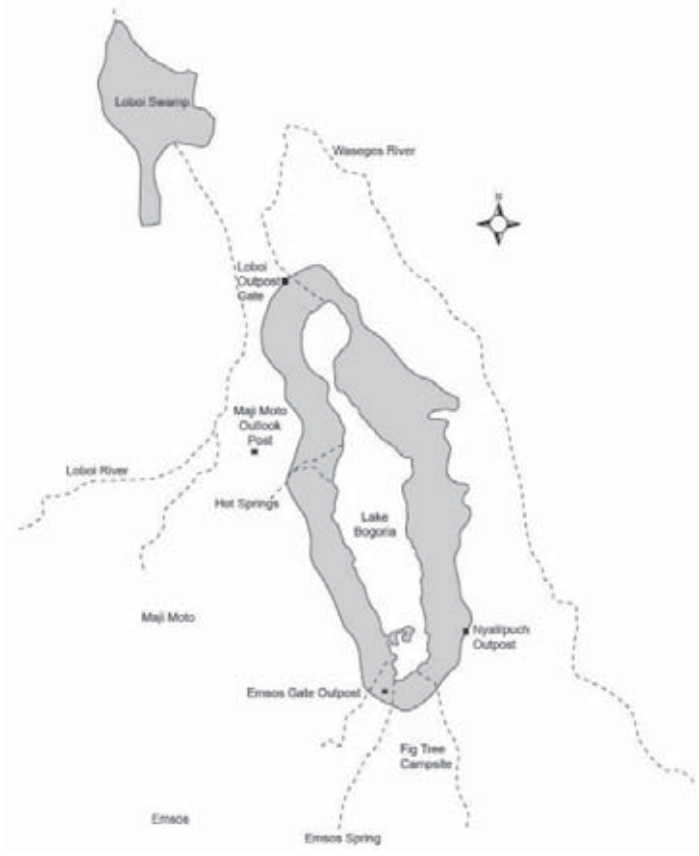

Figure 2. Lake Bogoria National Reserve and its drainage system.

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 in reduced to no flows within the river for downstream communities. Due to this, conflicts between the downstream and upstream communities ensued.

Over-abstraction of water from the Waseges River, mostly illegal, inefficient water use, combined with variable rainfall, resulted in reduced to no flows within the river for downstream communities. Based mostly on qualitative and anecdotal evidence, the no flow spell lasted for well over eight years. Due to this, conflicts between the downstream and upstream communities ensued. WWF working with other stakeholders in the area organised some members of the WRUA downstream to meet with members of the WRUA upstream so dialogue could be initiated so as to resolve conflict. Though mandated through the Water Act (2002) to have dialogue, WRUAs were not in a position to initiate this. There was also recognition that climate change had altered water resources availability within the area and some coping strategies were needed at farm and community level.

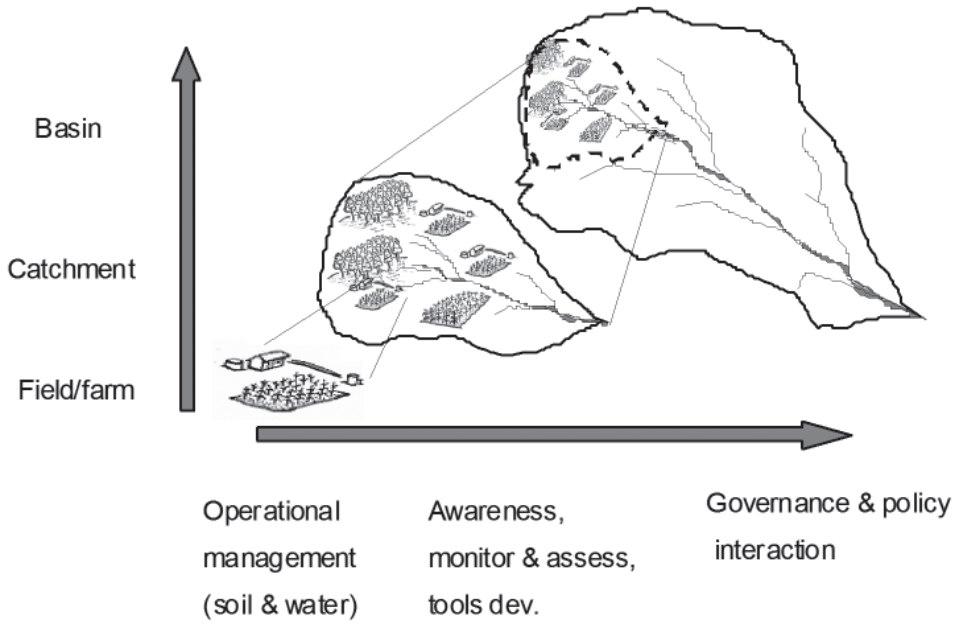

Figure 3. Nested approach for water governance at river basin scale

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 fisheries department provided training and sensitisation for the communities within the Lari-Wendani to develop water pan dams on their individual farms then stocking them with Tilapia and cat fish (Picture 2). As an incentive to the farmers the fisheries department integrated fish farming into the activity providing additional income to the farmers. During the rainy season between April and September the farmers can harvest storm flow and stock fish. At the end of the period farmers harvest can fish and use the stored nutrient rich water for irrigation during the dry season (October to March) without interfering with the river.

One key lesson that has been learnt is that a community-based approach is effective in developing appropriate adaptive strategies especially for vulnerable communities.

This adaptive strategy by the local communities has had positive consequences for the community and the environment. As a result of this intervention, the Waseges River flowed continuously in August 2007 reaching the Lake Bogoria (Picture 3). One key lesson that has been learnt is that a community-based approach is effective in developing appropriate adaptive strategies especially for vulnerable communities. WWF is therefore working very closely with the local communities within the Lake Bogoria Catchment on issues related to irrigated agriculture and the new National Water Resources

Picture 2. Releasing fish into a pan dam (*Courtesy WWF-EARPO/Musonda Mumba*)

Picture 3. Waseges River flowing continuously after 10 years during the dry season— August 2007 (*Courtesy WWF-EARPO/Musonda Mumba*)

Management Strategy (2007-2009) which clearly indicates the need for reserve water within river courses. This refers to the quantity and quality of water needed to meet both basic human and ecosystem needs. The strategy also emphasises that the reserve needs to be met before water is allocated for other uses.

Why adaptation is important: recommendations and way forward

This case study takes cognizance of the fact that adaptation is necessary particular within water scarce areas where communities are likely to be most vulnerable. Furthermore it is clear that the local communities need the right and appropriate information about how they should adapt. WWF and the different stakeholders have served as change agents within this catchment, which is an essential element to adaptation. WWF's approach to environmental sustainability has been to advocate Integrated Water Resources Management (IWRM) mechanism within this catchment. Both the water and agricultural sectors are climate sensitive and this case study illustrates the need to mainstream climate change adaptation policies into these sectors, something that is still lacking.

Information about similar case studies within Kenya has not been forthcoming or known. It is particularly important for both environmental and developmental NGOs and civil society groups to share lessons about community based adaptation. Once such lessons are shared and known, it would be easier to influence governments about the necessary policy changes as regards climate change adaptation.

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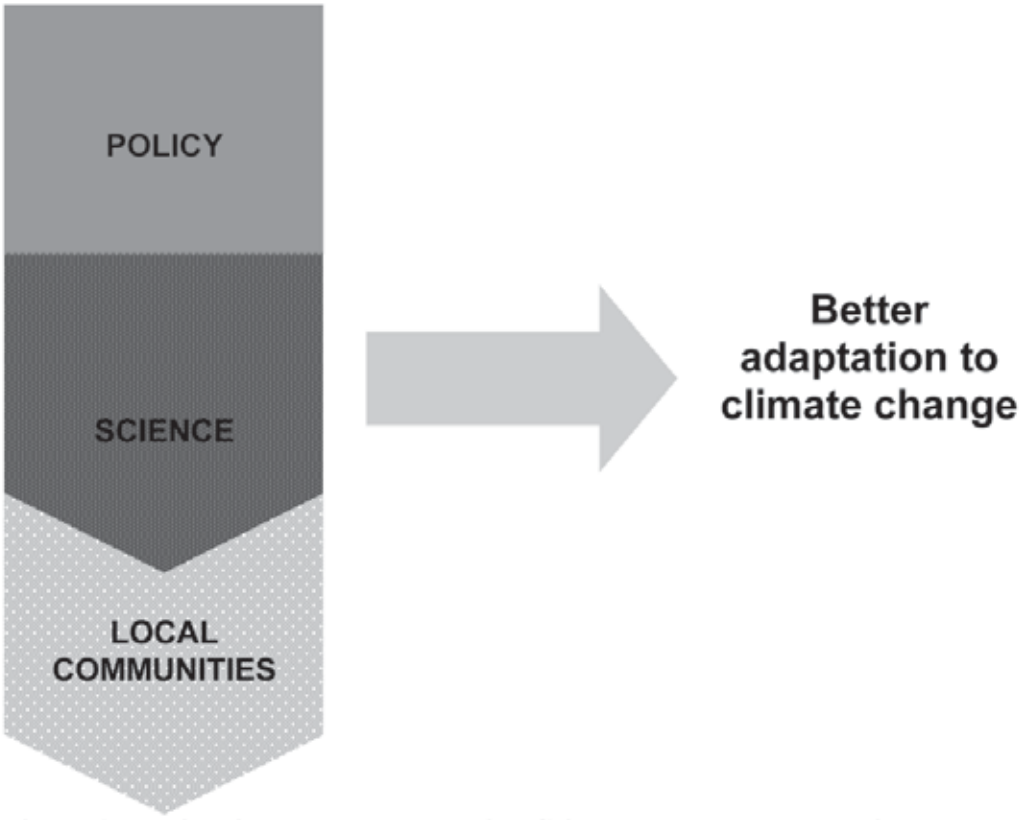
Finally figure 4 below illustrates the importance of linkages between policy, science and local communities. National and international policy structures are important in supporting community adaptation to climate. These can be supported by the best available science and knowledge structures however local communities also need to be linked to such structures.[4]

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, *et al*., 2006
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