

Tried and tested: Learning from farmers on adaptation to climate change

Hannah Reid, Muyeye Chambwera
and Laurel Murray



153: April 2013

Acknowledgements

The authors would like to thank the following current or past IIED staff members and partners for contributing to this paper: Tom Birch, Emma Blackmore, Maryanne Grieg-Gran, Ced Hesse, Saleemul Huq, Joy Hyvarinen, Sian Lewis, James MacGregor, Michel Pimbert, Linda Siegele, Krystyna Swiderska, Monique Vanni and Bill Vorley.

The editing, production and printing of this publication were funded by UK Aid from the UK Government, however the views expressed do not necessarily reflect the views of the UK Government.



The Gatekeeper series of the Natural Resources Group at the International Institute for Environment and Development (IIED) is produced by the Agroecology Team. The series aims to highlight key topics in the field of sustainable natural resource management. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions for development that are particularly relevant for policymakers, researchers and planners. References are provided to important sources and background material. The series is supported by the UK Department for International Development (DFID). The views expressed in this paper are those of the author(s), and do not necessarily represent those of IIED, DFID, or any of their partners.

Dr Hannah Reid is a consulting researcher, currently working with the Climate Change Group at the International Institute for Environment and Development in London. She has over ten years' experience working on climate change, with particular focus on how best to help those who are most vulnerable cope with its impacts. Email: hannah.reid@iied.org

Dr Muyeye Chambwera is a technical advisor with the United Nations Development Programme (UNDP) Botswana. His work focuses on sustainable development and climate change. He has previously worked for IIED on the economics of climate change, developing and applying economic methods for climate change adaptation that are suitable to developing countries. Email: Muyeye.Chambwera@undp.org

Laurel Murray is a research consultant with a background in both ecology and international relations, who specialises in climate change adaptation on the ground and at international negotiations. Her most recent work focuses on state behaviour in the UNFCCC negotiations as well as research on community-based adaptation. Email: laurelmurray@gmail.com

Executive Summary

Climate change adaptation is a relatively new field. However, there exists a wealth of largely overlooked experience that has been accrued over generations by small-scale farmers and pastoralists in poor countries as they cope with climatic extremes and increasing uncertainty – climate-change related or otherwise. IIED has 40 years' experience of working with these producers; this *Gatekeeper* paper draws lessons from this wealth of knowledge in order to inform adaptation planning efforts at all levels.

The paper underscores how measures to increase climate change resilience must view food, energy, water and waste management systems as interconnected and mutually dependent. This holistic approach must also be applied to economic analysis for adaptation planning. Similarly, it is vital to use traditional knowledge and management skills, which can further support adaptation planning.

The authors make three specific policy recommendations for achieving this:

1. Tackle climate change within an integrated environmental and development framework: A more holistic approach would address climate change adaptation and mitigation simultaneously, and also ensure complementarities between agendas that focus on climate change and those that focus on mainstream development. Economic assessments should also be more complete, and include a wide array of costs and benefits.
2. Keep locally-led solutions and genuine community benefits central in international climate change agreements and scientific research. Policy makers must take into account traditional knowledge about seed varieties, livestock, crops and land management to enhance adaptive management capabilities. This requires a similarly large shift in high-level policy-making processes.
3. Challenge power imbalances to ensure local people and their organisations are heard in policy making: Most policy-making processes in poor countries are organised along sectoral lines and are not geared up for strengthening local organisations and federations, building on local knowledge or empowering local people. A shift to more joined-up cross-sectoral policy making and institutional support is required. Lessons also need to be fed up from local and national levels to the United Nations Framework Convention on Climate Change (UNFCCC) – for example communities should be involved in national policy processes such as the National Adaptation Programmes of Action.

Tried and tested: Learning from farmers on adaptation to climate change

Hannah Reid, Muyeye Chambwera and Laurel Murray

For millennia farmers and pastoralists have been coping with droughts, floods, variable rainfall, pests and general uncertainty – long before climate change became topical. They have built up a vast body of first-hand experience, and a huge reservoir of genetic diversity on which to draw. The international research and policy community, on the other hand, has spent only the last decade developing support strategies for those most vulnerable to the likely impacts of climate change.¹

The aim of this *Gatekeeper* paper is to avoid energy and effort being expended on re-inventing the wheel; it urges those involved in supporting climate change adaptation² to draw much more from the existing strategies and knowledge of the millions of farmers and pastoralists worldwide. Of course, no amount of knowledge based on past experience will help deal with large or extreme changes. But in many cases the existing knowledge and experience of how to cope with current and past climate variability provide a solid grounding for how best to adapt to current and future climate change.

Many of these strategies and knowledge have been documented and supported by the International Institute for Environment and Development (IIED) over the last 40 years, working alongside vulnerable communities and learning from them in an attempt to inform regional, national and global policies. This *Gatekeeper* paper takes a broad look at some of the current and past work on which IIED researchers have focused their efforts over recent years with a view to exploring how this can inform current adaptation planning efforts at local, national and international levels.

1 The last two Intergovernmental Panel on Climate Change (IPCC) assessment reports (IPCC, 2001 & 2007) seem to reiterate this message, reflecting a huge increase in the amount of scientific literature on adaptation over this period. Its Fifth Assessment Report, for example, will have four chapters dedicated to adaptation, rather than one as in the two previous reports.

2 Climate change work tends to be divided into two strands: (1) climate change mitigation – reducing the warming effect that excess greenhouse gas emissions have on the Earth's climate; and (2) adaptation – helping vulnerable people, such as poor farmers or pastoralists, cope with the impacts of climate change.

What are the key lessons from IIED's work for climate change adaptation?

IIED has established programmes of work on dryland management, sustainable agriculture and rural livelihoods. The focus has been on long-term adaptive landscape management dealing with drought, climatic variability, pests and economic issues, to ensure food security from resilient production systems that consider food, water and energy systems as a whole. Climate change is just one component of this.

What have we learnt that can inform climate change adaptation planning? When considering IIED's work on food and agriculture, several key lessons emerge, discussed in turn below:

1. Holistic approaches can increase resilience
2. Economic assessments must also be holistic
3. Traditional knowledge and management skills are vital

Holistic approaches can increase resilience

Most policies, institutions, technologies and processes are based on the assumption that systems operate in a linear, throughput manner. IIED research shows that if food, energy, water and waste management systems are all interconnected and mutually dependent they can be much more efficient and resilient (Jones *et al.*, 2011). To illustrate, developed country markets focus on keeping food cheap at the point of sale rather than ensuring that the system is resilient. Efforts to increase efficiency and reduce storage costs in UK markets mean, for example, that about 80 per cent of supermarket supplies of carrots come from just ten big packers in East Anglia and the north of England, while raw milk is transported to just six locations for processing. As recent price spikes have shown (food prices rose 83 per cent between February 2005 and February 2008), this makes the system vulnerable to disruptions, a problem exacerbated by the long and complicated supply chains that typify many of the products on supermarket shelves in industrialised countries. Such systems are also vulnerable to the extreme weather events that are likely to become more frequent and more severe under climate change, as well as to other factors such as the use of food crops for biofuels, or an increase in fossil fuel and fertiliser prices (Jones *et al.*, 2011).

A shift to policies and institutions more suited to supporting cyclical systems, circular models of the economy and a more holistic approach to tackling both poverty and climate change will help ensure productivity and also enhance resilience in the face of climate change and other environmental changes. For example, IIED research in Malawi has shown that adaptation activities have a greater impact when they contribute to the capacity of the entire system rather than individual sectors, such as commercial agriculture or subsistence farming. A key measure identified in the Lower Shire of Malawi is to develop market linkages, and providing other adaptation goods and services through the market system, thereby building a wider adaptive base (Chambwera *et al.*, 2011). Such adaptation approaches enable several players – such as input suppliers, local distributors, farmers and others – to all undertake measures that

respond to changing climate, instead of just focusing on actual production.

There is also something of a dangerous dichotomy between mitigation and adaptation in the international climate change policy arena. A holistic approach would tackle climate change adaptation and mitigation simultaneously. Another concern is the important differences and potential conflicts between agendas that focus on climate change and those that focus on mainstream development. For example, the focus of mitigation activities in developing countries is on reducing emissions from deforestation and forest degradation (REDD), which provides a financial value to the carbon stored in forests, thereby increasing the incentive to protect and sustainably manage them. REDD+ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. If REDD and REDD+ restrict agricultural land expansion – on the basis that deforestation is a significant source of emissions – then the impacts on both mitigation and development need to be carefully assessed. In most countries it will not be possible to expand forested areas to meet REDD demands *and* the global food demand expected by 2050³ unless continued productivity improvements are made in agriculture. IIED research shows that national REDD and REDD+ strategies will be ineffective if they are not coherent with national agricultural development goals and with agricultural mitigation and adaptation efforts (Grieg-Gran, 2010).

Implementation of a REDD mechanism thus needs to be accompanied by policies to improve agricultural productivity, and these in turn need to be set in the context of whole food systems (as well as whole energy, waste and water management systems). For example, chemicals such as pesticides and fertilisers may temporarily boost agricultural productivity, but in the face of climate change impacts such as drought, they may ultimately reduce local resilience by using up a disproportionate amount of household budgets that could otherwise be spent on education, health or other issues that boost resilience. Furthermore, the manufacture of such chemicals also contributes to global warming, and their use causes a range of environmental problems. Instead, approaches that retain wealth locally and view food, energy, water and waste management systems as interconnected and mutually dependent should be considered to safeguard long-term resilience (Jones *et al.*, 2011). Barter markets in Peru are one such approach (see Box 1).

Holistic economic assessments can lead to more efficient policies

Demand is high for adaptation cost estimates these days – from governments, donors and United Nations Framework Convention on Climate Change (UNFCCC) bodies wanting information on where to invest and how best to channel available support. But as shown above, IIED research reveals that distinguishing between local adaptation needs and existing livelihood and development needs is near impossible because they are fundamentally intertwined. Demands to identify the exact costs of adaptation in isolation can force distinctions and divisions that do not reflect local realities and, at worst, could lead to maladaptation if not assessed within the context of multiple existing adaptation and livelihood needs.

³ See projections by the Food and Agriculture Organization of the United Nations and other international organisations.

BOX 1: BARTER MARKETS IN PERU

The Lares Valley is in the south-eastern Andes in Cusco, Peru. The 19,600 indigenous Quechua people live in some 50 communities throughout the 3,600 square kilometre region. The valley is rich in biodiversity, and covers three different agro-ecological zones between the altitudes of 1,000 and 4,850 metres above sea level. Andean tubers and potatoes are grown in the highest zone; corn, legumes and vegetables in the middle areas; and fruit trees, coffee, coca and yucca in the lower parts. Every week a barter market is held in the middle zone to exchange products grown in one zone with products grown in the others. In this way nearly 50 tonnes of goods are traded each market day, but without any money changing hands.

In the context of climate change and other external factors, these barter markets have several advantages over more monetary market systems. They can protect against the risks of agro-chemical supply price increases, falling production sale prices and increases in the purchase prices of agro-industrial foods. They also lead to better management of uncertainty by allowing peasants to diversify crops and varieties to reduce vulnerability to climatic and environmental change. Agricultural biodiversity (genetic, species and ecosystem) is conserved through continued use and exchange of food crops at the markets, thus providing more resilience against the severe blights that can affect crop monocultures. Moving biodiversity around in this way helps create a landscape that is more resilient to climate change.

Barter markets are embedded in a governance system which involves many institutions, such as households, kinship groups and communal assemblies. This helps to overcome external shocks such as those experienced and expected under climate change, and provides greater capacity for control over the processes of experimentation, learning and adaptation in the quest for food security.

Source: Argumedo and Pimbert (2010)

This means a holistic approach must also be applied to any economic analysis undertaken to inform adaptation planning, as opposed to the usual narrow analyses that focus on more immediate and easily measurable costs and benefits. For example, the use of chemicals to control pest increases induced by climate change may mean that: insects and diseases develop resistance over time; non-target organisms expand into newly available habitats when their natural controls are removed; soil and water are contaminated by chemicals; crop pollinators decline; agricultural labourers incur more health costs; the agro-biodiversity that helps maintain ecosystem functioning is lost; and the costs of mitigating the greenhouse gases emitted across the supply chain go up (Jones *et al.*, 2011). Such social and environmental costs are usually excluded from economic analyses, but if they are factored in then the true 'costs' of taking certain approaches would likely increase several-fold. IIED's 'fairmiles' research examines how assessments of greenhouse gas emissions caused by air-freighting food in from poor countries usually fail to consider the full spectrum of such emissions from 'farm to fork' and the additional benefits of supporting livelihoods in developing countries (see Box 2). In addition, IIED research on National Adaptation Programmes of Action is showing the importance of natural resources in adaptation planning in the least developed countries (Reid *et al.*, 2009).

The social impacts of large-scale animal protein production have also been examined through the lenses of food security and livelihoods resilience in the face of climate change (Hebditch and Blackmore, 2012). This work reveals that many of the costs of large-scale production are externalised. For example, this type of production drives demand for growing cereals for animal feed, contributing to deforestation and global

BOX 2: AIRMILES OR FAIRMILES?

'Local food is good' is a common mantra, but IIED's fairmiles work challenges this assumption. It argues that food chains emit greenhouse gases at all stages, and that transport typically only accounts for about 10 per cent of those emissions. These have been subject to excessive scrutiny, however, because they are easy to measure and highly visible. Other emissions result from the energy used to drive machinery, manufacture fertiliser and keep greenhouses in temperate countries warm. Air-freighted produce from developing countries is typically transported in the spare bellyhold capacity of scheduled passenger flights, which means the share of emissions caused by air-freighting food is relatively small. When these issues are accounted for it emerges that food grown in developing countries tends to have much lower greenhouse gas emissions than food grown in developed countries. There are also benefits for poor farmers when food is grown in developing countries, such as increased incomes and better livelihoods. Discriminating against such produce on environmental grounds is likely to hamper or reverse development gains.

James Gikunju Muuru, for example, is a Kenyan farmer who grows vegetables for export to the European market on his 1.5 hectare plot. This provides him with a better livelihood than producing staples for the local market. The income from this has allowed him to pay school fees for his children. Additionally, in collaboration with an association of other export farmers, a local maternity clinic has been funded. Working to cultivate crops in accordance with international standards is worth it for Muuru and many other farmers. Export horticulture is proving to be an important way to grow business in many developing countries, especially those in sub-Saharan Africa. Kenya was the first African country to develop systems that allow farmers to supply air-freighted fresh vegetables to consumers in Europe. Now other countries such as Tanzania, Rwanda and Ethiopia are starting to do the same.

Sources: Chi *et al.* (2009); Muuru (2009)

biodiversity loss. This in turn affects local livelihoods and food security, and reduces environmental resilience to climate change as the natural resources and ecosystem services provided by this biodiversity are lost.

Traditional knowledge and management skills are vital

IIED has a long history of supporting traditional knowledge and management strategies in sustainable agriculture and pastoralism to enhance productivity, alleviate poverty and secure sustainable livelihoods and income sources. IIED research shows that traditional knowledge of seed varieties, crops, livestock and land management can also support climate change adaptation.

However as agricultural biodiversity disappears (FAO, 2011), the genetic basis that allows agriculture to adapt to changing environmental conditions weakens. Intellectual property rights are also known to have a negative impact on genetic diversity when expropriated by large companies because local incentives to develop native species and varieties are lost. IIED work to protect community rights to traditional knowledge in Peru, China, India, Kenya and Panama has revealed that hybrid varieties are often less resilient than native ones to the climate change impacts communities are already experiencing (Swiderska, 2009). There is growing evidence that modern commercially produced seed varieties also undermine resilience by creating dependency on external agencies such as large agribusinesses.

BOX 3: HOW ADAPTATION IN THE ANDES BUILDS ON LOCAL AGRO-BIODIVERSITY

Quechua farmers in the highlands and valleys of the Cuchumuela community, Cochabamba, Bolivia, are experiencing unpredictable rainfall, more extreme weather events and higher temperatures. This affects food security due to the emergence of new pests, such as the black corn weevil, and increases in known pests, such as potato moths and Andean weevils. Increases in moth attacks mean potatoes can only be stored for one to three months rather than the typical seven months. This forces farmers to buy potatoes for the rest of the year.

In response to the new pests and resulting low harvests of certain varieties, some farmers have applied highly toxic chemicals, which increase production costs, compromise farmer health and lead to pest resistance. Other farmers have specialised in developing more resistant and flexible crop varieties. The diversity of local varieties has enabled them to select those which are best adapted to the new conditions. For example, "Doble H" was not planted before in this community, but is now the most common variety in the region because it will always produce, even with little rainfall. The same species are grown, but the varieties planted have changed.

Source: Swiderska *et al.* (2011)

Traditional knowledge and native varieties show great potential for supporting climate change adaptation in addition to enhancing productivity and food security and also providing mitigation benefits (Swiderska *et al.*, 2011). Our research has identified many farming communities worldwide who are already experiencing the impacts of climate change, and who are using agro-biodiversity and local knowledge in their strategies to adapt (see Box 3).

IIED research to improve our understanding of the threats to genetic resources and traditional knowledge, as well as developing tools and local networks (such as farmer organisations and seed networks) to protect community rights over them, has helped strengthen the adaptive capacity of indigenous and local communities. Such work has tremendous relevance for debates on climate change adaptation. Work in India, Indonesia, Iran and Peru has demonstrated that supporting decentralised, farmer-led, biodiversity-rich farming strategies and strong local organisations is also key to ensuring effective local responses to climate change.⁴

Another area where traditional knowledge is vital is amongst the nomadic pastoralists of the world's driest lands. IIED – through its Drylands Programme – has a long history of work on pastoralism. Pastoralists have always lived with environmental uncertainty and have developed a diverse range of strategies, institutions and networks to exploit this unpredictability and risk to their advantage. Livestock mobility and the carefully controlled breeding of animals to feed selectively on the best quality pastures highly dispersed in time and space are two of the more critical strategies. Despite their proven value, these strategies are still poorly understood and integrated into policy design. Enduring perceptions of pastoralism as an economically inefficient and environmentally destructive land use system, coupled with the absence of a dynamic economic valuation framework to assess the contribution of pastoralism, continue to justify the appropriation of pastoral land for other uses. Policies in Tanzania, for example, promote ranching, which is seen as the best way to produce high value goods. This is despite

⁴ See www.diversefoodsystems.org

studies by IIED on the total economic valuation of pastoralism that have shown that more beef and milk are produced per hectare than ranching even though cows are skinnier (Hesse, 2010; Hesse and MacGregor, 2006 & 2009). Such information can better inform adaptation decision making and actions where resources are limited and where players have to address multiple existing stresses that amplify vulnerability to climate change, such as competition for grazing land and water from other land uses like cultivation, and livestock diseases. Pastoralism is likely to be even more economically efficient in the face of climate change, which will likely increase environmental uncertainty. But in many instances policies on land, water, representation and credit do not support pastoralist lifestyles. In Eastern Niger, for example, while some policies support pastoral mobility, the livestock policy is against this. Government legislation more often supports sedentarisation despite the fact that it is the most mobile pastoralists who generate the most wealth. These inappropriate policy and development interventions mean that pastoral systems are increasingly failing to provide the sustainable livelihoods that they used to provide. IIED is working to challenge such short-sighted policy frameworks in Tanzania, Eastern Niger and elsewhere to address this.

Policies that support resilience

Supporting traditional knowledge of seed varieties, crops, livestock and land and water management in order to enhance local adaptation to climate change requires a large shift in high-level decision and policy-making processes. Securing funding for such integrated approaches is also difficult, because donors and governments tend to divide work into distinct sectors. Unfortunately, most policy-making processes in poor countries are not well geared up for strengthening local organisations and federations; for building on local knowledge of history, place and relevant technologies; for empowering local people and helping them mobilise their own resources to solve their problems; or for acknowledging that a one-size-fits-all approach is not suitable for such a diversity within and between vulnerable groups.

Decentralised governance, human rights and reclaiming or regaining control over these rights have all been a key focus of IIED's work. For example, the emerging food sovereignty policy movement identifies the need for several mutually supportive national and international policies to strengthen the autonomy and resilience of more localised food systems (Pimbert, 2010).

For about 12 years, IIED has also sought to raise the voices of the poor and vulnerable in climate change arenas and has supported community-driven solutions to climate change under its dedicated Climate Change Programme. Initiatives such as the annual international Community-Based Adaptation Conferences draw attention to local land use and agricultural solutions to climate change. Work has also focused on the importance of sound environmental management to secure development gains. For example IIED convened the Up in Smoke coalition with the new economics foundation, which helped bring major development NGOs into the climate change debate.

The following three measures are a first step in ensuring that policies for adaptation planning build on the type of knowledge and experience gained by IIED on sustainable agriculture and dryland management:

1. Tackle climate change within an integrated environmental and development approach

Under the UNFCCC, policies such as REDD+ need to be considered alongside those for agriculture. Indeed all agricultural mitigation activities (including work on soil carbon, emissions from livestock production and consumption, methane release from livestock and paddy rice) – whether under the UNFCCC or not – need to integrate lessons on pro-poor sustainable agriculture. Practical opportunities include payments for environmental services (PES) programmes. These can help support sustainable, resource-efficient agriculture-food supply chains which focus on the whole picture and not just climate change. For example, they incorporate the co-benefits of sound environmental management and hence improve ecosystem and community resilience to climate change (Box 4).

BOX 4. PES AND CLIMATE CHANGE ADAPTATION IN BRAZIL

IIED research highlights how Brazil has a strong history of using financial instruments for conservation, such as fiscal ecological transfers. More recently it has implemented PES payments as a more direct approach to reach farmers. *Bolsa Floresta*, led by a public-private NGO, is the first internationally-certified project in Brazil to focus on improving the quality of life of traditional people in exchange for them maintaining the ecosystem services provided by tropical forests. It does this by rewarding forest households with monthly payments into credit card accounts for practising 'farming without fire'.

Source: Viana (2010)

2. Keep locally-led solutions and genuine community benefits central in international climate change agreements and scientific research

It is the poor who are most vulnerable to climate change – adaptation activities must focus on them. However, current systems for accessing carbon funding are too expensive and complicated for small-scale producers. For example, they require proof of 'additionality', which itself is controversial and difficult to define, and the capacity to measure carbon sequestration. Promising emerging new opportunities include:

- Climate change insurance and carbon labelling schemes such as 'fairmiles': these offer more potential for engaging with and benefitting developing country farmers, but this potential needs to be realised and scaled up beyond a few case study communities.
- The International Air Passenger Adaptation Levy (IAPAL) – a proposed purchase tax on air tickets, the proceeds of which would be dedicated to investment in adaptation – also provides opportunities to reach the most vulnerable (Birch and Chambwera, 2011; Chambwera and Müller, 2008).

Given the value of local knowledge for addressing adaptation, work with local communities must continue, and agricultural research needs to get better at incorporating this local knowledge. Bringing together farmers and scientists will help break the deadlock of language, geography and experience that exists between these two groups (Pimbert, 2011).

3. Challenge power imbalances to ensure local people and their organisations are heard in policy making

Many common-sense policies never see the light of day because of powerful interests and numerous 'revolving doors' between these interests and government, which effectively block alternative approaches. For example, expropriation of intellectual property rights and plant breeding rights by multinational corporations severely threatens local capacity to adapt by restricting the use of some varieties and promoting a few modern commercial varieties at the expense of traditional crops and practices. Limiting the power of these actors is critical. This could be achieved through:

- legal action;
- building coalitions (Box 5) and strengthening social movements – such as the growing number of federations of the urban poor; and
- improving the quality and availability of evidence-based research. For example, broader economic analyses of the merits of pastoralism – which include not just meat and milk, but health, education, environment and tourism – could well strengthen the argument against powerful agribusiness-oriented alternative land uses. So too could a better understanding of the threats to traditional knowledge and links between this and landscapes, cultural values, customary laws, climate change and the need to protect biocultural systems as a whole.

BOX 5. IIED'S EXPERIENCE IN BUILDING COALITIONS

In addition to working with a number of donors, research institutes and government agencies in the North, IIED has a long history of partnering with institutions and individuals in the South. These include indigenous people, pastoral organisations such as the Pastoralist Livelihoods Task Force in Tanzania; intermediary organisations with close connections to communities; academics and research institutes such as Bunda College at the University of Malawi; national NGOs such as the Tanzania Natural Resources Forum or the Resource Conflict Institute in Kenya; and government bodies such as the Higher Council for Natural Environment and Natural Resources in Sudan.

Such partnerships are key to the way IIED works. By forging alliances with individuals and organisations such as those above, IIED helps strengthen marginalised people's voices in decision making and ensure that national and international policy better reflects the agendas of poorer communities and countries.

Market-based mitigation measures, including those in REDD, must avoid the mistakes made under the Clean Development Mechanism whereby most projects chase the carbon finance and side-line genuine local development benefits. Lessons need to be fed up from local and national levels to the UNFCCC – for example communities should be involved in national policy processes such as the National Adaptation Programmes of Action.

Conclusions

When it comes to climate change adaptation, there is no need to reinvent the wheel. There are generations of first-hand, tried and tested experience in poor countries and a huge body of associated research which can be used to better inform policies on a regional, national and global basis. Bearing in mind the lessons learnt and the policy opportunities highlighted above will ensure we are better prepared for an increasingly extreme and uncertain climate.



References

- Argumedo, A. and M. Pimbert. 2010. Bypassing globalization: Barter markets as a new indigenous economy in Peru. In: *Development* 53(3): 343–349.
- Birch, T. and M. Chambwera. 2011. *Fundraising flights: A levy on international air travel for adaptation*. IIED Briefing paper. IIED, London. <http://pubs.iied.org/17091IIED.html>
- Chambwera, M., et al. 2011. *Planning and costing agriculture's adaptation to climate change: Synthesis Report*. IIED, London. <http://pubs.iied.org/16511IIED.html>
- Chambwera, M. with B. Müller. 2008. *Fairer Flying: An international air travel levy for adaptation*. IIED Briefing paper, November 2008. IIED, London. <http://pubs.iied.org/17045IIED.html>
- Chi, K. R., MacGregor, J. and R. King. 2009. *Fair miles: Re-charting the food miles map*. IIED, London. <http://pubs.iied.org/15516IIED.html>
- FAO (UN Food and Agriculture Organisation). 2011. *State of the World's Plant Genetic Resources for Food and Agriculture*. FAO, Rome.
- Grieg-Gran, M. 2010. *Beyond forestry: Why agriculture is key to the success of REDD+*. IIED Briefing paper, November 2010, IIED, London. <http://pubs.iied.org/17086IIED.html?k=why%20agriculture>
- Hebditch, D. and E. Blackmore. 2012. *Building sustainable supply chains: Consumer choice or direct management?* IIED Opinion paper, June 2012. IIED, London. <http://pubs.iied.org/17134IIED.html>
- Hesse, C. 2010. Tracking the real value of pastoralism: A reevaluation of traditional livestock herding in Tanzania reveals the system's economic viability, climate resilience and fit with local needs. *IIED Reflect & Act paper*, May 2010. IIED, London. <http://pubs.iied.org/G02994.html>
- Hesse, C. and MacGregor, J. 2009. *Arid waste? Reassessing the value of dryland pastoralism*. IIED Briefing paper, June 2009. <http://pubs.iied.org/17065IIED.html>
- Hesse, C. and MacGregor, J. 2006. *Pastoralism: Drylands' invisible asset?* Drylands Issue Paper 142. IIED, London. <http://pubs.iied.org/12534IIED.html>
- IPCC. 2001. *IPCC Third Assessment Report: Climate Change 2001 (TAR)*. IPCC, Geneva.
- IPCC. 2007. *IPCC Fourth Assessment Report: Climate Change 2007 (AR4)*. IPCC, Geneva.
- Jones, A., Pimbert, M. and J. Jiggins. 2011. *Virtuous Circles: Values, Systems, Sustainability*. IIED and IUCN CEESP, London. <http://pubs.iied.org/14619IIED.html>
- Muuru, J. G. 2009. Kenya's flying vegetables: small farmers and the 'food miles' debate. *Policy Voices Series*. Africa Research Institute, London.
- Pimbert, M. 2010. *Towards Food Sovereignty: Reclaiming autonomous food systems*. IIED, London. <http://pubs.iied.org/G02268.html>

Pimbert, M. 2011. *Participatory Research and On-Farm Management of Agricultural Biodiversity in Europe*. IIED, London. <http://pubs.iied.org/14611IIED.html>

Reid, H., J. Phillips and M. Heath. 2009. *Natural Resilience: Healthy ecosystems as climate shock insurance*. IIED Briefing, December 2009. IIED, London. <http://pubs.iied.org/17078IIED.html>

Swiderska, K. 2009. *Protecting Traditional Knowledge from the Grassroots Up*. IIED Briefing paper, June 2009. IIED, London. <http://pubs.iied.org/17067IIED.html>

Swiderska, K., Y. Song, J. Li, H. Reid and D. Mutta. 2011. *Adapting Agriculture with Traditional Knowledge*. IIED Briefing, October 2011. IIED, London. <http://pubs.iied.org/17111IIED.html>

Swiderska, K., *et al.* 2011. The role of traditional knowledge and crop varieties in adaptation to climate change and food security in SW China, Bolivian Andes and coastal Kenya. Paper prepared for the UNU-IAS workshop on Indigenous Peoples, Marginalised Populations and Climate Change: Vulnerability, Adaptation and Traditional Knowledge, Mexico, July 2011. IIED, London. Available at <http://pubs.iied.org/G03338.html>

Viana, V. M. 2010. *Sustainable Development in Practice: Lessons learned from Amazonas*. IIED, London. <http://pubs.iied.org/17508IIED.html>

PREVIOUS GATEKEEPER PAPERS

The Gatekeeper Series has been published since 1987. Here we list the most recent titles. These, plus many earlier titles, can be downloaded free from our website: www.iied.org/pubs/

154. **Media Perceptions and Portrayals of Pastoralists in Kenya, India and China.** 2013.
Mike Shanahan
153. **Tried and Tested: Learning from farmers on adaptation to climate change.** 2013.
Hannah Reid, Muyeywa Chambwera and Laurel Murray
152. **Poverty, Biodiversity and Local Organisations: Lessons from BirdLife International.** 2011.
David Thomas
151. **Conservation Enterprise: What Works, Where and for Whom?** 2011.
Joanna Elliott and Daudi Sumba
150. **Biodiversity and Poverty: Ten Frequently Asked Questions – Ten Policy Implications.** 2011.
Dilys Roe, David Thomas, Jessica Smith, Matt Walpole, and Joanna Elliott
149. **Improving Farmer Learning in and for Sustainable Agriculture in Southern Africa.** 2010.
Mutizwa Mukute
148. **Revisiting Collaborative Forest Management in Kyrgyzstan: What happened to bottom-up decision-making?** 2010.
Jane Carter, Ennio Grisa, Rysbek Akenshaev, Nuramat Saparbaev, Patrick Sieber, and Jean-Marie Samyn
147. **Participatory Land Use Planning as a Tool for Community Empowerment in Northern Tanzania.** 2010.
Ujamaa Community Resource Team
146. **Equity and Social Justice in Water Resource Management in Bangladesh.** 2010.
Golam Rasul and A. K. M. Jahir Uddin Chowdhury
145. **Putting Pastoralists on the Policy Agenda: Land Alienation in Southern Ethiopia.** 2010.
Eyasu Elias and Feyera Abdi
144. **Can Biomass Power Development?** 2010.
Keith Openshaw
143. **New Hope for Indian Food Security: The System of Rice Intensification.** 2009.
Biksham Gujja and T.M. Thiagarajan
142. **Adaptation to Climate Change: A vulnerability assessment for Sudan.** 2009.
Sumaya Ahmed Zakiedeen
141. **Towards Food Sovereignty.** 2009
Michel Pimbert
140. **Resilience to Climate Change in Patagonia, Argentina.** 2008.
Rodrigo José Roveta
139. **Unlocking the Potential of Contract Farming: Lessons from Ghana.** 2008.
Comfort Kudadjie-Freeman, Paul Richards and Paul C. Struik
138. **Public Participation and Oil Exploitation in Uganda.** 2008.
Christoph Schwarte
- 137k. **The How, When and Why of Community Organisational Support: Uplink Yogyakarta in Indonesia.** 2009.
Awali Saeful Thohir, Wardah Hafidz and Gabriela Sauter
- 137j. **Uplink Porong: Supporting community-driven responses to the mud volcano disaster in Sidoarjo, Indonesia.** 2009.
Mujtaba Hamdi, Wardah Hafidz, and Gabriela Sauter
- 137i. **Reconstructing Life After the Tsunami: The work of Uplink Banda Aceh in Indonesia.** 2009.
Ade Syukrizal, Wardah Hafidz, and Gabriela Sauter
- 137h. **Renovation, Not Relocation: The work of the Paguyuban Warga Strenkali (PWS) in Indonesia.** 2009.
Wawan Some, Wardah Hafidz and Gabriela Sauter
- 137g. **The Urban Poor Development Fund in Cambodia: Supporting local and city-wide development.** 2009.
Somsak Phonphakdee, Sok Visal and Gabriela Sauter
- 137f. **The Urban Resource Centre, Karachi.** 2008.
Arif Hasan
- 137e. **The Pastoral Women's Council: Empowerment for Tanzania's Maasai.** 2008.
Maanda Ngoitiko
- 137d. **The Organisation of Rural Associations for Progress, Zimbabwe: Self-reliance for Sustainability.** 2008.
Dumisani Nyoni
- 137c. **IIED-América Latina: neighbourhood credit funds in Buenos Aires, Argentina.** 2008.
Florencia Almansi and Andrea Tammarazio
- 137b. **The Evolution of Casa Pueblo, Puerto Rico: From Mining Opposition to Community Revolution.** 2008.
Alexis Massol-González, Avril Andromache Johnnidis and Arturo Massol-Deyá
- 137c: **IIED-América Latina: 137a. Association ANDES: Conserving Indigenous Biocultural Heritage in Peru.** 2008.
Alejandro Argumedo and Tammy Stanner
137. **Understanding and Supporting the Role of Local Organisations in Sustainable Development.** 2008.
David Satterthwaite and Gabriela Sauter
136. **Underfed, Underpaid and Overlooked: Women, the Key to Food Security in South Asia.** 2008.
Nira Ramachandran
135. **Democratising Technology Choices? European Public Participation in Agbiotech Assessments.** 2008.
Les Levidow
134. **Land Reform and Rural Territories: Experience from Brazil and South Africa.** 2008.
Julian Quan
133. **Keeping CAMPFIRE Going: Political uncertainty and natural resource management in Zimbabwe.** 2007.
Everisto Mapedza
132. **Who benefits from land titling? Lessons from Bolivia and Laos.** 2007.
Susana Lastarria-Cornheil
131. **Legislators and Livestock: Pastoralist parliamentary groups in Ethiopia, Kenya and Uganda.** 2007.
John Morton, John K. Livingstone and Mohammed Mussa
130. **A People's Plan for Biodiversity Conservation: Creative strategies that work (and some that don't).** 2006.
Tejaswini Apte
129. **Banishing the Biopirates: A new approach to protecting traditional knowledge.** 2006.
Krystyna Swiderska
128. **Mainstreaming participatory forestry within the local government reform process in Tanzania.** 2006.
Tom Blomley
127. **State-farmer partnerships for seed diversity in Mali.** 2006.
Didier Bazile

126. **Seed diversity in the drylands: Women and farming in South India.** 2006.
Carine Pionetti
125. **Working Together: Forest-linked small and medium enterprise associations and collective action** 2006.
Duncan Macqueen, Sharmistha Bose, Septi Bukula, Cornelius Kazoora, Sharon Ousman, Noemi Porro and Horst Weyerhaeuser
124. **Mysteries and Myths: De Soto, property and poverty in South Africa.** 2006.
Rosalie Kingwill, Ben Cousins, Tessa Cousins, Donna Hornby, Lauren Royston and Warren Smit
123. **Climate Change and Development Links.** 2006.
Saleemul Huq, Hannah Reid and Laurel A. Murray
122. **Getting the Message Across: Promoting ecological agriculture in Bangladesh.** 2006.
Dipankar Datta and Kamal Kar
121. **The Market for Voluntary Carbon Offsets: A new tool for sustainable development?** 2005.
Nadaa Taiyab
120. **Organic Cotton: A New Development Path for African Smallholders?** 2006.
Simon Ferrigno, Saro G. Ratter, Peter Ton, Davo Simplicio Vodouhé, Stephanie Williamson and John Wilson
119. **State Policies and Land Use in the Chittagong Hill Tracts of Bangladesh.** 2006.
Golam Rasul
118. **Facing up to Climate Change in South Asia.** 2005.
Mozaharul Alam and Laurel A. Murray
117. **Adapting to Climate Change in East Africa: A strategic approach** 2005.
Victor A. Orindi and Laurel A. Murray
116. **Laws, lore and logjams: Critical issues in Indian forest conservation** 2005.
Madhu Sarin
115. **Biodiversity planning: Why and how should local opinions matter?** 2004.
Sonja Vermeulen
114. **Food Industrialisation and Food Power: Implications for food governance.** 2004.
Tim Lang
113. **Water For All: Improving Water Resource Governance in Southern Africa.** 2004.
Emmanuel Manzungu
112. **The Major Importance of 'Minor' Resources: Women and Plant Biodiversity.** 2003.
Patricia Howard
111. **Contract Farming in India: Impacts on women and child workers.** 2003.
Sukhpal Singh
110. **Risking Change: Experimenting with Local Forest Management Committees in Jamaica.** 2003.
Tighe Geoghegan & Noel Bennett
109. **The Contradictions of Clean: Supermarket Ethical Trade and African Horticulture.** 2003.
Susanne Freidberg
108. **Collaborative Forest Management in Kyrgyzstan: Moving from top-down to bottom-up decisionmaking.** 2003.
Jane Carter, Brieke Steenhof, Esther Haldimann and Nurlan Akenshaev
107. **Creating Markets with the Poor: Selling Treadle Pumps in India** 2003.
Frank van Steenberg
106. **Should Africa Protect Its Farmers to Revitalise Its Economy?** 2002.
Niek Koning
105. **Food Security in the Context of Crisis and Conflict: Beyond Continuum Thinking.** 2002.
Benedikt Korf and Eberhard Bauer
104. **Marketing Forest Environmental Services – Who Benefits?** 2002.
Natasha Landell-Mills
103. **Beyond Safe Use: Challenging the International Pesticide Industry's Hazard Reduction Strategy.** 2001.
Douglas L. Murray and Peter L. Taylor
102. **Measuring Farmers' Agroecological Resistance to Hurricane Mitch in Central America.** 2001.
Eric Holt-Giménez
101. **Social Networks and the Dynamics of Soil and Water Conservation in the Sahel.** 2001.
Valentina Mazzucato, David Niemeijer, Leo Stroosnijder and Niels Röling
100. **Global Restructuring, Agri-Food Systems and Livelihoods.** 2001.
Michel P. Pimbert, John Thompson and William T. Vorley with Tom Fox, Nazneen Kanji and Cecilia Tacoli
99. **Social Forestry versus Social Reality: Patronage and community-based forestry in Bangladesh.** 2001.
Niaz Ahmed Khan
98. **Learning Our Way Ahead: Navigating Institutional Change and Agricultural Decentralisation.** 2001.
Clive Lightfoot, Ricardo Ramirez, Annemarie Groot, Reg Noble, Carine Alders, Francis Shao, Dan Kisauzi and Isaac Bekalo
97. **Who Benefits From Participatory Watershed Development? Lessons From Gujarat, India.** 2001.
Amita Shah
96. **Farmer Learning and the International Research Centres: Lessons from IRRI.** 2001.
Stephen Morin, Florencia Palis, Karen McAllister, Aida Papag, and Melina Magsumbol
95. **Forest Management and Democracy in East and Southern Africa: Lessons From Tanzania.** 2001.
Liz Alden Wily
94. **Poverty and Systems Research in the Drylands.** 2000.
Michael Mortimore, Bill Adams and Frances Harris
93. **A Study of Biopesticides and Biofertilisers in Haryana, India.** 2000.
Ghayur Alam
92. **Women's Participation in Watershed Development in India.** 2000.
Janet Seeley, Meenakshi Batra and Madhu Sarin
91. **Borders, Rules and Governance: Mapping to catalyse changes in policy and management.** 2000.
Janis B. Alcorn
90. **Woodlots, Woodfuel and Wildlife: Lessons from Queen Elizabeth National Park, Uganda.** 2000.
Tom Blomley

The Agroecology Team co-ordinates the editorial process for the Gatekeeper Series. The Team seeks to enhance and promote understanding of environmental sustainability and equity in agri-food systems and the use of biodiversity. It emphasises close collaboration and consultation with a wide range of organisations and takes a multidisciplinary approach. Collaborative research projects are aimed at identifying the constraints and potentials of the livelihood strategies of marginalised groups who are affected by ecological, economic and social change. These initiatives focus on the development and application of participatory approaches to research and development; resource conserving technologies and practices; collective approaches to resource management; the values of wild foods and biodiversity; rural-urban interactions; strengthening citizen voice and agency in policy processes, and policies and institutions that work for sustainable agriculture and biodiversity based livelihoods.

The Agroecology Team is part of the Natural Resources Group (NR Group) at IIED. The NR Group and its partners work to enable greater participation of marginalised groups and to promote more sustainable and equitable patterns of land and natural resource use. We build partnerships, capacity and wise decision-making for fair and sustainable use of natural resources. Our priority is the control and management of natural resources and other ecosystem services by the people who rely on them, and on the necessary changes needed at international and national level to make this happen.

The Gatekeeper Series is co-ordinated by Nicole Kenton and edited by Fiona Hinchcliffe.

ISSN 1357-9258

Design: Piers Aitman



International Institute for Environment and Development

80-86 Gray's Inn Road,

London WC1X 8NH

Tel: +44 (0) 20 3463 7399

Fax +44 (0)20 3514 9055

E-mail: gatekeeper@iied.org

Website: www.iied.org