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Climate adaptation from a poverty perspective

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Adaptation to already discernible climate changes, particularly an increase in extreme events, is an urgent task for all nations. This article argues that adaptation is an urgent priority, especially for the developing world, to build a resilient society. For poor nations, poverty alleviation is the main policy driver, although changes in livelihood strategies are driven by a range of factors. Using a case study, direct and indirect adaptation is examined with reference to the specific livelihoods of the Chagga people on Kilimanjaro, Tanzania. Evidence suggests that coping strategies to maintain livelihood systems can work against long-term adaptation to climate change, unless there is linkage to poverty alleviation. Linking climate change adaptation to project development through notions of additionality does not carry sufficient leverage to simultaneously address poverty alleviation and climate change. It is suggested that, rather than micro-economic project management, a broader macro-economic frame be established. A rights-based approach is argued as a vital driver for informing financial, institutional, political and technological policies and instruments.

Keywords: adaptation; climate change; coping mechanisms; developing countries; livelihoods; poverty alleviation; resilience; rights-based approach; vulnerability

L'adaptation aux changements climatiques déjà discernables, en particulier l'augmentation des évènements extrêmes, est une tâche urgente pour toutes les nations. Cet article soutient que l'adaptation est une priorité urgente, particulièrement dans le but de permettre au monde en développement de construire une société résiliente. Pour les nations pauvres, la réduction de la pauvreté est le principal moteur des politiques, bien que l'evolution des stratégies de subsistance soit influencés par plusieurs facteurs. Sur la base d'une étude de cas, l'adaptation directe et indirecte sont examinées en faisant référence aux modes de subsistance particuliers des Chagga du Kilimandjaro en Tanzanie. L'évidence suggère que les stratégies de lutte au maintien des systèmes de subsistance peuvent aller à l'encontre de l'adaptation à long terme au changement climatique, à moins qu'il y ait un lien avec la lutte contre de la pauvreté. Intégrer l'adaptation au changement climatique au développement de projet à travers les notions d'additionalité n'a pas une portée suffisante pour attaquer simultanément la réduction de la pauvreté et le changement climatique. La mise en place d'un cadre macro-économique plus large serait préférable à une gestion de projet micro-économique. Il est argumenté qu'une approche fondée sur les droits est un moteur essentiel pour informer les politiques et instruments financiers, institutionnels, politiques et technologiques.

Mots clés: adaptation; approche fondée sur les droits; changement climatique; mécanismes d'adaptation; pays en développement; réduction de la pauvreté; résilience; subsistance; vulnérabilité

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1. Introduction

Climate change and variability is a multi-dimensioned hazard that can threaten life and livelihoods and impoverish people. Although weather-related disasters, such as hurricane Katrina, often appear as infrequent, but high-profile, events, the reality is that they account for some 90%, or $1.4 trillion, of recorded disaster-related economic losses. However, some 60% of losses derive from more mundane events such as temperature extremes and moderate droughts (McCarthy et al., 2001; Murnane, 2004; Mills, 2005). The Intergovernmental Panel on Climate Change (IPCC) predicts that climate-driven adverse impacts will increase. Many of these impacts will not be as catastrophic as hurricane Katrina, but are more subtle events that will gradually undermine livelihoods, particularly for poorer communities that are already on the edge of their coping capacity. With more frequent extreme events predicted in the near future, along with subtle and complex longer-term shifts in climate patterns, the challenge for public policy is effective risk reduction to both sudden extreme events and slow-onset disasters (IPCC, 2007).

This article explores the nature of vulnerability to climate change by focusing on issues of livelihood resilience. Using a detailed example from Tanzania, it explores how coping mechanisms develop in livelihood systems under stress, coming to the conclusion that a coping mechanism to maintain existing livelihood systems can work against long-term adaptation to climate change. Further discussion of the range of indirect adaptation possibilities as 'wicked problems' leads to the conclusion that project-based approaches to adaptation are insufficient. A broader programmatic approach based on poverty alleviation within and between countries is a necessary basis for future climate agreements.

2. Poverty, vulnerability and climate change

The science of climate change has largely focused on average changes in temperature and precipitation and the projected impact of sea-level rise. For most poor people living in developing countries, however, it is the increased variability associated with climate change that has more immediate impact and direct relevance (Kelly and Adger, 2000). Drought, flood and storm surge already dominate natural hazard impacts and will increasingly do so. Despite wide acknowledgement that adaptation without significant and sustained mitigation is not sufficient to avert climate impacts, the ability to adapt to climate change and variability is now an essential prerequisite for both sustainable development and poverty reduction (Kelly and Adger, 2000; Burton et al., 2002; Schipper, 2006; IPCC, 2007; UNDP, 2007).

Today, over 2 billion people are struggling to survive on an income of less than $1 a day. Even if the Millennium Development Goals are achieved on time – critically moving 1 billion people out of absolute poverty – demographic increases mean that by 2015 there will be the same number of people, if not more, in absolute poverty. Low income is only one component, however, of the multiple and interactive deprivations of human capabilities that sustain poverty (Sen, 1999; Baer et al., 2007). Millions of people around the world lack instrumental and substantive freedoms, including economic opportunities, political freedoms, social facilities, transparency guarantees, and protective security; this lack of freedom extends to the lack of the basic freedom to survive (Sen, 1999). Millions of people suffer unnecessary hardships, illness, misery and death – they are vulnerable.

Multiple vulnerabilities and risks form chronic and cumulative burdens for people living in poverty, particularly in situations where customary coping strategies are already at – or beyond – the brink of collapse, or alternatively work against longer-term adaptation initiatives.

The key concept here is the *erosion of resilience* (Bebbington, 1999; Kelly and Adger, 2000). Resilience is defined as the social capacity to resist and recover from shocks (O'Brien, et al., 2006). Disease epidemics, armed conflict and rapid urbanization are examples of how shocks and trends can disrupt and devastate livelihoods (Wisner et al., 2003). Climate variability – including varying seasonality – is a central component of vulnerability. Enhancing resilience through adaptation to climate variability, as well as other shocks and trends, demonstrates emerging good practice in development assistance targeted towards building sustainable livelihoods (DFID, 2004).

In the context of poverty, the adaptations that people are increasingly obliged to make in relation to increasing climate change impacts (such as heightened variability) are not easily discernable from the wider range of livelihood adjustments made in response to a variety of simultaneous and greater pressures; for example, globalization, political instability, urbanization and HIV/AIDS.

The basis of most foreign aid funds supported by donors who have signed the Kyoto agreement is that additional project costs due to climate hazard impact can be supported within development assistance (IISD, 2007). There are several difficulties with this; the first being that direct adaptation to climate change is difficult to separate from other livelihood adaptations. The second is that it proves to be extremely costly to accurately gauge additional project costs associated with adaptation (UNDP, 2007). Finally, the consideration of additionality implies a project-based approach to development, whereas most donors have abandoned this and moved towards sector-wide and core financial support to Treasury in programme modes, where these are largely focused on poverty alleviation.

3. Climate adaptation: the Tanzanian example

In the summer of 2007, a 1,000-household survey combined with qualitative analysis explored the relationships between livelihood vulnerability and climate adaptation. Fieldwork centred on the impact of climate change in the Kilimanjaro region. The survey instruments were originally used in a similar study in Rufiji, and refined in pilot surveys in Kilimanjaro (Stephenson, 2007). Both projects were directed by Hubert Meena, the Director of the Centre for Energy, Environment, Science and Technology (CEEST), a national think-tank that has contributed substantially to Tanzania's scientific submissions to the United Nations Framework Convention on Climate Change (UNFCCC).

The two systemic influences on East African climate, especially the precipitation that determines agricultural production, are the Inter-Tropical Convergence Zone, the high-pressure system that dominates, and the Southern Atlantic El Niño Oscillation (Paavola, 2004). There are indications that the former has moved, bringing greater aridity to both West and East Africa on a long-term basis, and that there is a 10–12-year cyclicity to the latter which coincides, over the last 50 years, with the occurrence of *njaa* ('hunger') in the region (Shariff, 2007).

Marked variability, not so much in temperature as in precipitation, is a well-documented phenomenon in Tanzania. In the Kilimanjaro region, annual precipitation varies by altitude, aspect and exposure. The precipitation is bimodal, falling in the short rains of October to December and the long rains of March to May. Total annual precipitation depends on the success of the short rains, and the onset, intensity and length of the long rains. In the study area, this can vary from 1,000–1,500 mm in the highlands to 700–900 mm in the lowlands. There is clear evidence, over the last 40 years, that temperatures have risen and precipitation has declined. More importantly, as the precipitation has declined, it has been accompanied by an increase in variability both across years and seasons (CEEST, 2007).

The Chagga, the people who live on the slopes of Kilimanjaro, have over the last century evolved a complex system of agroforestry gardens located at altitudes of 1,000–1,800 m above sea level. Trees 10–30 m tall shade bananas, which in turn shade coffee bushes. Ground cover includes herbs, beans and a variety of root crops, including yams (Soini, 2005; Hemp, 2006). On lower slopes where rainfall is less, some distance from their gardens, they plant maize and beans or, in very dry places, finger millet and cowpeas. It is, however, the gardens that are the centre of their livelihood system. The Chagga obtain food and a range of natural resources, especially wood, on which their family economies depend. These agroforestry systems are under threat from a range of drivers.

First, the population has increased from around 600,000 in the 1960s to around 2,000,000 today (Government of Tanzania, 2002). Second, this population increase has been accompanied by a significant diet change from bananas to maize as the key carbohydrate. Third, there is no longer any open savanna left on the lower slopes onto which they can expand their maize farms, and they are restricted on moving up the slopes by a combination of local government decisions that seek to preserve open space between the gardens and the higher montaine forest in order to help define the National Park – a major tourist attraction. Fourth, coffee production, the major cash crop from the gardens, has declined rapidly over the last 20 years, with output almost halving, reflecting a similar fall in real prices available from the world market. Finally, the gardens themselves are watered by a communal irrigation system that is now competing with the growth of commercial irrigated farming, including cut flowers for Europe (CEEST, 2007). Collectively, these pressures mean that the vital ecological services that the Chagga gardens provide in the Kilimanjaro catchment area are under threat.

The Chagga have always been a resourceful people. In the aftermath of the Second World War, they established a coffee cooperative that, among other things, paid for secondary schooling and university for their children. Following Independence in 1961, many moved into government and parastatal jobs, and this tradition has continued in local, regional and national labour markets (Coulson, 1982). Nearly all Chagga households have off-farm income from either formal employment or business activities. Other Tanzanians regard them as a relatively wealthy group because of their natural resource endowment and entrepreneurial activities. But there is real poverty and recurrent food insecurity.

Food insecurity is strongly gendered (Shariff, 2007). Women have lost control of the resources that were traditionally their income, particularly food crops. Timber products, coffee, honey and livestock were male income products but, with a collapse in the value of these products, not least from deforestation, men have moved into the women's realm. More importantly, especially for widowed or divorced women, loss of land entitlement and the poor protection offered by land law means that their entitlements are limited. Despite the proliferation of women's groups and their involvement in non-governmental organizations (NGOs), their future, if they do not receive remittances from their children, is bleak (Shariff, 2007).

Agricultural extensification is constrained by a lack of land availability on the slopes of Kilimanjaro (Hemp, 2006). Conventional agricultural intensification, by mechanized monocropping, is impossible because of the steepness of the slopes and the three-dimensional multicropping garden system. Intensification of the agroforestry system by recognizing its environmental service role in maintaining water quality, perhaps eventually financed through the Clean Development Mechanism, coupled with coffee rehabilitation that includes both production and processing to maximize local benefits, offers some hope. In terms of climate adaptation, returning to a banana diet would help, as maize suffers much more under drought conditions on the lower slopes and cannot be grown successfully on the higher slopes. Even if it were possible, this is unlikely to occur spontaneously among the Chagga people or any other groups in eastern and southern Africa.

For the Chagga themselves, increased variability in precipitation, which causes droughts – leading to food insecurity, is not the greatest threat to their livelihoods. Insecure employment markets, fluctuating foreign exchange rates and declining global coffee prices are experienced and expressed as a great threat to livelihoods. Their immediate coping mechanism is to cut the larger trees for sale, to sustain their local livelihood. This response may well jeopardize their longer-term adaptation requirements, not least because it lowers the atmospheric water content on Kilimanjaro leading, in turn, to less snow accumulation and run-off (Kaser et al., 2004). The fieldwork concluded that there is no simple or single causal factor in the pressures faced by the Chagga people. Beyond declining markets, there is a real threat to the Kilimanjaro catchment system since, without water, there will be no Chagga gardens.

As the case study demonstrates, people often experience simultaneous pressures, and climate change may not be perceived as the greatest of these. A clear conclusion that emerges from detailed fieldwork in Tanzania is that adaptation to global market signals is perceived as more immediately pressing than adaptation to climate change.

4. Indirect adaptation

Adaptation – and the broader climate change problematique – can be described as a 'wicked problem', where the answers are incomplete, contradictory and set against changing requirements; other examples include globalization, political instability, urbanization and HIV/AIDS. Climate adaptation is a problem where large groups of individuals have to change their mindsets and behaviour. One consequence of this is that many of the adaptations must be seen as indirect (Rittel and Webber, 1973). In a further exploration of the nature of 'wicked problems', Richey (2007) lists ten characteristics:

1. There is no definite formulation of the problem.
2. There is no exit strategy from the problem.
3. Answers are not true or false, but better or worse.
4. There is no immediate solution and no ultimate test of a solution.
5. Any intervention in a wicked problem counts significantly because there is no opportunity to learn by trial and error.
6. Wicked problems do not have a well-defined set of potential solutions.
7. Every wicked problem is unique.
8. Every wicked problem is a symptom of another wicked problem.
9. The logic of explanation of a wicked problem determines the solution.
10. Planners must be liable for the actions they generate in responding to a wicked problem.

Necessarily, in response to 'wicked problems', it is often 'indirect' adaptations that occur as a by-product of some other livelihood support or coping mechanism that increase resilience to climate hazards in the short term for poor people. Examples of 'indirect' adaptation include diversified cropping strategies; increasing food security through higher income or more secure access to productive land; and improving access to safe and reliable water and sanitation, energy, education and employment.

Some of the characteristics of indirect adaptations are listed below.

- Indirect adaptations are not a specific response to the impacts or risk of climate change. Without food or water, for example, a person is unlikely to prioritize climate risk or benefit fully from any other forms of intervention until basic needs are met.

- Indirect adaptations may or may not increase the resilience of those experiencing chronic and absolute poverty to the additional pressures induced by increasing climatic hazard.
- Indirect adaptations are effective in the short term as – theoretically – they more accurately reflect the immediate needs of poor people and communities.
- Indirect adaptations can enhance the effectiveness of some forms of planned climate adaptation strategies, such as community-based disaster preparedness.

Looking at the range of indirect adaptations, it is obvious that they are a programmatic rather than a project-based response. Indirect adaptation to climate risk is a necessary, but not a sufficient, condition in moving beyond poverty. Many forms of adaptation are necessary but not sufficient in moving towards sustainable development while averting climate risk and disaster. It is clear that it is no longer plausible to proceed as if the global poverty crisis exists in isolation of climate change (Baer et al., 2007) and it is also vital to ensure that short-term adaptations do not preclude longer-term sustainable livelihoods.

5. A programmatic response from a poverty alleviation perspective

The economics of dealing with climate change – both adaptation and mitigation – must be addressed at the level of macro-economics (Stern, 2007; UNDP, 2007). The recognition that climate change requires a macro-economic or programmatic approach means that linking climate change to the global poverty alleviation programme is a useful way forward. The IPCC estimated the macro-economic costs for mitigation to stabilize the global climate ranges up to 5.5% of global GDP (IPCC, 2007).[1] The *Stern Report* estimated that if no action is taken to address climate change, then damages could cost between 5% and 20% of global GDP, while estimating that the cost of action to stabilize the climate and adapt to existing climate change would only cost around 1% of global GDP (Stern, 2007).

In the past, one radical climate change position has been 'Contraction and Convergence', which proposed an emission allowance on a per capita basis (Aubrey, 2001). However, to date, Contraction and Convergence is based on per capita emissions on a national scale that essentially prevents any consideration of the often significant wealth disparities within national borders.

Global poverty alleviation must be the starting point of any global climate change agreement. This is not only because the world's poorest people are most vulnerable to the additional impacts of climate change and variability, not only because they are least responsible for climate change, but also because they are the least able to adapt. Ultimately, averting dangerous climate change, stabilization of atmospheric GHG concentrations – at whatever level – requires that annual emissions be brought down to more than 80% below current levels while simultaneously protecting the development aspirations of those least responsible for climate change (Baer et al., 2007).

The Greenhouse Development Rights Framework builds upon, and is a potential route through, the stymied UNFCCC negotiations on 'common but differentiated responsibilities' (Baer et al., 2007). It is based on the 'Polluter Pays' principle that is already well established in most OECD (Organisation of Economic Cooperation and Development) countries since the 1970s. The Framework proposes an annual global 'middle-class income' development threshold of $9,000 (Purchasing Power Parity value) below which people bear no responsibility for curbing their (carbon) consumption. It is assumed that, below this income, people are 'surviving' rather than 'consuming' and are therefore exempt from per capita calculations that quantify national mitigation and adaptation obligations.

By exempting the poorest people, this allows meaningful consideration of the 'common but differentiated' national obligations that are faced by all countries, while preventing the obfuscation of the stark disparities in wealth present within both poor and rich nations.

Consumers above the global middle-class income level of $9,000 would bear the responsibility to pay the incremental costs of adaptation and clean technology 'leapfrogging'.

The $9,000 value has been proposed in order to draw a transparent and equitable income level beyond which is defined a collective and individual responsibility for implementing a 'global emergency programme' to avert catastrophic climate change. This global income level guarantees that those least responsible, and least able to adapt to climate change, are not locked into a poverty future. It also provides a platform for developing countries to join the negotiations without the risk that by so doing they will potentially retard their economic development prospects for the future.

The Greenhouse Development Rights Framework estimates that it would cost between 1% and 3% of global GDP to avert catastrophic climate change in an equitable fashion. Based on the proposed 'Capacity and Responsibility Indicator', in terms of national responsibilities for the global burden of costs, the USA would bear around one-third, the EU would bear around one-quarter, China would bear less than one-fifteenth, and India less than one three-hundredth. The indicator is important because it considers national obligations towards funding a global climate change initiative based upon the size of population enjoying a lifestyle above and beyond the global middle-class threshold.

The Framework also argues that in order to reduce emissions and decarbonize energy futures in developing countries, there needs to be financial, technological, political and institutional support given by the industrialized world (Baer et al., 2007). Technology 'leapfrogging' is an essential component of attaining global emissions reductions of over 80% and stabilizing the climate below a 2°C increase. In order to contribute towards poverty reduction and sustainable livelihoods, this technology 'leapfrogging' will need to address the lack of access and control over new and old technologies by the poorest people (O'Brien et al., 2007). It is also imperative that consumers above the global middle-class level financially support adaptation and emissions mitigation in the developing world, while the richer industrialized nations simultaneously reduce their structural reliance on fossil fuels (Baer et al., 2007; Smith, 2007).

6. Conclusions

This article used a case study to explore the links between climate change and poverty alleviation, arguing that it is the poverty alleviation challenge that is the priority, particularly in developing countries. Using the case study, we explored how direct and indirect adaptation is driven by issues beyond solely climate change. Trying to link climate change adaptation to project development through notions of additionality of cost because of climate impact does not carry sufficient leverage to simultaneously address poverty alleviation and climate change. It is suggested that, rather than micro-economic project management, a broader macro-economic frame be established, politically working on from the *Stern Report* towards the Greenhouse Development Rights Framework to address both mitigation and adaptation on a global scale.

Note

1. These models do not currently take account of non-technical options such as lifestyle changes.

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