

# Adaptation to climate change and desertification: Perspectives from national policy and autonomous practice in Malawi

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This article explores the ways in which the interlinked challenges of climate change and desertification are managed in Malawi<sup>1</sup>. It examines the adaptations outlined in national policy to address desertification and climate change (in accordance with international commitments to the United Nations Convention to Combat Desertification and the United Nations Framework Convention on Climate Change) as well as the local autonomous adaptations being undertaken at household level. While policy efforts to address desertification and climate change share some common ground, they appear to be poorly mainstreamed into broader development processes at the national level. At the same time, many agricultural and livelihood adaptations outlined in national policy focus primarily on rural areas rather than embracing the rural–urban flows of people and money, identified as vital in the local-level analyses. Given current in-country migration patterns and Malawi's rapid urbanization, this is an important oversight. A more integrated approach is necessary within national policy to consider rural and urban areas and their interlinkages, and play a stronger facilitating role in supporting local autonomous adaptations. This is vital if adaptation efforts are to contribute to wider development goals and have a greater impact on increasing overall resilience to environmental and climate change.

Keywords: adaptation; climate change; climate policy; desertification; Malawi; urban agriculture

## 1. Introduction

Desertification and climate change are closely linked at the biophysical level through drought, land cover changes, fire, and other climate and biological feedbacks (see Chase et al., 2000; Sivakumar and Ndiang'ui, 2007). They are also related through their socio-economic impacts on people's livelihoods and well-being (Parry et al., 2007). Although it has become increasingly apparent that climate change and desertification are likely to continue into the foreseeable future, the precise impacts of these phenomena are uncertain. To date, the downscaling of Global Climate Model (GCM) projections (e.g. Hewitson and Crane, 2006) into Regional

Climate Models (RCMs) has failed to provide greater levels of confidence in projections of future climate change scenarios (IPCC, 2007). There are several regional climate models for predicting African climate on seasonal to decadal scales, but they still show many limitations. Coarse-scale models suggest increased climatic uncertainty for southern Africa, particularly with regard to future temperatures, rainfall and wind patterns (IPCC, 2007). Yet, it remains unclear whether these tendencies reflect short-term weather patterns that are typical characteristics of the regional climate (Tennant and Hewitson, 2002) or whether they represent longer-term trends (Bie et al., 2007). Similarly, land degradation and desertification are driven

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by climate alongside other multiple factors and processes operating across a range of scales (e.g. soils, hydrological processes, markets, trading patterns, governance, technology, etc.) (Lambin et al., 2002). This also adds to the uncertainty of future impacts, particularly in light of a changing climate. Despite this, it is vital to adapt to and prepare for future climatic changes, as well as to try to reduce vulnerability to any shocks and stresses that may be experienced through land degradation and desertification. The implementation of adequate policy adaptations is also important due to the knock-on effects that desertification and climate change may have on other sectors such as health, food security and water.

In accordance with Agenda 21, the need for adaptation has been recognized at the international level and enshrined in multilateral environmental agreements, including the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD). At the same time, local populations are not helpless victims of environmental change (Few, 2003) and they often undertake autonomous adaptations to manage change and prepare for the future. This article focuses on Malawi as a case study to consider the relationship between local autonomous adaptations to climate change and desertification practised at the household level and those driven by international and national policy. An assessment is made of the appropriateness and degree of mutual support that is provided both vertically (across local to national levels) and horizontally (at national level between different ministries dealing with climate change and desertification, and at local level between different types of autonomous household adaptations). First, this article examines the international policy context in which national-level policy adaptations are taking place. Background information is then provided on the Malawi case study, followed by documentary thematic analysis on the country's policies and strategies on climate change and desertification. Official documents are then compared with published field research and primary data detailing local autonomous adaptations, in

particular relating to agriculture and migration in both rural and urban areas. The analysis permits identification of ways in which national policy could be more supportive to local autonomous adaptations in Malawi, and highlights instances in which more synergetic policy efforts to address climate change and desertification across sectors could be beneficial.

## **2. Malawi in the international policy context of climate change and desertification**

The primary tool for international action to address climate change is the UNFCCC, which has two main approaches: mitigation and adaptation (Klein et al., 2007). This article focuses on adaptation, which refers to a process of deliberate change, often in response to, or anticipation of, multiple pressures and changes that affect people's lives (Nelson et al., 2007). Since 2001, adaptation has been institutionalized at the international policy level through National Adaptation Programmes of Action (NAPAs) and National Communications to the UNFCCC. The development of NAPAs is a requirement under the UNFCCC for each of the world's 49 least developed countries (LDCs). NAPAs should engage local stakeholders in the policy process and take into account existing coping strategies at the local level, building upon them to identify priority activities for which further delay could increase vulnerability or lead to higher adaptation costs at later stages (Stringer et al., 2009). The 49 LDCs (33 of which are located in Africa) and their status with regard to NAPA development (as of May 2009) are presented in Table 1.

The principal international institution for addressing desertification is the UNCCD. Like the UNFCCC's NAPAs, parties to the UNCCD that declare themselves affected by desertification are required to develop National Action Programmes (NAPs).<sup>2</sup> NAPs should highlight the key challenges that each affected country faces in relation to desertification and drought, presenting a strategy through which these challenges will be addressed (Stringer et al., 2009).

**TABLE 1** Current status of NAPA and NAP development at the international level for the world's 49 least developed countries (2009)

Country (in alphabetical order)	Data of NAPA	Data of NAP
1 Afghanistan	–	–
2 Angola	–	–
3 Bangladesh	2005	–
4 Benin	2008	2000
5 Bhutan	2006	–
6 Burkina Faso	2007	2000
7 Burundi	2007	2005
8 Cambodia	2007	–
9 Central African Republic	2008	–
10 Chad	–	2000
11 Comoros	2006	–
12 Djibouti	2006	2000
13 Equatorial Guinea	–	–
14 Eritrea	2007	2002
15 Ethiopia	2008	2000
16 Gambia	2008	2000
17 Guinea	2007	2006
18 Guinea-Bissau	2008	–
19 Haiti	2006	–
20 Kiribati	2007	–
21 Laos	–	2000
22 Liberia	2008	–
23 Lesotho	2007	2000
24 Madagascar	2006	2001
25 Malawi	2006	2001
26 Maldives	2008	–
27 Mali	2007	2000
28 Mauritania	2004	2002
29 Mozambique	2008	2002
30 Myanmar	–	2005
31 Nepal	–	2004
32 Niger	2006	2000
33 Democratic Republic of the Congo	2006	2006
34 Rwanda	2007	–
35 Samoa	2005	–
36 Sao Tome and Principe	2007	–
37 Senegal	2006	2000
38 Sierra Leone	2008	–

Continued

**TABLE 1** Continued

Country (in alphabetical order)	Data of NAPA	Data of NAP
39 Solomon Islands	2008	–
40 Somalia	Not a party	–
41 Sudan	2007	2002 and 2006
42 Tanzania	2007	2000
43 Timor Leste	–	–
44 Togo	–	2002
45 Tuvalu	2007	2006
46 Uganda	2007	2000
47 Vanuatu	2007	–
48 Yemen	2009	2000
49 Zambia	2007	2002

Notes: Countries in italics are located in Africa.

Source: Data are compiled from www.unfccc.int and www.unccd.int.

As Table 1 shows, several vulnerable countries are yet to formally define their adaptation priorities within national policy, but this does not mean that adaptation is not taking place. Rather, it demonstrates that actions to manage the impacts of climate change and desertification have not yet been fully absorbed within policy (Klein et al., 2007).

Under both the UNFCCC and UNCCD, countries must regularly report to the international community on the progress being made to implement these agreements. For the UNCCD, affected country reports are expected to provide a description of the strategies put into place to combat desertification. For the UNFCCC, reporting requirements are different for Annex I and non-Annex I Parties. However, national communications normally include information on 'national circumstances, vulnerability assessment, financial resources and transfer of technology, and education, training and public awareness' (UNFCCC, 1994) as well as information on emissions and removal of greenhouse gases.

The texts of both the UNCCD and UNFCCC show some consideration of the need for synergy and mainstreaming in their

implementation and highlight clear links to other environmental problems (e.g. biodiversity loss) and development targets (e.g. the Millennium Development Goals) (Huq et al., 2004). However, while the interlinkages are acknowledged at the international level, it is recognized that mainstreaming and integration of these challenges is more difficult to execute within national policies. Kok and de Coninck (2007) identify four reasons why this may be so. First, they suggest that the rapid proliferation of multi-lateral environmental agreements has led to the development of a variety of different regimes, each with their own goals, approaches, institutions and rules. Such diversity means it is increasingly challenging to harness synergy without causing conflict with the objectives and approaches of other agreements. Second, the architecture of current international policy frameworks, each with separate organizational structures, does not facilitate mainstreaming and synergy. Each agreement has its own vested interest and this can result in a disparate approach to decision making and a lack of cooperation. Third, they argue that different communities and actors have different understandings of the issues, resulting in different priorities. This is further compounded by the uncertainty associated with the impacts of both challenges. Finally, efforts to address climate change and desertification may inherently conflict with the goals of other policy sectors and, indeed, efforts to address climate change and desertification may conflict with each other. How these challenges identified by Kok and de Coninck (2007) play out in Malawi is considered throughout the article.

The next section provides context to the Malawi case study, before considering the key national policy adaptations to address desertification and climate change. The academic literature and unpublished primary data collected by one of the authors of this article are then examined to ascertain whether the national policy adaptations in Malawi support the autonomous local adaptations carried out in practice by the country's rural and urban households.

### 3. Malawi case study

Malawi is situated in south-east Africa, along part of the East African Rift Valley between latitudes 9° and 18°S, and longitudes 33° and 36°E, and provides an excellent case with which to explore adaptation challenges in more detail. The Malawian government first met its obligations to the UNCCD by producing a NAP in 2001. This was informed by the National Report presented to the UNCCD Conference of the Parties in 1999. Since then, further updates have been presented to the UNCCD Committee for the Review of the Implementation of the Convention in 2002 and 2004. The Malawi government has also developed a NAPA (2006) and has submitted two National Communications (2001 and 2009) in accordance with UNFCCC requirements.

Malawi is considered poor 'even by African standards' (Orr et al., 2009) and per capita GNI sits at US\$230 (World Bank, 2008). Infant mortality rates are high, the average life expectancy is 37 years and 52% of the population is classed as living below the poverty line (GOM, 2006). Malawi's economy also relies heavily on international donor aid (GOM, 2008). Indeed, the country received considerable international donor attention following droughts and famine in 2001–2002 (Devereux, 2002; Orr et al., 2009). Much of Malawi also suffers from extensive land degradation problems (UNEP, 1997), partly as a result of poor policy. For example, erratic agricultural pricing policies distorted incentives for rural farmers to adopt crops capable of reducing soil erosion losses (Barbier, 2000) while there remains a void in terms of policy support for rapidly growing urban and peri-urban farming communities (Mkwambisi, 2009). Almost 3 million hectares of the country are semi-arid or dry sub-humid, with drought both common and largely unpredictable. Approximately 90% of the country's 13.6 million inhabitants rely on rain-fed, subsistence agriculture to feed their families and sustain their livelihoods (GOM, 2006). The population is therefore particularly vulnerable to desertification and climate change, especially through resulting impacts on

water and food security. Projected climate change scenarios suggest that Malawi is likely to experience higher temperatures and greater rainfall variability in the future (IPCC, 2007). Indeed, changes in current weather patterns as observed by the Malawi Meteorological Service include higher temperatures, delayed and shorter rainy seasons, and increased intensity of rainfall, all of which can increase the potential risk of desertification and land degradation.

Maize is the country's dominant food crop, grown typically on small holdings of 0.2–3 ha in rural areas (Ellis et al., 2003), while most of the agricultural land within the cities of Lilongwe and Blantyre is used for maize production (Kwapata et al., 2001; Mkwambisi, 2008, 2009). Pressures on land continue to increase with agricultural expansion, environmental degradation and persistent population growth, particularly in urban parts (GOM, 2006). Indeed, the increased vulnerability of rural communities has resulted in significantly greater numbers of people moving to urban areas. According to the most recent draft of Malawi's Second National Communication to the UNFCCC (GOM, 2009), all the country's major cities have experienced large population increases over the last ten years due to rural–urban migration. Lilongwe's population has grown by 50% since 1998 to the present 669,021 people, overtaking that of Blantyre, which has a current population of 661,444 (GOM, 2009). This is putting pressure on the urban land resource to produce sufficient food for the population, while poverty headcounts indicate that over 50% of urban dwellers are poor (GOM, 2005). At the same time, the Malawi NAP estimates that in 2001, approximately 3 million of the country's 13.6 million inhabitants were affected by desertification and land degradation.

### **3.1. Adaptations at the national policy level in Malawi: Desertification**

Malawi's NAP (GOM, 2001) presents a predominantly neo-Malthusian description of

desertification within the country, citing poverty, a heavy reliance on natural resources, low land availability and rapid population increases as some of the main drivers (and consequences) of the problem (Table 2). Despite this explanation of the root causes of desertification, the NAP text does emphasize its cross-cutting nature, particularly in relation to problems of food security, water and sanitation, renewable energy, forest products and services, and environmental and indigenous knowledge (GOM, 2001; Table 2). This indicates that the importance of strategies to address desertification is at least recognized for other sectors.

Actions proposed to address desertification and land degradation within the NAP are considered in the framework of eight main programme components: (1) food security; (2) water resources management and development; (3) renewable energy; (4) deforestation; (5) environmental management; (6) indigenous knowledge systems and technologies; (7) institutional arrangements; and (8) funding arrangements (GOM, 2001). Many of these efforts focus on adaptations relevant to the agricultural sector, which is seen as increasingly important given its role in sustaining both livelihoods and food security.

Key specific policy adaptations that are proposed include changes to crop and livestock varieties, livelihood diversification through increased public sector investment and training of communities in vocational skills, education of farmers and communities in natural resource management through training to improve land husbandry techniques, provision of irrigation services, better food processing and marketing, and shifts to non-food crops such as *Jatropha curcas*, a biofuel crop. Links are made throughout the country's NAP (and National Reports) to other national policies and strategy papers (e.g. Poverty Reduction Strategy Paper; National Environment Action Plan; National Forestry Policy and Strategy; Land Policy; Water Resource Management Policy; Natural Renewable Energy Policy; and the Malawi Agricultural Sector Investment Plan). However, it is interesting to observe that climate change is mentioned only four

**TABLE 2** Drivers of desertification outlined within the Malawi NAP (GOM, 2001) and their links to other key issues

Drivers of desertification	Food security	Water scarcity	Deforestation
Rapid population growth	X	X	
Declining landholdings	X		
Traditional practices	X		
Environmental factors (climate change)	X		
Civil unrest	X		
Maladministration and legal and institutional constraints	X	X	
Poverty	X		X
Macro-economic forces	X		
Catchment encroachment (by settlements)	X		
Poor land use and management practices	X	X	X
Agrochemical use	X	X	
Lack of public awareness		X	X
Loss of indigenous knowledge and practice			X
Lack of alternative energy sources			X

times within the 24-page NAP: once in relation to key environmental issues addressed by the National Environment Action Plan, twice in relation to a lack of safe drinking water caused by water scarcity and drought, and once in the context of reforestation efforts, where it is stated that synergy with the other Rio conventions is needed in selecting appropriate tree species for planting. Substantive links between the two issues of desertification and climate change are not at all explored, neither at the biophysical nor the socio-economic level. Strategies outlined in the NAP instead primarily address the human drivers and developmental aspects of desertification, with climate change viewed largely as a compounding factor rather than something to be addressed in tandem. As such, the horizontal synergy that could be harnessed by addressing desertification and climate change in a

coordinated manner appears largely untapped according to the NAP and the country's National Reports.

### **3.2. Adaptations at the national policy level in Malawi: Climate change**

The Malawi NAPA under the UNFCCC takes a similar approach to the NAP in terms of the priorities it identifies (Table 3), with many priority adaptations to climate change clearly linked to food security, livelihood resilience, agriculture and water management. However, while these have direct relevance to and impacts on efforts to combat desertification, they are not explicitly presented as yielding such benefits and, indeed, desertification is not mentioned at all within the NAPA text.

The proposed agricultural adaptations in the NAPA present a key area in which synergy could be harnessed for both desertification and climate change challenges. These include, for example, land-use changes (including shifts in cultivated land area; crop type and crop location) and changes to crop management (through increased use of irrigation water and mineral fertilizers applied in combination with organic manure; control of insect pests, weeds, parasites and diseases; soil drainage and erosion control; improvements to farm infrastructure; use of improved and high-yielding crop varieties tolerant to drought and diseases; and improvements in crop husbandry and agronomic practices<sup>3</sup>). Despite mention of food security in both the NAP and NAPA, these agricultural adaptation efforts are not presented in terms of their cross-cutting value for multiple sectors. Instead, national policy adaptation strategies seem to relate to discrete issue areas.

This brief synthesis of our documentary analysis indicates that the different (desertification and climate change) regimes are addressing similar challenges at the national level but through different channels. While Kok and de Coninck (2007) suggest that this can create the potential for conflict, the NAPA and NAP show a general



**TABLE 3** Priorities outlined in the Malawi NAPA (GOM, 2006)

<i>Priority area</i>	
1	Sustaining life and livelihoods for the most vulnerable communities
2	Enhancing food security and developing community-based storage systems for seed and food
3	Improving crop production through the use of appropriate technologies
4	Increasing resilience of food production systems to erratic rains by promoting sustainable dimba <sup>a</sup> production of maize and vegetables in dambos, <sup>b</sup> wetlands and along river valleys
5	Targeting afforestation and reforestation programmes to control siltation and the provision of fuelwood, and for their benefits, such as sources of alternative cash income
6	Improving energy access and security in rural areas (e.g. through extension of the rural electrification programme, energy-efficient stoves and development of ethanol-based stoves)
7	Improving nutrition among rural communities (e.g. through the promotion of fish farming, rearing of small ruminants and nutritional supplements for children and the sick)
8	Disseminating bed nets in high-incidence malaria areas
9	Developing food and water reserves for disaster preparedness and response
10	Developing community-based wildlife ranching and a breeding programme for Nyala <sup>c</sup>
11	Developing and implementing strategies for drought preparedness, flood zoning and mitigation works
12	Developing technologies to mitigate climate change
13	Providing standby power generation facilities
14	Managing forest fires in collaboration with communities
15	Developing small dams, and other storage facilities, to mitigate flooding, to harvest water and to initiate community-based fish farming and breeding

<sup>a</sup>Dimba are vegetable gardens.

<sup>b</sup>Dambos are seasonal wetlands.

<sup>c</sup>Nyala is a type of antelope found in much of southern Africa.

convergence of objectives and adaptations, even if the current institutional structures do appear to promote vested interests and neglect to facilitate cooperation. The danger is thus considered not to be conflict but rather a duplication of efforts of the different ministries responsible for

developing and enacting the NAP and NAPA, leading to the inefficient use of already limited resources (Sporton and Stringer, 2007). This point is returned to in greater detail in the discussion.

### **3.3. Autonomous household adaptations at the local level in Malawi**

Analysis of the local autonomous adaptations from the literature shows greater tendencies towards integration than those adaptations proposed within policy. This is because households appear to adapt to multiple (aggregate) stresses in the context of an array of different drivers, needs and aspirations, operating over a range of time and spatial scales (cf. Stringer et al., 2009). The literature indicated that adaptations are often linked to livelihood goals and agricultural production. In particular, households in rural areas place an emphasis on agriculture as a route through which to attain food security and income (see Dorward and Kydd, 2004). This correlates well with the emphasis on agricultural adaptations in Malawi's NAPA. Indeed, many examples can be found where rural communities have adapted their agricultural practices to dynamic soil quality and climate conditions as well as to seasonal weather regimes and changing yields (GOM, 2001, 2008; Orr and Mwale, 2001; Ellis et al., 2003; ActionAid, 2006; Bryceson and Fonseca, 2006; Potts, 2006). For example, Vermeulen et al. (2008) have shown through their work in Mulanje District that with a later rainy season, farmers not only have been planting later, but also have switched to fast-maturing cultivars. They are now planting a minimum of two crops, mixing cereals with pulses and tubers and often intercropping with nitrogen-fixing pigeon peas. Diverse crops and relay-cropping through the rainy season are becoming an effective means of ensuring at least some harvest, while field pea and pigeon pea have replaced beans as crops with a higher tolerance of drought conditions. In addition, community organizations have developed partnerships with the local tea

industry to further diversify rural livelihoods (Vermeulen et al., 2008).

Other production-oriented adaptations are nevertheless tending to demonstrate less positive results (Bie et al., 2007). Diversification into the growth of burley tobacco as a cash crop with a view to increasing agricultural outputs has been problematic, largely due to fluctuations in market prices and quality issues (Ellis et al., 2003), while despite the higher yields from long-duration maize, more specialized maize production has been shown to take place to the detriment of the planting of subsidiary crops (sorghum, millet, legumes and vegetables). This may render the farming systems significantly less diverse and more vulnerable to drought and the adverse weather conditions projected by climate models (IPCC, 2007). Furthermore, Snapp and Slim (2002) identify the need for cultivars that require low levels of labour input: an increasingly critical consideration due to declining rural labour linked to the HIV/AIDS pandemic (Bryceson and Fonseca, 2006). Such local-level findings have important implications for the effectiveness of national policy implementation, as socio-economic considerations are vital in shaping the on-the-ground success of policy adaptations.

The autonomous adaptation of diversifying livelihood strategies beyond arable agriculture also appears to be of growing importance in building local-level resilience to desertification and climate change (Ellis et al., 2003). Diversification into small livestock production (e.g. keeping goats or chickens) can offer increased food security under adverse climate conditions and act as a useful buffer to the shocks and stresses delivered by drought and desertification (Mkwambisi, 2009). The development of microenterprises is also evident. For example, handicrafts have been marketed to tourists in Mangochi, Salima and Nkhata Bay districts along with locally produced gin in the Blantyre Shire Highlands (Orr and Mwale, 2001). This was facilitated by market liberalization in the early 1990s. However, unless further policy support is forthcoming, it is unlikely that in areas of extreme

poverty smallholder farmers will have access to the funds and assets needed to exploit these opportunities at a larger scale. Such support could take the form of economic mechanisms such as targeted subsidies (which the Malawian government is already providing for fertilizers to support maize production) or the provision of low-interest loans, incentives and microcredit facilities. However, cultural barriers may hinder the uptake of such measures, particularly of loans and credit.

*Ganyu*, a 'longstanding form of *ad hoc* casualised rural labour' (Bryceson, 2006, p. 174), refers to an arrangement in which labour is exchanged for cash or in-kind food payment, providing mutual benefits to both the labourer and the contractor. Bryceson (2006) nevertheless warns that *ganyu* may be deepening impoverishment by widening the gap between those who can afford to purchase *ganyu* labour and those who rely on selling it, particularly in times of food shortage. She suggests that in many cases it has resulted in exploitative contractual terms, as well as reduced time for labourers to tend their own agricultural assets. It has also been linked to the spread of HIV/AIDS with the incorporation of 'transactional sex' into *ganyu* contracts (Bryceson, 2006). While overall *ganyu* represents a key adaptive strategy, particularly for poorer households, its local value is yet to be afforded policy recognition and support within the NAPA or the NAP. More thorough consideration of *ganyu* within policy could help to reduce the exploitative terms under which some contracts operate, and could reduce the risks for those engaging in this adaptation.

The migration of one or more members of the household to other rural areas (intra-rural migration), to urban areas (rural-urban migration) and abroad is also becoming more commonplace as an adaptive strategy (Potts, 2006), particularly in areas where population pressures on land and poverty act as additional push factors alongside climate change and desertification. Recent primary data collected by one of the authors from Chikwawa District in July 2009<sup>4</sup> illustrate some of the push-and-pull



factors driving migration. Preliminary results show that many farmers have experienced climate change impacts such as low crop yields (90%), frequent drying of rivers (62%), flooding (52%), destruction of ecosystem integrity (41%) and loss of biodiversity (21%). The study further suggested that migration is the main adaptation strategy being adopted to manage these impacts, especially by younger people. Of the five villages covered by the study, those that were close to the main river (Mwanza River) saw greater numbers of people leave than those that were far from the river. This is perhaps because those closest to the river were most dependent on it, and therefore most vulnerable to its drying. Most of the migrants moved to urban areas of Lilongwe and Blantyre to seek employment as an adaptation to the increasing risks they faced from climate change, desertification and other threats. Table 4 synthesizes the rankings of different push factors driving migration from the area. It is clear that the drying of rivers followed by crop destruction and land shortages are the most important push factors. However, Table 4 also reveals that the majority of migrants do not leave because of other climate-related impacts such as flooding and diseases. Some households have remained in their communities due to the adaptation opportunities brought by flooding, such as winter crop production and fishing. Cultural links were also reported as a factor encouraging people to stay put.

**TABLE 4** Ranking by heads of households of factors that push people to migrate ( $n = 50$ )

Rank	Push factor
1	Drying of rivers
2	Crop destruction
3	Land shortages
4	Conflicts
5	Lack of employment opportunities
6	Flooding
7	Disease

Source: Authors' own data.

Often those migrating to other rural areas within Malawi (intra-rural migration) go to locations where their relatives live, and so they use their social networks to help them adapt. Rural–urban migration occurs as people seek employment opportunities in the towns and cities, and matches findings reported by Potts (2006). Temporary migration abroad is also important. Labour shortages at harvest time can be problematic in neighbouring Mozambique, so Malawians take advantage of this opportunity.

Table 5 summarizes further data collected from Chikwawa in July 2009, and illustrates some of the pull factors that attract people to migrate. Employment and business opportunities are some of the key factors pulling people to migrate. These factors thus work in tandem with the push factors in Table 4. While climate change and desertification play an important role in people's decisions to migrate, it is clear that migration as an autonomous adaptation strategy is highly complex and the result of the interplay between a variety of factors.

Given the extent of migration, remittances from migrants form an important part of rural households' overall livelihood strategies, particularly for female-headed households (Bryceson, 2006; Bryceson and Fonseca, 2006). However, migrants to Malawi's urban areas face different risks from climate change and desertification compared with their rural-dwelling counterparts. Moser and Satterthwaite (2008) consider that key urban issues driven by climate change are likely to

**TABLE 5** Ranking by heads of households of factors that pull people to migrate to cities ( $n = 50$ )

Rank	Pull factor
1	Employment opportunities
2	Business opportunities
3	Education
4	Better housing
5	Health facilities
6	Peer pressure

Source: Authors' own data.

include large concentrations of poor and vulnerable populations living in informal settlements with inadequate sanitation; water shortages; lower rural demands for goods and services; and higher food prices. As a consequence, key adaptations for urban populations (both existing and migrant) also include livelihood diversification, often incorporating urban agricultural activities to address the need for food security (e.g. Mougeot, 2005; Hovorka et al., 2009). Peri-urban households appear to be taking advantage of this demand, generating income through the sale of their land, while the engagement of waged labourers on agricultural plots belonging to other people is another increasingly important source of cash income. However, the strategies within the NAP and NAPA appear to mainly target rural areas and neglect urban parts, despite the potential that local urban-based adaptations have for addressing problems such as food security. Such a rural bias is apparent at the international level too, with little mention of urban and peri-urban areas in either the IPCC's reports or the UNCCD's issue papers.

Field research by Mkwambisi (2008) involved analyses of primary interview data collected from 330 households in Lilongwe and Blantyre and shows a production average of 228 kg/capita of cereal/year (or cereal equivalents) – considerably more than the 181 kg/capita that the Government of Malawi recommends as a typical food budget. This suggests that, on average, urban households could support themselves entirely on the food they produce on urban agricultural plots without the need to rely on the significant flows of food into urban markets from the surrounding rural hinterlands, provided production is sustainable. Mkwambisi (2009) further suggests that urban agricultural production can also help to absorb urban organic waste, which can be added to the soil to increase organic matter, improve water-holding capacity and maintain nutrient levels, thus helping to prevent land degradation and desertification. This reduces the need for expensive external inputs such as fertilizers or new higher-yielding crop varieties and is most beneficial to the

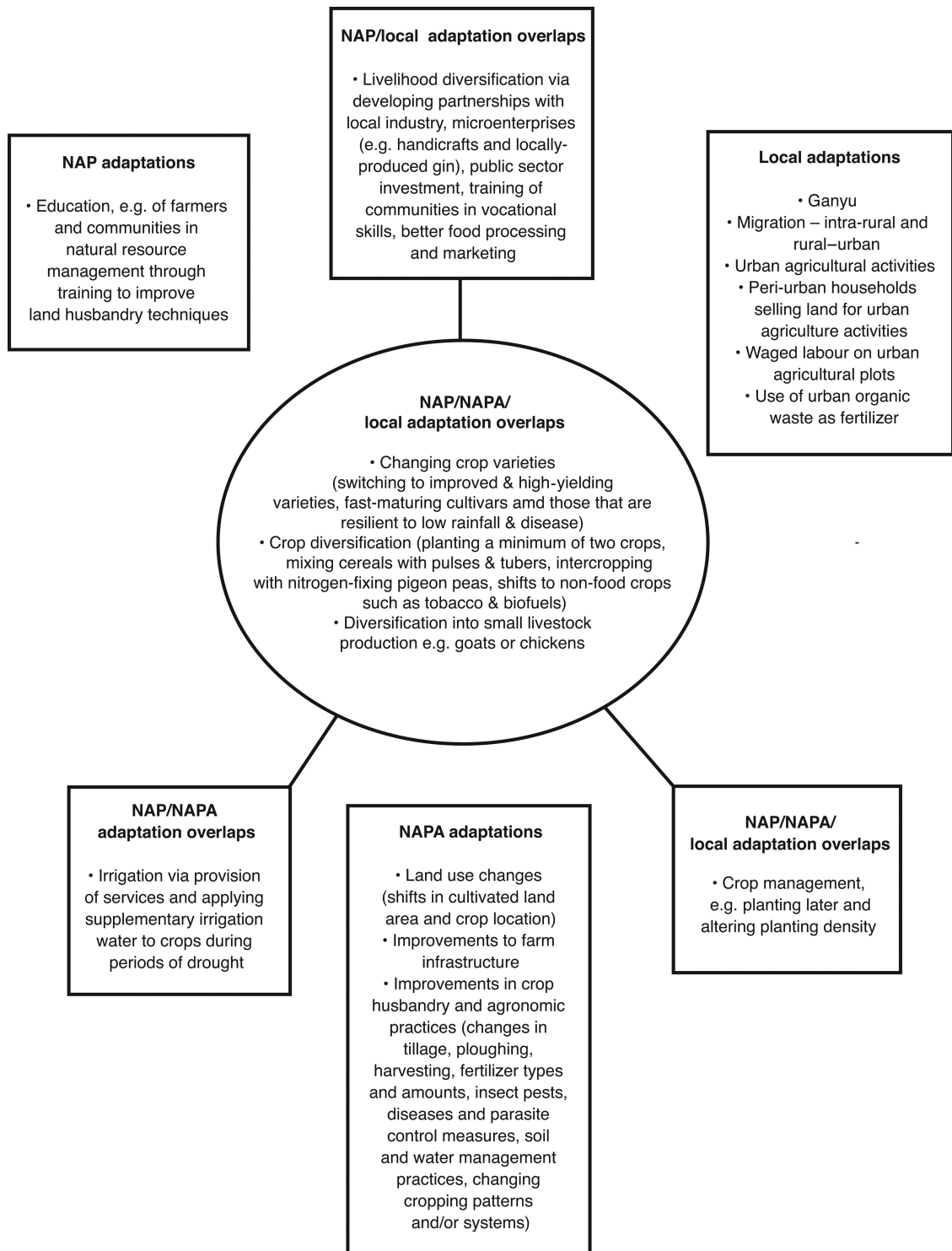
growing number of urban poor. Policy support for such action nevertheless is lacking. Furthermore, a considerable amount of agricultural land in the cities is devoted to producing maize for relatively well-off households. This suggests that the promotion of alternative crops such as vegetables could be advantageous for urban dwellers, and could address many of the priority areas identified in the NAPA and NAP while simultaneously helping the poorest members of society (who are often those least able to adapt).

#### 4. Discussion and conclusion

Our analysis has highlighted both differences and similarities between national policy efforts to address climate change and desertification, and between national policy and examples of local-level household autonomous adaptive practice (Figure 1).

It is encouraging to observe that the national policy and autonomous household-level adaptive strategies identified in our analysis show some degree of common ground, and that further support for and refinement of many of these adaptations have emerged in Malawi's National Communications and Reports to the UNFCCC and UNCCD. For example, subsistence and cash crop diversification are adaptations already being undertaken autonomously, yet they are also detailed within policy, and therefore may prove to be both effective and acceptable to local populations (Stringer et al., 2009). However, Ellis et al. (2003) note that planting of crops such as groundnuts and sweet potatoes (encouraged by both the NAP and NAPA) is relatively limited, covering only 10% of the country's cultivated area, due to a heavy bias towards growing maize. This is still the case today.

While the local autonomous adaptations we have identified suggest that rural and urban populations are interlinked through flows of migrants and remittances, both the NAP and NAPA retain a bias towards rural areas as the focus of their efforts. This suggests that vertical linkages between adaptations at different levels



**FIGURE 1** Synthesis of local climate change and desertification adaptations and those proposed in the Malawi NAP and NAPA  
*Notes:* Linked boxes show overlaps between adaptations; non-linked boxes show adaptations only noted in that particular source.

(i.e. between national policy and local autonomous practice) would benefit from greater harmonization. Although the neglect of urban areas is probably due to the fact that the majority of Malawi's population is currently based in rural parts (and is largely dependent on the natural resource base at that), the rapid urbanization currently under way requires extensive anticipatory action if preparations for the impacts of climate change and desertification are to be adequate. Indeed, the United Nations (UN, 2005; UN Habitat, 2006) reports that the percentage of urban residents in sub-Saharan Africa as a whole is expected to rise from 39.7 to 53.5% between 2005 and 2030. This will bring new and severe challenges for assuring household food security and access to basic services, independent of climate change and desertification threats (Haddad et al., 1998; Armar-Klemesu, 2000).

Moreover, the current policy infrastructure neglects to recognize the horizontal links between rural and urban parts and fails to capitalize on the successful adaptations already taking place, particularly with regard to urban agriculture. Despite some urban agriculture provisions within the Town and Country Planning Act (GOM, 1998), there are no practical regulations to guide and support urban food production within the context of climate change and desertification. Similarly, the NAP and NAPA largely neglect to specify a role for local government in defining and supporting adaptation strategies for urban areas more generally (Moser and Satterthwaite, 2008), which also indicates a weakness in vertical integration. Such problems are not unique to Malawi. Commentators working in many other countries report the need for Local Adaptation Programmes of Action and City Adaptation Programmes of Action to drive forward the advances within NAPAs and increase their relevance for urban parts (Satterthwaite et al., 2007).

Despite the gaps between policy and practice identified above, Malawi's UNCCD NAP and UNFCCC NAPA show a fair degree of issue convergence, particularly with regard to the cross-cutting issues of food security and water

management. Education, in the form of awareness-raising about potential options, also features strongly in both documents, especially in terms of increasing the effectiveness of new crops and techniques in enhancing adaptation capacity. Similarly, both texts emphasize diversifying livelihood options, either through cultivation of different and more suitable crops or through other employment opportunities. This matches the autonomous adaptation efforts that households currently practise. Nevertheless, an important difference lies in the policies' approaches to promoting diversification: the NAP proposes to attract greater private sector investment, while the NAPA tends to focus on improving market access links. In future, opportunities for complementarities could perhaps be found whereby both sources of funding could be tapped in a synergetic manner. This difference reflects broader processes at the international political level, whereby the UNCCD is currently targeting greater private sector buy-in (see e.g. Global Mechanism, 2009), while the UNFCCC (and mitigation of and adaptation to climate change in general) already has significant private sector investment and national support, particularly in relation to technology transfer (see UNFCCC, 2007).

Despite the above convergences, institutional structures to support efforts to address the challenges of desertification and climate change are not well integrated horizontally at the national level. If a more integrated institutional structure could be developed, this would enhance the possibilities for reaching shared goals as well as providing improvements to efficiency and effectiveness (Kok and de Coninck, 2007). At present, the Malawi National Focal Point to the UNFCCC is based in the Environmental Affairs Department, while the National Focal Point for desertification is based in the Department of Forests. Despite the emphasis on agriculture and food security within the NAP and NAPA, the Ministry of Agriculture and Food Security is separate from the Ministry of Lands, Environment and Natural Resources. Some of these problems have been acknowledged (e.g. it is recognized that

practical coordination between the Ministry of Agriculture and other ministries responsible for sectors such as Forests, Economy Planning, Development, Local Government and so on could be strengthened), and first steps towards greater collaboration are being initiated (Evans Njewa, 2009,<sup>5</sup> pers. comm.). However, there is a sense that the Environmental Affairs Department needs to be more proactive in acting as a nodal point so that all the relevant ministries can better understand and champion climate change and desertification issues.

Text within the Malawi NAP mentions a vast array of legislation and other policies and strategies under the overall umbrella of the National Environment Action Programme (NEAP), formulated in 1996. While such cross-referencing and mention of the NEAP shows promise that inter-linkages are starting to be appreciated, the institutional infrastructure for horizontal mainstreaming and harnessing synergy at the national level is currently lacking. This makes it difficult for the rhetoric of integration to become reality, with many decisions relevant to climate change and desertification likely to be taken with minimal consideration of the respective NAPA and NAP. In doing so, it could result in missed opportunities with regard to minimizing contradictions and trade-offs (see Kok and de Coninck, 2007).

Overall, this analysis has indicated that better horizontal alignment of policy adaptation strategies at the national level could help facilitate local autonomous adaptations and improve vertical integration, particularly if cooperation and communication can be enhanced horizontally among relevant ministries. This is considered to have been successfully achieved in countries such as Tunisia (Global Mechanism, 2002), where efforts to address desertification are now embedded in the country's social and economic development plans, and are supported with related policies in all relevant sectors (Hajje and Ben Khadra, 2006). Such integration in Malawi could be further facilitated by proposed moves towards more coordinated reporting requirements at the international level. This would

help to identify points of conflict and synergy in addressing climate change and desertification and could help to foster shared understandings of the two issues. Ultimately, this could result in more coordinated action and better integration both horizontally and vertically, reducing conflict with other policy sectors (cf. Kok and de Coninck, 2007) and helping increase resilience overall. Nevertheless, even if greater resilience can be fostered, it should be noted that the effects of climate change and desertification are likely to be at scales or frequencies that are greater than those which local communities are accustomed to, and potentially, therefore, too great for them to adjust to in an autonomous manner alone. As such, in addition to supporting local autonomous adaptation, national policy may also need to develop larger-scale adaptation strategies (such as nation wide early warning or food security systems) (see e.g. Wilhite et al., 2007).

This article considers the interlinked challenges of desertification and climate change and the ways in which they are being addressed at the local level and within national policy in Malawi. The current trend towards urbanization in Malawi highlights the need to define a clear role for local governments in urban areas to better engage them in the adaptation process. In doing so, this could provide multiple benefits across a range of different sectors and enhance support for the local practices and adaptations that rely on existing rural–urban linkages. Households are going to continue to adapt autonomously whatever happens in policy (notwithstanding that the existing policy context will have already facilitated and possibly prevented some local-level autonomous adaptations). However, the effectiveness of these efforts could be enhanced if mutually supportive and appropriate institutional and policy adaptations are in place. Policy adaptations could also assist people in making more permanent/longer-term adjustments, helping them to avoid some of the lock-ins caused by the existing dominant structures (Patt and Gwata, 2002). Furthermore, not all adaptation options are necessarily compatible



with one another. As suggested by Stringer et al. (2009), research is needed to investigate (in advance) the likely aggregate effects of combining anticipatory adaptations to reduce trade-offs and promote win-win situations. There thus remains an urgent need to further examine policy strategies and assess their supportiveness for local-level autonomous adaptations. As observed by Mertz et al. (2009, p. 747), 'policies on adaptation must be very carefully devised as they find themselves in a complex reality of societies that are poor and vulnerable for a wide range of reasons. They must be an integral part of a development policy process that ensures mainstreaming of adaptation in all relevant sectors of society while not forgetting the other multiple drivers'.

## Notes

1. An early draft of this article was presented at the session New Boundaries for Development? Adaptation to Climate Change in southern Africa, Joint Conference of the African Studies Association in Germany (VAD) and the Swiss Society for African Studies (SGAS): Frontiers and Passages, Freiburg and Basel, 14–17 May 2008.
2. It is up to each country to decide for itself whether it is affected by desertification or not. For the purposes of this article, we have assumed that all LDC signatories to the UNCCD would consider themselves 'affected' by desertification. This is a reasonable assumption, given the LDCs' push to have a UNCCD in the first place. Consequently, we would expect all African signatories to prepare a NAP.
3. This is proposed to be achieved via (i) changes in tillage, ploughing, harvesting, fertilizer types and amounts, insect pests, diseases and parasite control measures, soil and water management practices, time of planting and planting density, (ii) crop diversification, (iii) altering planting dates, (iv) changing crop varieties to those that are resilient to low rainfall, (v) changing cropping patterns and/or systems, (vi) changing fertilizer application strategies and (viii) applying supplementary irrigation water to crops during periods of drought.
4. Methods of data collection included household questionnaires ( $n = 50$ , of which 34 were women and 16 were men) and focus groups ( $n = 5$ ). The overall population of Chikwawa District is 400,000. While this research necessitated only a small sample size, the results are similar to those in the literature (e.g. Potts, 2006) and so may be considered broadly representative of Malawian experiences in general.
5. Desk Officer for Climate Change in the Department of Environmental Affairs.

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