

Climate Change and Rural Livelihoods in Guruve District: A Gender Analysis

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Abstract

Studies on climate change have treated men and women with a similar eye. As a result, the widening gaps between men and women due to climate change have not been empirically studied. This is despite the fact that at the household level, the ability to adapt to changes in the climate depends on control over land, money, information, credit and tools, low dependency ratios, good health and personal mobility, household entitlements and food security, secure housing in safe locations, and freedom from violence which are not readily accessible to women (Lambrou & Piana 2006; UNFPA 2009). As such, women are often deemed as less able to adapt to climate change than men since they lack most of the above listed items. Furthermore, they generally have less education than men and are thus less likely to be reached by extension agents. This article presents findings from a study carried out in Guruve district to answer two objectives, that is, to investigate the gender differentiated impacts of climate change on rural livelihoods which are mainly agriculture based and to establish the roles of women and men in local food systems in adapting to a changing climate. The study was carried out over a period of a month using observation, key informant interviews, and focus group discussions. The study established that climate change has effects on crops, livestock and human health due to long dry spells and water shortages. These effects have resulted in an extra burden on women in several ways: where households relied on draught power (because of animal diseases and deaths, most have resorted to conservation agriculture and mulching which are labour intensive); women engage in alternative livelihood strategies due to persistent crop failure; women bear the brunt of caring for the sick (mainly due to malaria); women travel long distances to fetch water

and feed for small livestock. Women have however, managed to make ends meet in spite of the limited access and control over resources including lack of information. They have used their individual and collective agency in dealing with climate change. Women's support groups have played a very important role in labour provision in the face of high demands for labour. Support has also come from various agencies in the area of crop and livestock production and this has somehow eased the burden on women. This article concludes that climate change, like all aspects of social life is gendered and widens gaps between men and women. Outside interventions therefore need to take cognizance of these gender differences.

Keywords: climate change, livelihoods, gender

Introduction

Climate change is predicted to reduce crop yields and food production in some regions, particularly the tropics (European Commission 2009). Developing countries have suffered most from the direct effects of climate change. Zimbabwe is listed amongst the range of countries that have experienced production declines as a result of climate change. The other countries listed are Morocco, Australia, Venezuela, Chile, Greece and India (European Commission 2009). Rain-fed agriculture, which covers 96% of all cultivated land in sub-Saharan Africa, has been particularly hard hit. It is projected that by the 2020s, yield from rain-fed agriculture in some African countries could be reduced by as much as 50%. Agriculture is linked to climate change in close and complex ways. Agriculture is affected by climate change; but as the world's largest industry agriculture itself contributes significantly to greenhouse gas emissions (estimated by the IPCC at about 60% of anthropogenic methane and about 50% of nitrous oxide). Little has been done in terms of research in Zimbabwe to establish the gendered nature of climate change impacts and adaptation strategies. The objectives of the study from which this article is derived were therefore to investigate the gender differentiated impacts of climate change on rural livelihoods which are mainly agriculture based and to establish the roles of women and men in local food systems in adapting to a changing climate. The article considers gender and access to resources in the context of the Sustainable Livelihoods

Framework (SLF) in order to contextualize the various climate change adaptation strategies. This is in view of the fact that adapting to climate change depends on control over resources such as land, credit, information and education linked to the various forms of capital identified by the SLF that women more often than not do not have due to patriarchy and associated gender roles and relations.

Statement of the Problem

There has been lack of empirical evidence on how climate change has impacted on agriculture especially for people that rely heavily on it for livelihoods such as women. Women are responsible for 70 – 80 percent of household food production in sub-Saharan Africa, 65 percent in Asia, and 45 percent in Latin America and the Caribbean (IPCC 2007). They achieve this despite unequal access to land, information, and inputs such as improved seeds and fertilizer. This study therefore offers empirical evidence on gender and climate change effects on livelihoods with particular reference to agriculture-based livelihoods. It also considers the gendered nature of adaptation strategies using the case of Guruve, one of the districts in Zimbabwe.

Study Methodology

The study was carried out in ward twenty-two of Guruve district, in Zimbabwe. The study was informed by and relied on a qualitative methodology in order to get a comprehensive picture of gender relations as they relate to climate change adaptation strategies. The study made use of direct observation, in-depth interviews with key informants as well as focus group discussions with male and female farmers to gather the required data. Observation provided rich information on the rural people's adaptation strategies by gender. The people were observed as they were engaged in their daily activities. In depth interviews were conducted with officers from the veterinary department, the department of livestock production, the Grain Marketing Board, the District Administrator and Non-Governmental Organisations (NGOS) including the Lower Guruve Development Association and the Sustainable Agriculture Technology (SAT) supporting

farmers in adapting to climate change. Qualitative data was analysed using the common themes approach and the accounts are interspersed with quotes from the people studied.

Conceptual Framework

Using the Sustainable Livelihoods Framework, it is clear that when people lack assets, they are vulnerable to shocks of various natures. A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living: a livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets ... both now and in the future (Carney 1998:4), or ... while not undermining the natural base (Scoones 1998:5), or including both these last statements (Farrington *et al.* 1999:1). Ellis (2000) in his definition of a 'livelihood' has placed more emphasis on the *access* to assets and activities that is influenced by social relations (gender, class, kin, belief systems) and institutions. He has excluded any reference to capabilities or sustainability. A person or family's livelihood is sustainable when they can cope with and recover from stresses and shocks and maintain or enhance their capabilities and assets both now and in the future, without undermining environmental resources (Neefjes 2000).

The livelihoods approach is based on the premise that the asset status of the poor is fundamental to understanding the options open to them, the strategies they adopt to attain livelihoods, the outcomes they aspire to and the vulnerability context under which they operate (Ellis 2000). DFID distinguishes five categories of assets (or capital) – natural, social, human, physical and financial (Carney 1998). Human capital includes health, nutrition, education, knowledge, skills, capacity to work and capacity to adapt. The labour capacity is in most cases there but the skills and education is limited. Natural capital includes land and produce, water resources, forest products and environmental services. Social capital includes networks and connections (patronage, neighbourhoods, kinship), relations of trust and mutual support, formal and informal groups, common rules and sanctions, collective representation, mechanisms for participation in decision-making and leadership. Physical capital includes infrastructure (transport-roads, vehicles, shelter and buildings, water supply and sanitation, energy, communications), tools and technology (tools and equipment for production,

seed, fertilizer and pesticides, traditional technology). Financial capital includes savings, credit/debt (formal, informal, NGOs), remittances, pensions and wages. Political capital involves the political will by those wielding political power to allow certain activities as people adapt to climate change. The argument presented in this article is that adaptation to climate change especially by women is affected by a diversity of assets, amount of assets and a balance between the assets.

The Sustainable Livelihoods Framework also considers the vulnerability context, which discusses the shocks, seasonality and trends and changes (population, environmental changes, technological changes, markets and trade). Policies (of government, of city council and local authorities) institutions (political, legislative and representative bodies, civil society and membership organisations, NGOs) and processes (decision-making processes, social norms and customs, gender) also affecting the way men and women adapt to climate change. Access, control and use of assets are influenced by the institutional structures and processes. An understanding of structures and processes provides the link between the micro (individual, household and community) and the macro (regional, government, powerful private enterprise) (Scoones 1998; Carney 1998; Ellis 2000). Such an understanding helps to identify areas where restrictions, barriers or constraints occur and explain social process that could impact on livelihood sustainability (Scoones 1998).

The Sustainable Livelihoods Framework is particularly useful because it assists in conceptualising the interrelationships between the different dimensions of people's lives and helps to reveal the complexity of livelihoods in the context of climate change. The basic argument is that the quality and sustainability of livelihoods depend on the strategies people develop to manage their 'capital assets', which are by and large under their control, within an environmental and institutional context, over which they may have little control.

Research Findings

Characterisation of Climate Change

Both men and women observed that there has been a change in climate. They made reference to the fact that seasons are no longer predictable (this is mainly a factor of rainfall unpredictability). Unpredictability of rainfall was

the most consequential change, both in terms of time (arriving early or late) and quantity (when present either insufficient or too abundant). Secondly, windy conditions, droughts and long dry spells were observed as frequent in the area. Both men and women had observed these changes in the past ten years. Changes in temperature and therefore seasons had a detrimental effect as rainfall and temperatures no longer coincided for appropriate planting conditions. Men and women interviewed concurred that they could no longer use the traditional calendar of seasons they were accustomed to. Respondents during a focus group discussion concurred with one female respondent who argued,

the planting season starts late and it quickly stops, which never used to be. In the past, the first rains would come in October, which is when Zimbabwe Junior Certificate (ZJC) students were writing their examinations. The ZJC students would finish examinations and come to help their parents with planting because the first rains were experienced during the time of their examinations in October. *Kana dai form 2 yainyorwa nhasi uno vana ava hapana chavanenge vachiita nekuti mvura yava kunonoka kunaya mazuva ano* (If the ZJC examinations were to be re-introduced the candidates will be idle after the examinations because the rains are coming very late).

In the study area, more men than women had better access to climate change information because of three reasons:

- a) they had platforms to discuss climate change issues;
- b) they had time to listen to news at shopping centres
- c) they had access to newspapers

As one male respondent in a focus group argued, *'vanamai vashoma vanomwa, kuhwahwa ndiko kunowanikwa ruzivo rwacho* (few women take beer, the issues are discussed when people meet for beer).

This same situation was observed in Bangladesh in 1991 following the cyclone and flood. It is stated that warning information was transmitted by men to men in public spaces but rarely communicated to the rest of the

family, as a result, the death rate was five times as high for women as for men (Brody *et al.* 2008). Information is therefore an asset/capital that is critical in coping with climate change for which attempts should be made to ensure women and other categories of people have access.

Impacts of Climate Change

Climate change has impacted negatively on livelihoods. Due to the fact that these livelihoods are gendered, the effects have been felt differently by men and women. Odingo (1990) noted that the poorest members of society which tend to be the most dependent on agriculture for jobs and income are worse affected by the seasonal shifts in precipitation patterns and increase in temperatures. Climate change has impacted on human and animal health as well as crops, thereby directly affecting women due to their gender roles. Unpredictable changes in disease vectors and pests significantly impacts human and animal health (EAA-press release 2008). In the study area, respondents pointed to the increased cases of human diseases especially malaria. As a result, the burden of caring for the sick by women has been increased. This comes on top of caring for People Living with HIV considering that the HIV statistics are high in areas with growth points such as Guruve (Human Development Report 2003). Care work eats into women's productive time.

Climate change has been associated with increased animal diseases and deaths as well as reduced cattle herds in Guruve. Due to low rainfall, rivers dry up early and women and children have to walk long distances with animals to find water. This affects both animal and human health. Low rainfall also means that there is not enough pasture for animals that include cattle, goats and pigs which are kept in the area. Lack of pasture affects animal health. Furthermore, respondents noted that cattle were not reproducing as fast as they used to do due to changes in the rainfall patterns that have affected the drinking and feeding systems of the livestock. When cattle do not get enough grass and water their health is affected and this affects their reproduction as well as the products they produce for human consumption. Calves also die from diseases and so the herds remain very small. The health of the calves is also affected when the cows do not eat the right fodder and also if they lack adequate water. This implies low production of milk because the health of the cows is compromised.

Mukaka unodzivirira kuzvirwere zvakasiyana siyana, kana mhuru ikashaya mukaka utano hwayo hunenge hwava panjodzi. (Milk contains antibodies which help the calf fight diseases, if a calf does not get enough milk it is at a high risk of contracting diseases).

The common diseases in cattle that respondents named are red water, three day sickness, black leg, lump skin and foot-and-mouth. In interviews, most respondents reported reduced cattle herd due to 'strange' diseases. As one male small scale farmer pointed out,

I used to have fifteen cattle, now I have four. I lost the rest to a disease called red water.

As a result, where there is reduction in cattle herd, this affects people's livelihoods especially those dependant on agriculture. Because people rely on cattle as draught power for agriculture, where the herd is reduced, women labour is the alternative. This is because women comprise the bulk of the rural populace and farmers in Zimbabwe. They constitute 53% of agricultural labor in Zimbabwe (FAO 2006).

Furthermore, traditionally cattle belong to men and these are assets that people fall back on in times of crisis. The reduction in cattle herd has affected the male asset and power base. This results in stress for men who are socialized to believe that cattle are for them and that manhood is defined by ownership of a cattle herd.

Climate change has also affected livelihoods diversification as it presents limited livelihoods options mainly due to shortage of water. This implies reduced income as the income sources shrink. As a result food security is compromised as it is estimated that food costs account for approximately 60% of household income expenditures in Zimbabwe. Most women in the area used to rely on all year round gardening but with shortage of water, gardening has become a seasonal activity. Furthermore, women, largely responsible for water collection in the community, are more sensitive to the changes in seasons and climatic conditions that affect water quantity and accessibility that make its collection even more time-consuming.

Small scale farmers noticed decline in crop production and yields due to climate change since 2000. Countrywide, the main crops produced by smallholder farmers - maize, small grains, groundnuts, and cotton, among

others have also shown reduced output. In communal areas such as Guruve, maize yields halved from approximately 1.3 million tonnes p.h. in 1986 to approximately 0.8 tonnes p.h. in 2004 (FAO 2007). From a surplus producer of maize, Zimbabwe has become a net food importer during the 2000s.

Climate change has hit agricultural productivity in Guruve directly through drought, pests, diseases as well as by temperature changes that affect plant productivity. While drivers of plant pest change include increases in temperature, variability in rainfall intensity and distribution, change in seasonality, drought, intrinsic pest characteristics (e.g. diapause, number of generations, minimum, maximum and optimum growth temperature of fungi, interaction with the host) and intrinsic ecosystem characteristics (e.g. monoculture, biodiversity) also affect change (European Commission 2009). Emerging pests are often plant pests of related species known as new encounter pests, which come into contact with new hosts that do not necessarily have an appropriate level of resistance, or are plant pests introduced without their biological control agents, in particular, insect pests, nematodes and weeds (FAO 2008e).

Respondents noted an increase in pests and crop diseases, which affects yields. This is worsened by the fact that the farmers who are mainly women do not have the financial resources to procure chemicals, which prevent the spread of pest and diseases. Financial capital is therefore a key dimension in adaptation to climate change. As the European Commission (2009) observed, a number of important natural resources for agricultural and food systems, such as soil, water, and biodiversity have been deteriorating over many years, slowly but steadily undermining ecosystem services and the resilience of agro-ecosystems. A number of examples are given which point to the unsustainability of conventional farming and food systems due to their high energy dependence, high water demand or their adverse environmental footprint. Food security is therefore endangered by constraints such as shrinking water and land resources, increasing biodiversity losses and soil degradation. Gains in crop production were realized after the introduction of conservation farming in 2007.

Due to the unpredictable weather conditions, there has been poor timing in terms of when to plant. In focus group discussions, all respondents pointed out that they receive first rains in December and highest rainfall in the late summer, which was not the case before. Late rains impact on livelihoods mainly due to lack of information on risk prediction, which affect

preparedness. The meteorological department focuses more on weather than risk prediction. Community members however said in the absence of risk predictions by the meteorological office, they make use of indigenous knowledge systems using behaviors of certain animals, birds, tree and plants. One female respondent observed,

kushayikwa kwemvura yakakwana inogutsa zvirimwa kurikutishayisa zano hatichanyatsozivi kuti todii nokuti kare taiziva kuti kana kukapisa zvakanyanga mvura inenge yave pedyo. Asi zvemazuva ano hatichaziva nekuti kukapisa kunobva kwauya chando apo isu tinenge tave kutarisira mvura.mamiriro aita kunze ari kukonzera nzara. (We used to predict that if the temperatures increase it means the rains would be coming soon but the situation is quite different now. After we experience high temperature we suddenly experience very low temperatures whilst we will be expecting rains to come. Shortage of rainfall is resulting in famines).

Climate Change Adaptation

The term adaptation generally refers to actions taken to adjust to the consequences of climate change either before or after impact is experienced. An adaptation to climate change takes place through adjustments to reduce vulnerability in response to observed or expected change in climate and associated extreme weather events of people who rely on climate dependent resources for their livelihoods (Khadhka 2011). Adaptation occurs in physical, ecological and human systems. Adger *et al.* (2008) noted that adaptation involves changes in social and environmental processes, perceptions of climate risk, practices and functions to reduce potential damages or to realize new opportunities. Adaptation strategies range from technological options to behavior change at an individual level. Adapting to climate change depends on the various forms of capital/assets that the Sustainable Livelihoods Framework makes reference to. These are financial, natural, social, physical and human. It is clear that when people lack assets, they are vulnerable to shocks of various natures including climate change. Men and women have responded differently to climate change due to the differential roles and access to assets critical for livelihoods. Adaptation has

also been supported by various agencies in the communities as will be discussed in this article.

Coping with Animal Diseases and Shortage of Pasture

As a result of shortage of pasture due to dry conditions, men in the majority of cases gather maize stover and grass soon after harvesting which will then be used as feed in the dry season.

‘Kana takohwa tinochengeta mashanga echibage tozopa mombe muchirimo apo sora rinenge rava shoma’ (After harvesting, the maize stover is gathered and stored as fodder, it is given to cattle in the dry season when there will be insufficient grass for feed).

During the dry season the grass does not shoot and natural fodder becomes very necessary as it supplements the animal nutrient requirements. Giving cattle maize stover is also a way of controlling their movement and the movement of people tending them who happen to be men and boys although women also play a role. During the dry season cattle travel long distances in search of grass and water. If a farmer gives cattle stover they will always come back home expecting more. Stover is given with salt to make it more nutritious and this improves the health of the animals.

‘Utano hwemombe dzinopiwa mashanga hurinani pane dzisingapiwi mashanga.’ (Cattle which are given fodder appear healthier than those which are not given supplementary feeds).

Maize stover is the commonest type of natural fodder the farmers can use. Forage is sold in shops but very few communal farmers afford it hence it is necessary to gather maize stover which is readily available. Due to climate change and related animal diseases and the increased costs of veterinary medicine, people have resorted to ethno-veterinary practices. The use of aloe vera and soot is common in small livestock.

‘Ruzivo rwemishonga yekurapa huku nembudzi rwakawandira kunana mai asi vana baba ndivo vane ruzivo rwakawanda

rwemombe, mushonga yekurapa mombe vana baba ndivo vanotsvaka' (Women have more knowledge about traditional medicines to treat diseases in poultry and goats but men have knowledge on medicines for cattle).

However, the Veterinary Services Department does not encourage the use of traditional veterinary medicines because of lack of clear standardized dosage instructions. The withdrawal period of such drugs is not clear. Drugs take various periods to leave the animal's blood stream. Furthermore, side effects of such medicines are not known, the overdose or under dose are not known also. In case of overdose there is no remedy to reverse the side effects and these medicines are discouraged. If there is overdose the animal may die and if there is under dose the bacteria or infection will not die and this may build resistance to the disease. The Veterinary Services Department therefore recommends prescribed medicines that are approved by their department.

There has been an increased shift from cattle production to small livestock production due to their resistance to diseases. Most people have shifted to goat and pig production. Small livestock production is also supported by non-governmental organizations in the area such as the Lower Gurove Development Association and the Sustainable Agriculture Technology (S.A.T.). These livestock are given to women and children. Goats and pigs are not hard to tend and fend for. Respondents pointed out that there are very few diseases in goats and pigs compared to cattle. The care of goats is also easy as they can be tied around trees and they feed around the confined area when the farmer is busy. They also multiply easily than cattle because a goat can have two or more kids at the same time. They do not require a lot of water hence one can provide them with water from a bucket; this is an advantage where climate change has resulted in low rainfall. There are very few diseases that affect goats besides tapeworms and some stomach infections, which cause diarrhea. Goats browse some trees, which are not browsed by cattle. This naturally improves their immunity,

'kana nyoka ikaruma mbudzi inogona kurarama asi nyoka iyoyo ikaruma mombe inogona kufa' (if a snake bites a goat it can survive but if that same snake bites cattle it may die).

The aloe vera plant and soot are used to treat the stomach disorders in goats,

Sunungurai Dominica Chingarande

the leaves are crushed and mixed with soot and the goat is made to drink the mixture. This makes goats and pigs easy to look after considering the nature and amount of women's work. Women and children have to find pasture and water for goats and bring it home to the goats at the same time walking through people's homes and fields asking for rotten pumpkins for pigs.

Traditionally women own small livestock (goats, pigs and chickens and rabbits) but due to the increase in diseases in cattle, men are taking an interest in small livestock production (FAO 2003).

Zvinonzi huku, mbudzi nenguruve ndedzanamai kashoma kunzwa kuti baba vane huku dzavowo' (it is said chicken, goats and pigs belong to women, it is very rare to hear that men have chicken).

Small stock belongs to women and large stock belongs to men hence women know about small stock more than men and men know more about large stock. However, with climate change this distinction has been blurred, it can be argued that defining animal ownership as male or female is not static but fluid as men are claiming co-ownership of the small livestock.

Small livestock production has helped women to meet their household needs because they can be easily disposed of. It is easy for people to sell a goat to meet the immediate needs of the household like food, while it is more of a taboo to dispose large stock because of their cultural significance.

Figure 1: A 64 year old woman's pig project



Figure 2: Goats feeding on pasture sourced and brought home



Figure 3: Pumpkin gathered for pigs



Drought Resistant and Plant Genetic Diversity

With reference to crop production, adaptation has taken into consideration the need to increase land productivity, nutrient and water efficiency, stress-tolerance, disease resistance, and to maintain/improve soil fertility. It is advised that in the short-term changing varieties and planting times can help to reduce negative impacts in annual cropping systems (e.g. alternative crops, drought- or heat-tolerant varieties, altered timing of cropping activities). With perennial crops adaptation strategies have to take a much longer perspective (introduction or development of suitable varieties or changes in land-use patterns; new breeding goals to utilise the entire vegetation period or multi-cropping options (Ritter 2008). In Guruve, both men and women have resorted to drought resistant varieties that include millet, sorghum and rapoko. Plant genetic diversity is crucial in sustaining long-term productivity, with genetically uniform systems being extremely vulnerable not only to pests and diseases but also to external shocks under extreme weather conditions.

Intercropping and crop rotation are other methods that have been employed by both men and women to deal with pests and plant diseases. Mitchell *et al.* (2007) also reported that women who are the small scale crop producers in Bangladesh in India, Nepal are also growing drought resistant crops, diversifying crops and at the same time adjusting to the seasonal variations.

Conservation Agriculture

Both men and women have resorted to organic farming techniques such as shallow ploughing, recycling of livestock manure onto arable cropland, composting techniques as well as diversified crop sequences to reduce soil erosion and increase formation of soil humus. This often results in considerable annual carbon gains (between 40 kg and 2000 kg of C per hectare).

The practice of conservation agriculture has become common in Guruve. It is commonly known by the local community as ‘dhiga udye’ (dig and eat) from the basin tillage that is associated with it. One component of conservation agriculture is mulching. One key informant pointed out that mulching burdens women because it is labour intensive. There is division of labour that accompanies mulching. Men cut the grass and collect leaves from

the forest whilst women usually do the digging and spreading of the mulching materials. Due to the labour demands of conservation agriculture and its shortage in the area, women have resorted to labour cooperatives through support groups. This is because women tend to be more closely tied to social networks than men, their social capital proves an important asset in coping with climate change.

Support for Adaptation Strategies

There are a number of players supporting adaptation to climate change. These are the department of agriculture and extension services (AGRITEX), the department of veterinary services, S.A.T, the Lower Gurube Development Association and the Department of Livestock production. It is important to point out that these organizations have avoided gender biases often reproducing assumptions that it is men who are farmers (Gurung *et al.* 2006 in Mitchel *et al.* 2007). As a result, the interventions in the majority of cases are targeting women as beneficiaries.

Conclusion

Climate change has affected men and women in various ways. Despite the fact that the communities know about climate change, there is lack of information dissemination on climate change. This information gap affects women more than men as a result of division of labour. However, by relying on indigenous knowledge for rain prediction, women and men have managed to cope with the impacts of climate change on their livelihoods. Climate change tends to demand more from women in terms of labour, thereby calling for interventions that reduce the demands on women's labour such as the mechanization of conservation agriculture as well as supply of irrigation equipment. Women's capacity to adapt to climate change is affected by lack of access to resources. An improvement in access and control over resources by women strengthens their capacity to cope with climate change.

References

- Beall, J & N Kanji 1999. *Households, Livelihoods and Urban Poverty*. Theme paper 3, Urban Governance, Partnership and Poverty Series. Produced by the International Development Department, School of Public Policy, University of Birmingham.
- CIDA n.d. *Gender Equality and Climate Change: Why Consider Gender Equality when Taking Action on Climate Change?* Quebec: Canadian International Development Agency. Website: [http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/Climate%20change3/\\$file/Gender-2.pdf](http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/Climate%20change3/$file/Gender-2.pdf).
- Gurung, JD & S Mwanundu 2006. *Gender and Desertification: Expanding Roles for Women to Restore Drylands*. International Fund for Agricultural Development (IFAD). Website: <http://www.ifad.org/>.
- IPCC 2007. *Adaptation and Vulnerability Summary for Policy Maker's Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel Climate Change. Website: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.
- IPCC 2001. *Climate Change Synthesis Report: Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- Lambrou, Y & G Piana 2006. *Gender: The Missing Component of the Response to Climate*. USA, Food and Agriculture Organisation. Website: http://www.fao.org/sd/dim_pe1/docs/pe1_051001d1_en.pdf.
- Mararike CG1999. *Survival Strategies in Rural Zimbabwe: The Role of Assets, Indigenous Knowledge and Organisations*. Harare: Mond Books.
- Mitchell, T, T Tanner & K Lussier 2007. 'We know what we need!' *South Asian Women Speak Out On Climate Change Adaptation*. London: Action Aid International and the Institute of Development Studies (IDS).
- Neefjes, K 2000. *Environments and Livelihoods: Strategies for Sustainability*. London: Oxfam GB.
- USAID 2008. *Impacts of Climate Change on Rural Livelihoods in Madagascar and the Potential for Adaptation*. International Resource Group. Website: <http://www.gripweb.org/gripweb/?q=countries-risk-information/disaster-risk-profiles/impacts-climate-change-rural-livelihoods>.

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