# Local innovation in climate-change adaptation by Ethiopian pastoralists

## PROLINNOVA–Ethiopia and Pastoralist Forum Ethiopia (PFE)

## Final report

**by**

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# Table of contents

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Generally, the study is more of a scanning and hopefully it will be an entry point for different organisations to work jointly on promoting local innovation in climate adaptation in pastoral areas of Ethiopia.

## List of Acronyms

| | |
|---|---|
| ASE | Agri-Service Ethiopia |
| CBA | Community-Based Adaptation |
| DPPB | Disaster Preparedness and Prevention Bureau (regional level) |
| DPPO | Disaster Preparedness and Prevention Office (district level) |
| EPE | Environmental Policy of Ethiopia |
| EPARDA | Ethiopian Pastoralist Research and Development Association |
| FSS | Food Security and Safety net |
| GHG | Greenhouse Gas |
| HfH | Hope for the Horn |
| IPCC | Intergovernmental Panel on Climate Change |
| MEAs | Multilateral Environmental Agreements |
| NMA | National Meteorological Agency |
| NAPA | National Adaptation Program of Action |
| NGO | Non-Governmental Organisation |
| NRM | Natural Resources Management |
| PASDEP | Plan for Accelerated and Sustainable Development to End Poverty |
| PFE | Pastoralist Forum Ethiopia |
| PROLINNOVA | Promoting Local Innovation |
| SC–USA | Save the Children–United States of America |
| UNCBD | United Nations Convention on Biological Diversity |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNCCD | United Nations Convention to Combat Desertification |
| UN–OCHA | United Nations Office for the Coordination of Humanitarian Affairs |

# 1. Introduction

## 1.1 Magnitude of climate change

Some facts about global climate change include: increasing temperature (0.74°C increase per annum), melting polar icecaps, uncontrolled forest fires and annual average increase in sea level of 3.1 mm (Spore 2008). Such changes have already had some impacts on the natural equilibrium at the risk of the survival of human beings. It is also assumed that African countries that depend on natural resources and rainfed agriculture are more vulnerable to the risk of climate change. For example, the Intergovernmental Panel on Climate Change (IPCC 2007a) has estimated that, by 2020, agricultural production would decline by 50% in some countries with rainfed agriculture. Similarly, UNEP (2006) has predicted that, by 2025, about 480 million people in Africa could be living in water-stress areas and, by 2085, up to 40% of wildlife species habitat in Africa could be lost. According to Spore (2008), a recent study by the World Bank has also predicted that, with the future trend of climate change, many African farmers will be shifting from crop to livestock production, which might be rational ecologically and economically. The wide range of estimates of climate change using different climate models, which is compounded by the difficulty to perceive small degrees of change, may lead to an underestimation of the big impact to be expected and may delay timely action.

In Ethiopia, it is assumed that the temperature has been increasing annually at the rate of 0.2°C over the past five decades. This has already led to a decline in agricultural production, and cereal production is expected to decline still further (by 12%) under moderate global warming (Ringer 2008). Moreover, it has led to a decline in biodiversity, shortage of food and increases in human and livestock health problems, rural-urban migration and dependency on external support. Factors compounding the impact of climate change in Ethiopia are rapid population growth, land degradation, widespread poverty, dependency on rained agriculture, lack of awareness by policy- and decision-makers about climate change and lack of appropriate policies and legislation (Wondwossen 2008, Daniel 2008, NMA 2007).

In countries like Ethiopia, more than 85% of the people depend mainly on agriculture for their livelihoods, rendering them very vulnerable to climate variability and change. Accordingly, in recent times, a significant number of people in Ethiopia are being affected chronically by drought and/or flooding, leading to deaths and loss of assets and to an appeal for international support. The problem is very serious in the arid and semi-arid areas, especially among the pastoralists.

## 1.2 Causes of climate change

At global scale, the main cause of greenhouse gas (GHG) emissions is from carbon dioxide (70%), primarily from burning of fossil fuel (petroleum) imported from industrialised countries, while the other sources for GHG are methane and nitrous oxide caused by deforestation and agricultural activities, particularly the use of pesticides.

There are historical accounts of many centuries ago indicating that climate variability and change are not recent phenomena in Ethiopia. For example, from 1540 to 1800 AD, 26 major famines and droughts, accompanied by the spread of human and livestock diseases, had been recorded. Similarly, the great Ethiopian famine (1889–92) is known for its epidemics and famine (McKee 2008, Pankhurst 1985).

The famines were due not only to shortage of rain but also to extended or excessive rain. This has many implications. Most important of all, however, is that – because of the long history of climate variability and change – the local people have developed some deep-rooted adaptation mechanisms and competencies. In other words, adaptation to climatic variability is a way of life and nothing new to Ethiopians.

In the other hand, in the past centuries and at present, there is a widespread cultural belief among the rural community (farmers and pastoralists, Christians and Muslims) that drought and famine are acts of God against human sin (McKee 2008, Mesfin 1991, Pankhurst 1985). In this regard, in his famous work on famine and epidemics, Pankhurst underlined that "several subsequent epidemics and famines are mentioned in the literature of the thirteenth and fourteenth centuries which suggests that such outbreaks were regarded as punishments sent down by God" (Pankhurst 1985, p17). This historic account also underlines that, despite such cultural perceptions of the causes of climate variability, the community practised different coping mechanisms, including crop diversification, mobility and migration. Moreover, some Roman Catholic missionaries in the late 19$^{th}$ century had also indicated that the weather was unusually hot, which affected the balance of nature (Pankhurst 1985).

In the arid and semi-arid areas, drought is part of a normal cycle, and pastoralists have developed some strategies to cope with it, such as mobility, livestock species diversity, reciprocity in use of resources, territorial fluidity and social safety nets. However, according to many applied research findings, the vulnerability of pastoralists to drought is very complex and diverse. It is claimed that drought as such is not making pastoralists vulnerable but rather the increasing marginalisation of their drought-response mechanisms (Devereux 2006). Restriction on mobility of people and animals, intensification of conflicts and stricter control of cross-border trade and defective tenure policy are some of the threats (Mebratu 2009, Hesse & MacGregor 2006, Yohannes & Waters-Bayer 2002). Some authors underlined that the prolonged droughts, combined with environmental degradation and increasing sedentarisation, have led to deterioration of pastoral livelihoods (e.g. Ayelew 2001). Others consider the frequency of drought as a crisis of pastoralism and predict that this way of life and production will not be viable; they therefore recommend sedentarisation of pastoral communities (e.g. Devereux 2006).

### 1.3 Coping mechanisms

International conventions such as the United Nations Framework Convention on Climate Change (UNFCCC) assume that developing countries are the victims of climate change and need external solutions in a top-down approach. Moreover, little is known about the rationality of local adaptation mechanisms because of insufficient documentation and awareness (Macchi et al 2008, Pandey 2006, IPCC 2007a). However, there is slowly growing recognition of local adaptation to the changing environment (both environmental and policy changes) in terms of efficiency, effectiveness and sustainability. Recognition of local adaptation is seen as an entry point to strengthen the resilience of local people to climate change. Similarly, the concept of community-based adaptation (CBA) is based on recognition of the competence of grassroots communities to solve their own problems (PROLINNOVA 2008, IISD & IIED 2007, IPCC 2007a).

At global level, different strategies had been suggested to overcome the challenges of climate change. These include reduction in use of fossil fuels and increased use of other energy sources such as atomic power. Yet such strategies are not only expensive but can also have many undesired outcomes (e.g. misuse of power but also

climate change) when utilised by industrialised nations, let alone by developing countries (Green Forum 2008).

In the other hand, in addressing global climate change, there is a shift toward production of biofuels. However, much evidence is emerging of the undesired outcomes of this shift from producing crops for consumption, including the high rate of GHG emissions from biofuels and the process of producing them, e.g. use of nitrate fertiliser, converting grassland or woodland to agrofuel-cropping areas (Spore 2008, Green Forum 2008). This implies that developing countries like Ethiopia need to take a very close look at this evidence before embarking on biofuel production in a big way.

As already mentioned, for many centuries, Ethiopia has been characterised by climate variability and change and, out of necessity, the local people have developed different adaptation strategies. These include early warning systems, indigenous soil and water conservation techniques, diversification of crop and livestock species, mobility, reciprocity, customary conflict resolution etc. Thus, the historical accounts indicate that adaptation had been practised in Ethiopia before the concept of "climate change" was developed (McKee 2008).

### 1.4 Concepts of adaptation to climate change

When dealing with issues of climate change, it is important to understand the different terms used as "packages" in understanding the system. Accordingly, "climate variability" is the fluctuation in climatic parameters from the normal or baseline values, whereas "climate change" is a change in the long-term mean value of a particular climate parameter (Abebe 2008). "Vulnerability" is defined as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity (IPCC 2007b).

According to Burton *et al* (1993), the term "adaptation measures" covers eight categories: bearing losses (doing nothing), sharing losses, modifying the threat and thus preventing effects, changing use, changing location, accessing new research-based technologies, disseminating knowledge through education to change behaviour, and restoration. Others have classified the different forms of adaptation as anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (IPCC 2001).

Adaptation as applied to climate change is a very broad concept, and the concept is defined differently in the literature, as indicated below:

- Adaptation to climate is the process through which people reduce the adverse effects of climate on their health and well-being, and take advantage of the opportunities that their climatic environment provides (Burton 1992).
- The term adaptation means any adjustment, whether passive, reactive or anticipatory, that is proposed as a means for ameliorating the anticipated adverse consequences associated with climate change (Stakhiv 1993).
- Adaptability refers to the degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual change in climate. Adaptation can be spontaneous or planned, and can be carried out in response to or in anticipation of changes in conditions (IPCC 1996).

From these concepts the following major principles of adaptation to climate can be extracted:

- Adaptation is a continuous and learning process.
- Adaptation is a response to actual or expected risks; in other words, adaptation can occur before, during or after any external stimulus or threat.
- Adaptation integrates prevention or mitigation in its process.
- Adaptation can be spontaneous and planned.
- Adaptation can be a practice, management practice or process.
- Climate change has both challenges and opportunities.

This implies that local innovation for climate adaptation needs to be assessed together with the environmental and socio-economic and policy changes. This dynamic process helps also to avoid the trap of romanticising local practices. It also implies that the present scanning of local innovation is only partially addressing the complex and diverse issues of adaptation to climate change.

## 2. Partners in the study

### 2.1 Pastoralist Forum Ethiopia (PFE)

Pastoralist Forum Ethiopia (PFE) was established in 1998 as a local non-governmental organisation (NGO). Currently, it has 23 local and international NGO members working in different parts of Ethiopia. PFE aspires to see empowered, socially and economically developed pastoral communities that enjoy an affluent livelihood, durable peace and social harmony. To realise its vision, PFE focuses on the following major activities:

- Policy research, advocacy and lobbying
- Networking and coordination
- Promotion of good governance and practices
- Partnership and coalition building
- Capacity-building.

PFE is a member of the PROLINNOVA–Ethiopia National Steering Group and is responsible for coordinating the activities related to promoting local innovation and participatory innovation development in pastoral areas of the country (see also website:www.pfe-ethiopia.org).

### 2.2 PROLINNOVA–Ethiopia

PROLINNOVA–Ethiopia (PROmoting Local INNOVAtion in ecologically oriented agriculture and natural resource management) is a national network and partner of PROLINNOVA International. It has a primary goal of enhancing the integration of farmer-led research and development approaches, with a focus on promoting farmer innovation and local experimentation to ensure food security and sustainable resource management into the endeavours of relevant government organisations, NGOs, universities and research and development institutions and thereby make a significant contribution towards the realisation of ensuring food security, sustainable rural livelihoods, poverty reduction and safeguarding the environment.

PROLINNOVA–Ethiopia involves institutions in agricultural research, extension and education and operates through a National Steering Group which currently consists of 17 state and non-state institutions. Agri-Service Ethiopia (ASE), as a secretariat and facilitator of the multi-stakeholder national platform, is responsible for overall coordination of activities of network members, financial administration, contractual agreements and international representation on behalf of PROLINNOVA–Ethiopia (see also website:www.prolinnova.net).

## 3. Objectives of the study

The overall aim of the study is underline the rationale and competence of pastoral community adaptation to the changing environment (ecological and policy changes) to use as a point of departure for development of more sustainable use of resources.

The specific objectives are to:

i. Systematically document the different experiences in local innovation in adapting to climate change
ii. Understand the perceptions of "climate change" in different pastoral communities in arid and semi-arid areas of Ethiopia
iii. Stimulate the documentation of local innovation (processes) at local level
iv. Draw lessons for diffusion, policy influence and shared clarity of concepts.

## 4. Methodology

To be able to understand perceptions of climate change and adaptation processes among pastoralists in Ethiopia, a series of brainstorming sessions were carried out by members of PFE and the PROLINNOVA–Ethiopia secretariat and external advisor. The first approach proposed was to conduct a mini-workshop with some of the NGOs working in pastoral areas and to do the scanning of local innovation by pastoralists with the respective NGOs in their operational areas. However, PFE assumed that this approach of involving the NGOs from the beginning would be a time-consuming process during a period that unfortunately coincided with various other, urgent activities previously planned. The second approach proposed was to do the scanning in some study areas, in consultation with some NGOs working at the grassroots level and to share the findings in a workshop. Given the limited budget and time for the study, the second option was chosen and three study areas were identified:

1. ***Gashamo District***, Somali Region, selected because of its frequent serious droughts;
2. ***Awash Fentale District***, Afar Region, selected because of its chronic problems of conflict; and
3. ***Daasanach District,*** South Omo Zone of Southern Nations, Nationalities and Peoples Region (referred to as Southern Region), selected because of its flooding problems (see Fig. 1).

In each district, some *kebeles* or villages close to the main road were identified in consultation with the district government and experts in NGOs. The choice of villages attempted to address different clans and subclans, majorities and minorities in the specific localities. We drew up a checklist for semi-structured discussions with different groups of community members. With the assistance of the local resource persons, whoever was encountered in the locality at the time of the visit was categorised into groups of elders and leaders, women, ordinary pastoralists, youth and students (male and female). Each discussion group consisted of 3–7 people (see Annex 1).

Some discussions were also held with government and NGO staff working at village, district, zonal, regional and federal level. In addition, a literature review was made on some global and regional issues related to climate change and local adaptation.

During the field visits, the Gashamo area was experiencing a serious drought and motorised water-tankering was being conducted. Similarly, in Awash Fentale, there

were shortages of food and fodder, and the communities were demanding external support. In one woman-headed household visited, a pregnant cow was sick and dying because of the drought. In Daasanach District, because of the cumulative effects of drought followed by flooding, many of the pastoralists had moved with the herds towards Lake Turkana (called Lake Rudolf in colonial times in Kenya), and only some elders and children remained in Southern Ethiopia to be victims of the crisis. Under these circumstances, it was difficult, if not impossible, to have extended discussions with community members.

The first draft of the intermediate report was circulated to different organisations through email prior to the workshop. During the workshop, the major findings were presented and the participants made comments, which were accommodated in this final report (for list of participants, see Annex 2). As an added value, different workshops dealing with climate change were attended, such as the international workshop conducted on November 2008 at the African Union conference centre in Addis Ababa on "Ecological agriculture in mitigating climate and food security", the international workshop on "How can African agriculture adapt to climate change" in December 2008 in Nazareth, and the National Climate Change Conference in January 2009 at the UNECA conference centre in Addis. By and large, the outcomes of the different workshops were skewed to highlight the magnitude of the problems with climate change and less attention was given to communities' competence to adapt to the changing climate.

**Some of the pastoralists consulted**

## 5. Profiles of the study areas

### 5.1 Somali Region

Somali Region consists of nine administrative zones, 44 *woredas* (administrative districts) and 67 urban settlements. The total population is estimated to be more than 3.5 million people, with an average household size of 6.6 people. The livelihood of the people depends mainly on livestock, complemented by rainfed and irrigated crop production.

Gashamo District lies about 400km east of Jigiga, the capital of Somali Region (see Fig. 1), in a semi-arid climatic zone with bimodal rainfall in April–June (*Gu*) and October–December (*Deyr*). Usually, the rainfall is very unreliable in terms of time and

space. Camels, sheep and goats are the dominant livestock in the district. However, with the widespread adoption of *birkas* (in-ground watertanks) and the growth of settlements around them, cattle-keeping is becoming more important.

The population of the district is estimated to be over 130,000 people. The dominant clan in the district is the Issaq, which has many subclans, such as the Haber Awel, Araab, lidagale, Haber Yonis and Haber Jealo. As a survival strategy, most of the households depend on livestock, while the others are involved in petty trade, daily labour, selling *birka* water and remittances from relatives abroad.

Extended drought and food-aid support have become the rule rather than the exception in Somali Region, where more than 25% of the people are chronically food-insecure. Each year, food, fodder and water emergency support is given in the region, yet there is no clear indication whether and how these emergency interventions have supported the adaptation capacity of the community or undermined it. In spite of this support, the livelihoods of the pastoralists are deteriorating over time. The percentage of Somali pastoral households that were "doing well" according to community perceptions has fallen from over 90% in the mid-1990s to about 30% in 2004/5. Moreover, with the increase in poverty during drought periods, also inequalities and divorce have increased. Also the consumption of *chat* (a drug derived from the plant *Catha edulis*) has increased among the male household heads, mainly because of male economic role in the family deteriorated after the loss of livestock (Devereux 2006). The prevailing drought has triggered many women to diversify their economic activities and to engage in petty trade and other small businesses. In the long run, it is possible that economic power in the households may gradually shift in favour of the women.

### 5.2 Afar Region

Afar Regional State in northeast Ethiopia has an area of 9,725,620 ha and borders on four other regional states: Tigray Region in the northwest, Amhara Region in the southwest, Oromia Region in the south and Somali Region in the southeast. It has two international borders: with Djibouti in the east and with Eritrea in the northeast. The altitude of the region ranges from 120m below sea level to 1500m above sea level. In agroclimatic terms, about 85% of the area is classified as arid and the remaining as semi-arid. It has a bimodal rainfall pattern, with a main wet season from July to September and a short wet season from March to April. Annual average rainfall ranges between 200 and 500 mm. The major rivers in the region are Awash, Mille, Kessem and Burkena, while the parks and sanctuaries include Awash, Yangudi and Gewane and Mille-Sardo. The human population of the region is estimated to be 1,493,400 persons, of which over 90% is rural.

Livelihoods in the region are based mainly on pastoralism and agropastoralism, where cattle, sheep, goats, donkeys and camels are reared and different varieties of sorghum and maize are grown in opportunistic cropping. Some people are engaged in petty trade, salt mining and – a more recent phenomenon – charcoal making.

Cross-border and internal conflicts have been serious and chronic problems that have contributed to the prevalence of poverty and vulnerability to climate change. The main conflicts in Afar are those between ethnic groups (Afar vs. Issa-Somali, Afar vs. Oromo, Afar vs. Amhara), the border conflict with Eritrea (a national issue) and some localised inter- and intra-clan conflicts. Recurrent droughts, encroachment of crop farming and invasion weed (*Prosopis julifora*), and the resulting decline in opportunities for herd movement are major causes for the conflicts. Awash Fentale District lies about 200km east of Addis (see Fig. 1) at an interface with highland farmers (Amhara and Oromo), with Oromo and Somali pastoralists, with a state farm and national parks, and with

private investors along the Awash River. Conflicts over resources use between these various actors have contributed to the vulnerability of the Awash Fentale community. The total area of the district is about 180,000ha and its population is estimated to be about 40,360 people

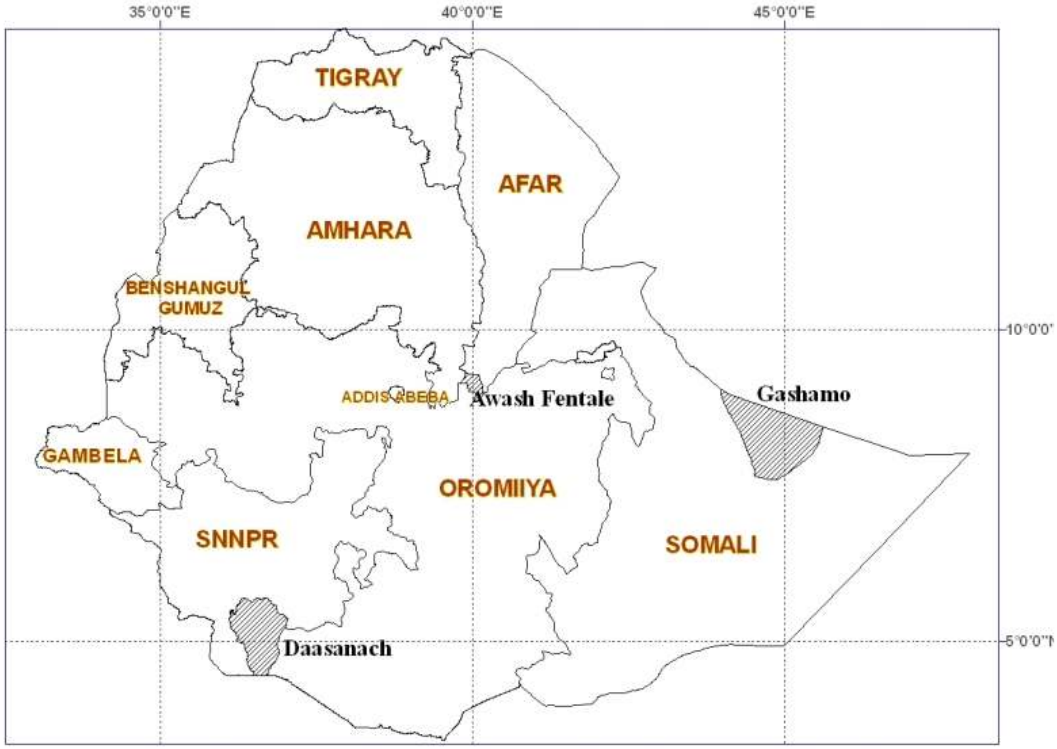



**Figure 1: Location of the study areas**

### 5.3 Southern Region (South Omo Zone)

The Southern Nations, Nationalities and Peoples Regional State (or "Southern Region") includes more than 45 ethnic groups. The Daasanach (formerly known as the Geleb) people in South Omo Zone have a border in the east with the Hammer, in the north with the Naygatom and in the west and south with Kenya. The Omo River serves as a natural boundary among the different ethnic groups. The Daasanach ethnic group has eight subgroups, most of which are engaged in livestock rearing, while minorities such as the Narch and Rele are engaged in fishing, hunting and beekeeping. During the main wet season (February–June) and short wet season (November–December), flood-recession cropping along the bank of the seasonally flooded Omo River is more reliable than rainfed cultivation. Some of the sub-ethnic groups are also known for their facilitation of peacemaking in the intra- and inter-clan conflicts. Daasanach District has an estimated population of 52,700 people with an average household size of 5 persons. It is one of the most remote and sparsely populated areas in Ethiopia and has an area of 328,394 ha

The receding floodwater is the basis of livelihood for the Daasanach community as a source for both crop and pasture production. However, in the recent past, extreme flooding became very frequent and disastrous. The 2006 flood in Daasanach caused the deaths of about 360 people, the displacement of more than 18,000 people, and loss of livestock and cropland. The root cause of this flooding was a change in land use: much of the natural vegetation have been deforested for crop farming and

settlements. This led to erosion of soil, which silted up the river courses and caused Lake Turkana to overflow easily. Moreover, after the construction of the Gilgel-Ghibe hydro-electric power dam upstream, water was released irregularly, also causing the overflow. When such overflows continue for a longer period, this aggravates the infestation of livestock diseases and conflicts (Mekonnen & Biruk 2006).

## 6. Major findings of the study

### 6.1 Community vulnerability to climate change

Generally, the livelihood of pastoralists and agropastoralists, who are highly dependent on natural resources for livestock-keeping, cropping, fishing, beekeeping and hunting, is very sensitive to climate change. However, because of differences in wealth, power, social values and natural resource bases within the communities, their vulnerability to climate change and their capacity to adapt to this also vary in time and space. The range of vulnerability within the pastoralist community can be broadly classified as follows:

- The most vulnerable to climate change are usually elderly men and women and children.
- The poor with fewer livestock and less voice in decision-making in the community are more vulnerable; women household heads are usually classified as poor.
- Minorities within the clans and subclans (engaged on fishing, beekeeping and hunting) are more vulnerable than the majority and more powerful who are engaged in livestock-keeping.
- Those who rear mainly cattle and sheep are more vulnerable than those rearing camels and goats, which are more resistant to drought.
- People living in critical areas such as flooded areas and bounded by different conflicting ethnic groups are more vulnerable than in peoples in other locations.
- Agropastoralists with limited mobility are more vulnerable to climate change than are nomadic pastoralists.

**Some challenges of pastoralists**

**Prolonged drought**

**Fuelwood for survival**

**Siltation of ponds**

**Chewing chat**

**Invasive species**

**Cross-border marketing**

This also implies that pastoralist communities are characterised by heterogeneity and that local innovation in climate adaptation may therefore be difficult to replicate or scale-up in other areas.

### 6.2 Community perceptions on climate variability and change

As shown in Table 1, most of the pastoralist communities in the three different locations feel that the dry season has become longer and that the short and main wet seasons fail more often. Drought is usually accompanied by heavy dust; shortages of water, food and fodder; spread of human and livestock diseases; and high frequency of conflicts, all of which contribute to a vicious cycle of poverty. The start of the rains is also becoming more unpredictable, as they may come early or late. The rains may stop very early and be more erosive because there is less vegetation cover.

According to the elders in Gashamo, droughts in earlier times resulted from a failure of either the *Gu* or the *Deyr* wet season. Gradually, however, this has changed to the failure of both wet seasons. Moreover, the rainfall is highly localised, which puts narrower limits on mobility and leads to higher risk of the spread of livestock diseases and conflicts, because many herds are concentrated in the same areas favoured by the limited rains.

On the other hand, the climate data for more than five decades indicates that the amount of rainfall has been constant on a national average, with a declining trend in the north of Ethiopia which coincides with land degradation, while there has been an increase in rainfall intensity and variability in central Ethiopia. This climate change is also linked with the El Nino and La Nina phenomena, leading to droughts, floods, heavy rain, food insecurity, disease outbreaks and land degradation (Abebe 2008, Daniel 2008). Similarly, in Somali Region, rainfall data from 1957–2002 show an increase of rainfall in the *Gu* season and consistency in the *Deyr* rainfall (Devereux 2006). Maybe the inconsistency of the climate data and community perceptions can be attributed to a combination of factors. Firstly, the climate data stations are too small to reflect the reality under spatial distribution of different climatic conditions. Secondly, averages are not good indicators of rainfall distribution in space and time. Women in the Daasanach community pointed out that the wild fruits and roots that used to be ready for collecting during the dry season now take longer to mature.

**Table 1: Community perceptions of climate variability and change in study areas**

| Indicators | Trend | Remarks |
|---|---|---|
| Hot and dry months | + | Failure of short and main wet seasons |
| Rainfall amount | - | Comes early or late and stops early |
| Rainfall intensity | +/- | Sometimes in short period, heavy rainfall with high rate of runoff |
| Rainfall duration | - | During wet season, it rains for very few days or hours |
| Rainfall distribution<br>- Main wet season<br>- Short wet season | <br>-<br>- | Often, both wet seasons become part of the dry season; the main wet season is more reliable than the short one |
| Dusty months | + | Because of prolonged dry seasons |
| Frequency of<br>- drought<br>- famine<br>- flooding | <br>+<br>+<br>+ | Usually with failure of main and short wet season, drought and famine are intensified, while flooding is due mainly to land-use change, soil erosion and siltation of the river courses |
| Duration of flooding | + | Mainly due to high rate of land degradation and runoff from upstream while the water course is too shallow to hold more water |
| Ethnic conflict | +/- | Due to shortage of resources and greater limitation to herd movements, livestock raiding is intensified |

| | | |
|---|---|---|
| Spread of disease<br>- human<br>- livestock<br>- crop | <br>+<br>+<br>+ | Flooding creates a favourable environment for malaria and some crop pests and diseases. With drought and flooding, livestock are highly concentrated on specific areas for water and pasture, and diseases spread easily; in Southern Ethiopia, this is also compounded with infestation of tsetse fly. Shortage of food and fodder results in lower resistance of human and animals to disease. |
| Biodiversity<br>- plant (trees and crops)<br>- livestock | <br>-<br>- | The decline in indigenous trees has become very obvious mainly because of deforestation for fuelwood, crop farming and expansion of settlements. The decline in diversity of varieties and land races of crops is due to pests, diseases, prolonged drought and the introduction of "improved" seeds through extension. The decline in livestock biodiversity is due to drought, loss of assets and a shift to small animals. |

**Note:** (**+**) increasing trend (**-**) decreasing trend (**+/-**) fluctuation

The communities in the study areas also had perceptions on changes in land use and livelihoods, as indicated below.

**Change in land use:** The communities recognised that many pastoralists have become agropastoralists (as dropouts from pastoralism or because of government extension influence). There is a change from communal land holding to private land ownership. Moreover, the elders underlined that the grassland is changing into bushland with the encroachment of woody species. In Afar Region, invasion by prosopis (a leguminous spiny shrub) is becoming a serious problem (Dubale 2009). Similarly, the banks of the Omo River have become infested with bush on account of the long duration of flooding, and crop production has become difficult.

**Diversification of economy:** The communities indicated some shifts in economic activities: mainly women are dealing with petty trade, while some are involved in cross-border trade. The elders underlined that government agencies and NGOs have stimulated some of the changes in dairy and livestock marketing.

### 6.3 Community perceptions of causes of their vulnerability to drought

Most pastoralists believe that their vulnerability is attributable not only to the drought situation but also to other fundamental factors. In the discussions in different villages, they highlighted the following major causes of their vulnerability to drought:

**Prolonged drought:** In almost all communities visited, there is a clear perception that "the amount and duration of rainfall is declining and the dry season is becoming longer, which has led to shortage of water and pasture, spread of human and livestock diseases, and intensification of conflicts. Prolonged drought has led to the loss of livestock assets, and it has become difficult to restock because of the absence of a "regular drought cycle". Afar pastoralists said that, since the drought of 1984 (which was serious throughout Ethiopia), things are getting worse and worse.

**Dropouts:** Across all villages visited, the pastoralists thought that the number of schools dropouts in their area was increasing over time. Many indicated that the number had had doubled in the last ten years, and the demand for food aid has been increasing. On the other hand, a significant number of pastoralists are polygamous: a single pastoral man may have two or more wives located in different villages in order to

spread risk and to manage different *birkas*. Generally, the community has positive cultural values of having a large family as an indicator of wealth and strong kinship ties.

**Expansion of settlements:** On one hand, old settlements have been increasing in size mainly because of the constant increase in Internally Displaced Persons (IDPs) from inside the country as well as refugees from across borders. Many settlements have been created to access food aid and development interventions. This has resulted in enclosure of communal land for private purposes and high demand for fuelwood for own consumption and to sell as a source of income.

**Influx of migrants**: The local pastoralists underlined that a huge number of pastoralists are coming in from Somaliland and Puntland (like an "exodus"), consuming the water and pasture reserves in a short time, so that all are trapped in the vicious circle of poverty. Similarly, in the study district in Afar Region, farmers from the Ethiopian highlands are coming to the lowlands to cultivate because of the shortage of land in the highlands.

**Expansion of livestock diseases:** Usually during drought, as the animals have less access to pasture and become weak, they are more susceptible to different diseases when they are concentrated around a few waterpoints. Moreover, after a long dry season, when the rain finally comes, many animals die. Some cases were reported by the communities of conflicts that occurred among the Afar subclans, as some attempted to protect their territory from other subclans because they feared that livestock diseases would spread. No doubt, in areas such as Daasanach, restocking is done using the cultural practice of livestock raiding.

**Shortage of water sources:** Many pastoralists in Somali Region stated that their main source of water used to be *birkas*, but many no longer function and need rehabilitation. In the study district in Afar Region, the main source of water is the Awash River. However, since most of the land on the river banks is occupied by a state farm, national park and private investors, it is difficult for pastoralists to access water for livestock and to grow crops. The Omo River is expected to have similar fate with an increasing number of private investors coming in.

**Increase in conflicts:** In the Awash Fentale area in Afar, conflict is a serious problem of the pastoral community. On account of its geographical location, the district has boundaries with different groups, such as Issa and Karayu pastoralists, farmers from Amhara and Oromia Regions, and the state-owned farm and national park. In Somali Region, conflicts are not only because of competition over resources but also because conflicts between individuals in the different settlements are spreading to become clan and subclan conflicts. Similarly, in Daasanach, the conflicts are not only over water and pasture but also because of livestock raiding. Consequently, movements of animals and people are highly restricted. With the increased climate variability (droughts and floods), livestock raiding has been intensified.

**Defective marketing system:** Because of the peripheral location of many of the pastoral areas in relation to the central highlands of Ethiopia, pastoralists move across international borders for pasture, water and trade. However, cross-border trade is considered to be illegal (contraband). Moreover, with the increasing inflation, the terms of trade between consumable commodities and livestock are deteriorating.

**Chewing of chat:** Many of the elders in Somali and Afar Regions strongly condemned the chewing of chat as a root cause of the crisis in pastoralism. They estimated that up to 80% of the pastoralists in their area currently chew chat and 35–55% of household earnings is spent on chat. This habit not only consumes household income but also

paralyses the livestock sector, as many older and younger men are preoccupied with chewing chat in the villages and small towns. Surprisingly, many women who are not chewing chat (and even complain about men chewing chat) are generating part of their income by selling chat.

**Flooding:** The Omo River is the basis of the livelihood of the Daasanach community, and they have made many observations about the river. With the increasing rate of siltation, the water usually becomes brown, the river becomes shallower and wider as the riverine forest is removed, and the number of islands around Lake Turkana has increased. Moreover, pollution of the water has caused the death of some species of fish in the river. The rate of flooding has also increased and a huge area has come under permanent flooding, which has triggered the infestation of bush and mosquitoes (malaria).

**Private investment:** The pastoralists stressed that, in the name of "development", the prime land on the river banks (the pastoralists' sources of water, pasture and land for cropping) are given by the government and by clan leaders to private investors for irrigation, with the agreement of clan leaders. This has also stimulated a shift from communal to private land ownership, e.g. in Afar Region.

**Act of God:** As already mentioned in the introduction, there is a widespread cultural belief among the pastoralists that drought and famine are acts of God against sinful human actions. Usually, the elderly pastoralists pray for the coming of rain during chat ceremonies.

### 6.4 Community adaptation to climate change

**Traditional early-warning systems:** Already, the pastoral communities had been informed through specific elderly people who are knowledgeable about astronomical and climate change. Some make their predictions by observing stars, wind and cloud arrangements. Others predict after considering the behaviour of different wild animals and the flowering and seeding of some indigenous trees.

**Weather prediction**

In the Daasanach area, men slaughter a goat to investigate the intestine alignments (locally known as *numere*) to predict the bad or good season. These people warn their community about the situation and discuss what to do. The pastoral community still values such knowledgeable people very highly. However, whereas some pastoralists managed to move, others who were already vulnerable had to face the reality on the spot. No doubt, livestock deaths could have been reduced by destocking through the market; however, there is little policy support for cross-border trade, and it is also not a common culture among pastoralists to sell livestock prior to an expected drought.

**Moving with livestock:** Traditionally, there are no boundaries to camels moving across the territories of different clans and subclans. However, with the prolonged

drought, pastoralists are now moving with other species of livestock. In many localities, this is reciprocal while, in a few, it ends up in conflict because of the fear of spread of livestock diseases.

**Purchasing water:** When no water is available in their area, the pastoral communities organise themselves to contribute money to buy water from other areas. Those who do not have money borrow from relatives, and the water is distributed by tanker to each family in proportion to their contribution. Some use the water only for human consumption, while others use it for both people and livestock. As is common in pastoral culture, the poor and the immigrants are also assisted with free water distribution, at least for human consumption.


**Cutting and carrying fodder from national parks**

**Cut-and-carry feeding system:** Since the establishment of the Awash National Park several decades ago, Afar pastoralists lost their prime grazing areas and water points, but did not benefit from tourism income. Hence, conflict over use of resources in the national park has been chronic. In very recent times, there was an agreement that the pastoralists can use the border areas of the park during drought; however, demarcation of area was difficult and always led to conflicts. However, some Afar pastoralists have recently developed a cut-and-carry system (carried by people or carts), including renting carts as a community group by contributing some money and then distributing the forage within the community.

**Settlement around water points**

**Settlement around water points:** During the field trip to Somali Region, it was observed that many pastoralists have been temporarily settling around the communal *birkas* and *haffirs* (excavations into which surface water drains) in the Gashamo area and around deep wells. In the past, many pastoralists had to sell some of their livestock to be able to pay to water, which becomes very expensive during times of drought.

**Purchasing with credit:** During drought, many of the small shops in the small settlements and towns in the pastoral areas sell most of their commodities on a credit basis, charging no interest. This is a traditional norm in many of the villages and towns visited.

**Moving with fuel:** In areas with boreholes, mainly in Somali Region, some pastoralists were observed moving with jerrycans full of fuel so that they could have easy access to the boreholes. The borehole pumps need fuel to operate, and fuel shortage is a serious problem in some areas.

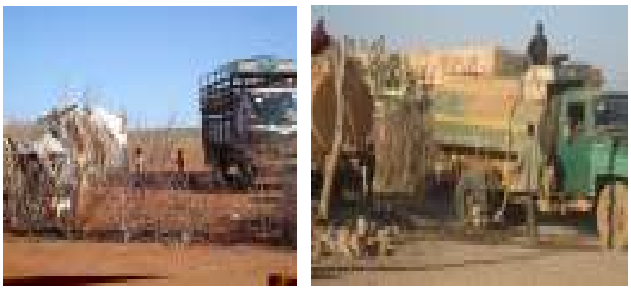
**Practising polygamy:** Relatively speaking, those pastoral men who have two or more wives are better off. Their wives live in different locations, each with some *birkas*. This gives the pastoralists breathing space to have access to water and pasture, on account of the spatial and temporal variability of rainfall.

**Rearing small stock**

**Selection of livestock species:** There is a shift in livestock species from camel to "shoats" (sheep and goats) in the areas visited in Somali Region, as it is easier to have small units of livestock to exchange on the market for daily consumables, and the shoats need less pasture than do camels. This does not mean the pastoralists no longer have access to camel milk simply that the number of camels is diminishing. It was also observed that there is an increase in the number of donkeys, because of their multi-functionality in transporting water and fuel wood, while the cattle population is already wiped out on account of prolonged drought and disease. In Afar, there is a clear shift from cattle towards goats and camels. Moreover, the pastoralists have adopted some breeds of livestock from the border areas of Oromia Region. In Afar, it used to be only cow milk that was commonly sold, but now the pastoral women have started selling camel milk.

**Settlement on islands:** On account of the prolonged drought in their area, the Daasanach prefer to stay on the islands in Lake Turkana in order to have easy access to water, pasture and fish, and less risk of livestock raiding by other ethnic groups.

**Diversification:** The minorities who used to depend almost solely on fishing to be used for consumption have started marketing fish, using modern fish traps from the Turkana area in Kenya, and rearing small livestock.



**Flexible use of trucks for livestock and water**

**Flexible use of trucks:** In many localities, an increasing number of pastoralists are getting richer because they own trucks that can be flexibly used to transport livestock

for marketing and grazing, and to transport marketable commodities. The same truck can load a watertank when water is needed for own consumption but also to generate income by transporting water to *birka* owners.


**Opportunistic farming and complementary irrigation**

**Crop cultivation:** Some pastoralists living around the state farms are going into irrigated crop cultivation, and some have subcontracted the land mainly to people from the highlands. The land along the river bank is owned by different sub-clans and each clan member has the right to cultivate or subcontract to others. Some women have also organised themselves into groups to practice horticulture around the *haffir* dams in Somali Region.

**Empowerment of traditional institutions:** In Afar, the community underlined that the root cause of their vulnerability is closely connected to the lack of good governance. They concluded that the modern pastoral leaders are highly corrupt and are not accountable to the community. Accordingly, they have tried to strengthen their powers by penalising and/or overthrowing the corrupt leaders. They also work hard on conflict resolution, and have sometimes become successful in coming to mutual understanding to use resources in different geographic locations, at least during drought. Generally, these efforts have contributed to improving governance at the grassroots level.

**Other local adaptations.** Afar pastoralists are growing varieties of sorghum and maize that are widely adaptable, drought resistant and good sources of fodder and food. Most of the varieties are local landraces, while some have been adopted from the lowland farmers, extension workers and market centres. The pastoral community around the Awash National Park has developed a cut-and-carry system to feed their livestock using vegetation from the park. During prolonged drought, elders negotiate with different clans on use of pasture and water. These are reciprocal arrangements so that the other clans can likewise have access to pasture and water elsewhere. Arranging intermarriage with different ethnic groups has contributed to peace keeping and lower demands for livestock to be used for dowry, this has, in turn, decreased cattle raiding in some areas. With the perceived change in climate, the Daasanach are giving more attention to practices such as traditional zero tillage (using planting sticks), the use of wild fruits and roots as food, and the use of traditional medicine for human and livestock. Another adaptation is in the orientation of their dwellings constructed around the lake. The dwellings used to be aligned uniformly according to the predictable direction of seasonal winds. Because the dust-laden winds now change direction frequently, the community members more frequently re-align their dwellings according to the direction of the wind. Otherwise, there might even be so much dust blown against the door that it could not be opened.

**Weeds as source of fodder and from zero tillage**

### 6.5 Interventions of government and NGOs

During the field study, some discussions were held with government and NGO staff. Generally, they believe their interventions dealing with capacity-building, natural resource management, marketing, and conflict resolution and water development, among others, have direct relevance to dealing with climatic variability (Fig. 2). Environmental issues need long-term commitment, while most NGOs are engaged on short-term projects. They are very weak in documenting community adaptation to climate change and incorporating this into their implementation planning. Nevertheless, a few pastoralists thought that, although some of the government and NGO interventions may be options to cope with climate change, these could also be threats because of the top-down planning approach which could create a dependency syndrome. This might lead to the diminishment of innovative local adaptation.

During the process of implementing the Climate Change National Adaptation Program of Action of Ethiopia (NAPA), the Ministry of Water Resources and the National Meteorological Agency conducted a series of consultative workshops with different regional states and at national level. The outputs from these workshops highlighted the magnitude of the problem, identified some causes and proposed some solutions. The workshop report underlined that climate change has become a crosscutting issue that affects food security and sustainable development in Ethiopia. It also highlighted that the causes of vulnerability to climate change in Ethiopia can be attributed to the very high dependence on rainfed agriculture, which is very sensitive to climate variability and change, underdevelopment of water resources, low health service coverage, high population growth rate, low economic development level, low adaptive capacity of the local people, inadequate road infrastructure in drought-prone areas, weak institutions and lack of awareness of pastoralists. It also recognised the different coping mechanisms of the local communities, such as changes in cropping systems, economic diversification, migration and marketing modalities. Finally, it stated that many of the existing government policies and strategies have relevance to climate change and identified 20 priority project ideas that address immediate needs of the country to adapt to climate change. These include capacity-building, natural resource management, intensification of agriculture (using irrigation and water-harvesting), strengthening early-warning systems and raising awareness of the local people. This type of assessment implies that insufficient attention is given to local innovation and enhancing local adaptive capacity to climate change and that intervention thinking is still skewed toward the classic transfer-of-technology approach. The principles of participatory innovation development, which synergises pastoralist and external expert knowledge, seem far from this strategy.

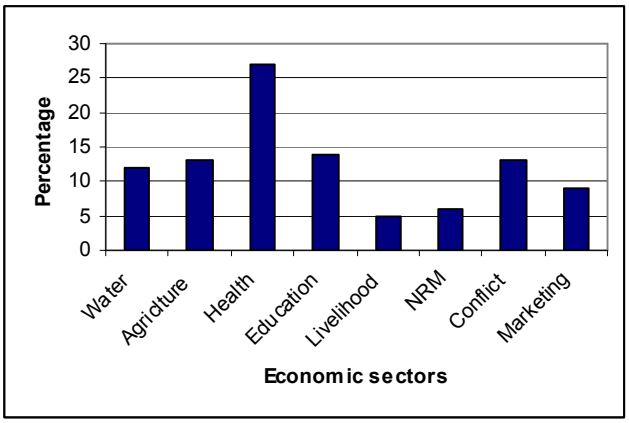



**Figure 2: NGO activities in pastoral areas**

On the other hand the Green Forum (2008) attempted to make a quick inventory of organisations dealing with climate change according to their activities. More than 50 organisations, including academic and research, civil society, government, and international organisations were identified. The conclusion from this review was that most of them do not have activities that fit into the climate-change framework

### 6.6 Challenges in understanding adaptation to climate change

No doubt, climate change has affected livelihoods in pastoral communities, and pastoralists have developed some strategies to cope with changes in their environment. However, during the process of trying to understand pastoral community adaptation to climate change, the following challenges were encountered:

**Segregation of climate change from the complex pastoral system**: Drought is normal in a pastoral system. Already, pastoralists underlined that their vulnerability to drought is highly attributable to their marginalisation with respect to drought-response mechanisms. This marginalisation includes allocation of rangeland to investors, expansion of irrigation schemes, focus on crop production and settlement, and establishment of "community-based organisations" that are not in harmony with the customary organisations. Therefore, in attempts to address climate change, attention should be given to the root causes of vulnerability of pastoralists to any risk, including climate change. It is possible that focusing only on climate change as a challenge to the livelihoods of pastoral communities might underestimate the root causes and exacerbate the vicious cycle of poverty.

**Claiming to address climate change:** Climate change is a popular issue, and many organisations claim that they have been addressing it in their policy and development interventions since decades. Yet such attempts have their limitations in accommodating added values, including recognition of and support to local adaptation.

**Keeping pace with fast change:** Very rapid changes (ecological, socio-economic and political) are taking place at the grassroots level. Many organisations that claim to work at this level may soon be outdated if they do not give close follow-up, and if they do not mainstream documentation to gauge the changes and local adaptation to them.

**Temporal perspective:** Adaptation is a process that deals with both current and future vulnerability and strengthening of resilience. Some adaptation mechanisms might be good at the current time but not necessarily in the future. This implies that regular

assessment needs to be made of these mechanisms; such assessment may be time consuming and expensive.

**Microscopic changes remain unrecognised:** Because of the heterogeneity of the communities and ecology in the pastoral areas, recognition of local adaptation is difficult, if not impossible. Some of the adaptive innovations might be only by some individuals or among a few small groups and may therefore remain unrecognised.

## 7. Policy environment

Generally, as shown in Table 2, the different agricultural and development policies seem to have much relevance to address climate variability and change directly or indirectly. Similarly, the government extension service with its improved seed, short-maturing crops, irrigation, water-harvesting technologies and watershed approach is geared to address climate variability (McKee 2008). Moreover, with the government policy of decentralisation of power to the grassroots, the districts are receiving budgets to manage their needs and priorities. This should help assure good governances as a component of efforts to alleviate poverty. However, government policy on land ownership and rights, investment policy, controlling cross-border trade, and pushing rather than allowing alternative choices for crop production and sedentarisation still need very serious attention and re-orientation. On the other hand, a workshop on climate issues in Ethiopia held in late 2007 by the Forum for Environment has made a substantial declaration to the government on climate issues (see Box 1).

**Table 2: Relevance of selected policies/ programmes/ strategies to options for adaptation to climate change**

| Policies / programmes / strategies | Relevance / complementarities | Remarks |
|---|---|---|
| • Most policies, strategies & programmes | Promoting sustainable development, sustainable use of biological diversity & reducing climate-related vulnerability are common objectives | Achieving sustainable development in sectors affected by drought is among the UNCCD's areas of emphasis, while sustainable use of biological diversity is among the UNCBD's areas of emphasis |
| • EPE<br>• Biodiversity Conservation Policy<br>• Agricultural Policy | Strength & resilience of ecosystems, thereby helping to reduce the economic and social vulnerability of local people | Both the EPE and the UNFCCC aim at ensuring sustainable economic development through mitigation of adverse climate-change impacts. |
| • Rural and Agricultural Policy<br>• Safety-Net Programme<br>• PASDEP/FSS | Focus on rehabilitation and reclamation of degraded land, reforestation, and conservation, management and protection of natural resources | Community-based participatory projects/ activities to ensure food self-sufficiency, increase farm production and reduce vulnerability through transfer of income, household asset building, and public works to develop natural resource base and productivity |
| • PASDEP<br>• EPE<br>• Biodiversity Conservation Policy<br>• NARP | Encourage activities that reduce poverty/improve livelihoods and simultaneously conserve and protect the ecosystem | Projects that introduce & propagate plants with high commercial value to improve income/livelihoods through benefit-sharing arrangements involving local communities using indigenous or exotic plants, herbal medicinal plants and plants used to extract essential oils show some potential. |

| | | |
|---|---|---|
| • Rural and Agricultural Policy<br>• PASDEP<br>• Safety-Net Programme<br>• FSS | Drought-resistant plants and crop species easily adaptable to areas with moisture stress and interventions to rehabilitate and maintain biodiversity of dryland and fragile ecosystems have complementarities with MEAs. | Poverty alleviation and improving livelihoods are among the strategies of PASDEP and the agricultural policy. Shifting/ diversifying crops and selecting drought-resistant crops/ varieties are strategies to attain food self-sufficiency and improve household livelihoods in drought-prone areas with high climate variability. |
| • EPE<br>• PASDEP | UN conventions and other MEAs that emphasise environmental information network and capacity-building as well as the need to create awareness about impacts of climate change and coping mechanisms are in conformity with policies/ strategies/ programmes, particularly the EPE. | Promoting projects that target capacity-building to ameliorate the impacts of climate change on livelihoods and national economy. Mainly information network on climate & biodiversity; environmental fora & institutional capacity-building are among projects that help develop national capacity-building & NAPA. |

**Source:** NMA (2007), p35

**Box 1: Declaration on climate change: a burning issue for Ethiopia**

- Recognised as global issue needing joint efforts
- The climate-change issue must not be used to cover up decades of land degradation.
- Recognition of impact on livelihood, biodiversity and health
- Need to integrate traditional and modern adaptation approaches
- Need to develop a national adaptation programme of action (NAPA)
- Mainstream climate-change adaptation in the development process
- More research on the impact of climate change
- Awareness creation on climate change
- Implications of environmental impact assessment in any investments
- Priority to food crops rather than biofuels
- Climate as crosscutting issue needs collaboration of institutions
- Needs coordination and cooperation of government and NGOs

*Source: Green Forum (2008)*

## 8. The way forward

Representatives from over 30 organisations attended the consultative workshop on 18 November 2008 in Addis Ababa, designed to gain feedback on the scanning of local innovation in climate-change adaptation by Ethiopian pastoralists (see Annex 2). From the discussions, the following major concrete conclusions were drawn as components of the way forward:

- The scanning was found to be a good foundation to acknowledge community competence and the rationality of local innovation in solving community problems.
- Local innovation in adaptation to climate change is considered as a prerequisite for assuring food security, genuine participation in decision making and sustainable resource management.

- It was underlined that the vulnerability of the pastoral community is mainly due to defective policy, which is rooted in information gaps among policymakers on the rationality of pastoralism, the deep-rooted indigenous knowledge of pastoralists and their initiatives in endogenous development (e.g. Eyasu 2008).
- The need was identified to have detailed documentation of local adaptation to climate change, which can serve as a point of departure for diffusion of successful practices among pastoralists and to support rational policymaking in pastoral areas.
- Successful local adaptation practices need to be tested and further explored in joint experimentation, i.e. according to principles of participatory innovation development (creating synergy between different types of knowledge), prior to their diffusion among the wider community.
- Partnership and networking among the different organisations on issues of climate change has been very weak. Therefore, more has to be done to create strong partnerships through PFE and other networks.

# 9 Conclusion

Generally, the livelihoods of pastoralists are highly dependent on natural resources and very sensitive to climate change, yet such events can not be easily separated from other events such land degradation and policy changes. Similarly, the degree of vulnerability to climate change between and within pastoral groups varies greatly according to various factors such as age, sex, wealth rank, economic engagement, ownership of different livestock species and geographical location. This also implies heterogeneity in adaptation and difficulty of replication or scaling up of successful adaptations across the community. The pastoral communities have underlined the fact that their lives have been affected by climate variability and change, but they see the fundamental threats to pastoral systems of Ethiopia to be the increasing marginalisation of their drought-response mechanisms with the mentality of modernisation. Moreover, the assumption of solving the climate problems dominantly with external interventions will not only underestimate local competence to solve their problems but also create a dependency syndrome, which paralyses local innovativeness.

On the other hand, there is a wide range of evidence that the pastoralists have accumulated and continue to accumulate deep-rooted knowledge and experience in adapting to the ever-changing environment. Innovation by pastoralists in adaptation to climate change cannot easily be distinguished from the flexibility and adaptability that have always been features of pastoral systems – and have been the source of their strength. Therefore, support to pastoralists' flexible and dynamic local innovation needs to be integrated into any development intervention with the principles of participatory innovation development. Lastly, as was underlined in the workshop feedback, a detailed documentation of local innovation in climate adaptation needs to be done prior to the dissemination of the successful practices.

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## Annex 1: Itinerary and list of persons met

| Date/2008 | Place | Contact persons | Organisation |
|---|---|---|---|
| April to August | Addis | Tesfahun Fenta | PROLINNOVA–Ethiopia |
| | | Adrian Cullis | SC–USA |
| | | Kassaye Hadegu | UN–OCHA Early Warning |
| | | Wondewosen Gulelat | PFE |
| | | Tezera Getahun | PFE |
| | | Bruk Yemane | Oxfam–GB |
| | | Diresse Demissie | Oxfam–Spain |
| | | Derge Mekonen | NMA |
| | | Zerihun Ambaye | EPARDA |
| | | Abebayehu Haile | CARE–Ethiopia |
| | | Abdulkarim A. Guleid | Hope for the Horn (HfH) |
| | | Ann Waters-Bayer | ETC EcoCulture |
| May 16 | Jigiga | Hope for the Horn staff | HfH Jigiga |
| May 17 | Jigiga<br><br>Rabaso | Anwar (Humanitarian)<br>Ahmed Omer<br>Ahemed | President's office<br>DPPB<br>HfH |
| May 18 | Gashamo | 5 women, 7 male elders and village leaders<br>3 women, 5 male elders and village leaders<br>HFH staff (supervision committee, 3 people) | Bicidaale village<br>Samater Ahmed village<br>HfH |
| May 19 | Gashamo | Three tanker owners (people)<br>Gashamo District Administration (5 people<br>7 women and 5 male elders and leaders<br>3 women and 2 male IDPs | Private truck owners<br>Gashamo District<br>Balimadan village<br>Urban dwellers and IDPs near Gashamo |
| May 20 | Rabaso | District Administration (3 men) and HfH staff | Rabaso District / HfH |
| May 21 | Aboker | District Administration (4 people) | Aboker District |
| May 22 | Jigiga | Jigiga staff members (4 people) | HfH |
| May 23 | Jigiga–Addis | Return to Addis Ababa | |
| July 6 | Awash Fentale | Ali Seid<br>Seid Mohammed<br>5 women, 9 male elders and 2 men from *kebele* | DPPO<br>CARE–Ethiopia<br>Dudub Kebele |
| July 7 | Awash Fentale | 3 women, 4 male elders and *kebele* leader | Doho Kebele |
| Aug 26 | Addis–ArbaMinch | Discussions on the checklist by study team | PFE |
| Aug 27 | Jinka | Tadesse Getachew<br>Seyeum Tamire | Jinka Food Security Office<br>EPARDA |
| Aug 28 | Omerate | Tamirat Aynew<br>Samuel Brsha<br>Afework Nako, Development Agent | Agriculture Office<br><br>Awga Kebele |
| Aug 29 | Omerate | 4 women, 5 male elders<br>4 (people) students from Daasanach, Hammer, Karo and Naygatom | Awega Village |
| Aug 30 | Konso | Overnight | |
| Aug 31 | Addis Ababa | | |

## Annex 2: Participants in consultative workshop, 18 November 2008

| Name of participant | Institutional affiliation | Email address |
|---|---|---|
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