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Paper s and Proceedings of

Symposium on Agrarian Technology Options and Food Security in Ethiopian Pastoralist Areas

October 2010
Addis Ababa

The three papers presented in this publication written by the distinguished experts, and the proceedings of the consultation, provide evidence based insight on the issues related to the chronic and critical food insecurity in the pastoral areas. In tandem, they also shed light on the potential policy measures to be considered to address the problem, including the appropriate agricultural technology options to be promoted.

In closing, I wish to thank Dr. Angela Roberts, Dr. Bekele Hundie and Dr. Kidane Georgis for sharing their valuable research papers and expertise with us.

Likewise, I would like to express my appreciation to Dr. Alula Pankhurst and Dr. Alemayehu Seyoum, for their thought provoking and fruitful views as discussants, that enriched the deliberations of the conference.

Finally, on behalf of InterAfrica Group, I would like to express gratitude to the Royal Governments of Sweden and Norway for providing the funds used to organize the Symposium. I also thank the Early Warning and Response Mechanism (CEWARN) of IGAD for sharing the cost and co-sponsoring the conference with InterAfrica Group.

Tamrat Kebede
IAG Executive Director

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Proceedings of the Symposium on Agrarian Technology Options and Food Security in Ethiopian Pastoralist Areas

InterAfrica Group held a Symposium on Agrarian Technology and Food Security in Ethiopian Pastoralist Areas on October 7th 2010, at Harmony Hotel, Addis Ababa.

The symposium served as a forum for deliberation on food security and pastoralist livelihoods, identifying the history and challenges of said topics in the political, economic and policy arena's of the Ethiopian landscape. The utilization of agricultural technology to achieve food security in the pastoralist setting was addressed alongside linkages with the theoretical underpinnings of food security. Concrete recommendations were deduced from the presentation and discussion sessions.

Ato Tamrat Kebede, Executive Director of InterAfrica Group, delivered the opening remarks for the conference. He thanked the presenters and participants on behalf of InterAfrica Group and CEWARN (Conflict Early Warning and Response Unit) of IGAD (Intergovernmental Authority on Development). He highlighted that InterAfrica Group had previously held symposiums on the economic conditions of Ethiopia in 1992 and 2000. When organizing the symposium in 2010, it was realized that reviews of the macro -economic performance of Ethiopia is conducted regularly by other institutions. In light of this, it was decided to adopt a forum where research and debate on critical socio-economic issues of the country would be advanced.

Food insecurity and agricultural technology are important subjects especially in relation to the pastoralist community. Pastoralists survive on arid and semi arid land where there is unreliable rainfall and the land is ill suited for crop production. Although the community is highly vulnerable, pastoralists have developed commendable adaptive strategies to survive in this environment. They contribute to the national economy quite significantly. However they are now

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- Agricultural and rural credit through rural-based private and cooperative-owned banks that mobilize savings, use market -determined interest rates, and undertake serious loan recovery efforts are needed.
- Development of infrastructure in national water supply, rural roads, and transport programs, each serving rural areas with participation by the private sector
- Capacity-building efforts in terms of trained manpower, facilities infrastructure should also get due emphasis.
- National policy for promoting appropriate agricultural technology use and transfer (internally and externally) with preference to cost effective and labor intensive technologies should be developed.

There are many institutions involved in the pastoral development programs in the country but without integrated approach. They should have a common forum and jointly work together for a common goal. National development pastoral commission should be established to facilitate this.

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Symposium on:

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Drylands management has to a large extent been seen as a defensive battle: a struggle to protect and conserve dryland resources from degradation-a combat against desertification. Although there are environmental resource problems threatening the livelihood security of people in large parts of the world's drylands, there should perhaps be more focus on possibilities, and potentials rather than problems alone. Pointing to potentials and possibilities may create more enthusiasm for the task at hand. This paper has pointed to many possibilities for increasing the productivity of drylands. A doubling or fourfold increase or more of yield should be well within reach in many areas. To be sure, many obstacles and constraints first need to be passed or removed. Many dryland areas have a rich history. If appropriate actions are taken, they may yet provide well for their inhabitants.

Recommendations

- National agricultural research with better links to farmers' needs at one end and to international research at the other is needed.
- National agricultural extension with participation by farmers, NGOs, and the private sector and with closer attention and focus on fiscal sustainability.
- Agricultural policy reform and institution building with more focus on land tenure is required.
- Farmer-managed small-scale irrigation could result the response to the urgent need to achieve food security and protect the natural resource base.
- Expansion of natural resource management programs with more farmer and community management; enhanced support for national water, forestry and soil fertility programs.
- Support to farmers' groups to mobilize participation by farmers and especially by women's groups in project preparation and implementation.

Drought preparedness should be a primary concern. Too little effort has been made to design policies that will reduce both the short-and long-term impacts of drought. Linking drought preparedness to overall development strategies is fundamental for increasing food/ feed security in drought-prone environments. Policies need to see famine prevention, famine recovery, and reducing food insecurity under more normal circumstances as integrated elements of a long-term strategy for food security and drought preparedness. The risk and uncertainty created by drought must be met by a variety of measures that provide individual and collective solutions at various levels of social organization. Public policies should seek to strengthen the effectiveness of drought preparedness strategies already adopted by rural households-and if possible seek to provide new opportunities for coping with drought.

Efforts to reduce dryland degradation require intensification in agriculture, translated as more efficient use of land, labor, and capital, related to technological, institutional and policy innovations. Inadequate, highly variable, and erratic rainfall represents a major constraint to agriculture in the pastoral areas. This paper has, however, pointed to a number of other constraints that may often be even more binding, such as infertile soils, remoteness from markets, poorly functioning markets, and-last but not least-inappropriate policies. It has presented a number of technological possibilities for improved land conservation and productivity increase, such as water harvesting, soil conservation, and the use of organic and inorganic fertilizers. However, technologies do need to be adjusted and adapted to local conditions. In particular, they need to be appropriate to the resource constraints farmers face.

The basic preconditions for improved drylands and pastoral management are government concern, political will, and commitment. Focusing more attention on how government commitment is created to advance the sustained political economy development of drylands management-is therefore important.

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Closer studies of long-term landscape changes, of rangeland ecology, of community natural resource management regimes, and of agricultural intensification processes reveal many cases where the resource management practices adopted by the people living in an area have unjustly been seen as degrading the land. Thus, overgrazing has probably been exaggerated as a problem, especially in the driest areas. Much is still unknown, however, about how dryland ecosystems are affected by different resource management practices.

There is a need to understand drylands change and management in a local and site-specific context. There is heterogeneity or variety of causes and consequences of a certain type of change that differs from one social and ecological setting to another. Major differences exist in land availability and access, rainfall, access to irrigation water, forest cover, livestock numbers and dependence, and soil type. These differences affect agricultural development potentials, extension and research strategies, and natural resources management. Each region requires a different strategy

A main lesson of the past, emphasized in this paper, is that strategies to improve drylands management and pastoral areas must build on a greater appreciation of the skills with which drylands people allocate resources and use opportunities, and of the constraints they face. Interventions by governments must utilize the knowledge of local people, and be based on their views.

Policy makers and planners should be able to integrate environmental concerns into country economic planning and social development to be successful in developing the pastoral production system. The plans need to be developed through participatory processes involving public and private organizations and people at large. The resource management itself has to be more participatory. Indeed, local communities should have more responsibility for resource management.

get was not pastoral development oriented but potential resource exploitation to fill the gap of hard currency deficit by the government. Since this was not a right policy and strategy, it was not sustainable.

Post 1991

Since 1991, the pastoralists legitimately have enjoyed a more liberated federalism in their own ethnic groups, but in a period of ten years, they showed little improvements in their livelihood status**.** Because their political leverages perhaps may not go beyond creating political stabilization in trans-boarder areas more than economic affairs.

More significantly the EPRDF's political programs give more stress to disease prevention in pastoral areas, and still do not advance clear and elaborate policies and strategies with respect to pastoralists. It advocates the political empowerment and representation rather than economic issues.

On the other hand the pastoral regional states in their current outlooks resume the highland crop/livestock system approach orientations and more of being toiling to implement the federal crop extension system designed by the Federal Institution but that has too little relevance to the majority of the nomadic-pastoralists except partly to the agro-pastoralists. By extrapolation of the engagement activities of the pastoral regional states therefore, it is possible for one to conclude the political representation is the core theme of the system than the pastoral production system in place.

Conclusion and Recommendations

It can be concluded that there is a lot resource potential in the pastoral/agropastoral production system, which is untapped, but could be used for the development of sustainable agriculture, if used properly. This include base natural resource such huge amount of water resources, fertile soils, forest resources, energy and minerals, key watershed and wetlands and important biological diversity.

Foreword

In 1992 and 2000, InterAfrica Group organized symposiums covering various policy issues related to the overall economic performance of Ethiopia. During the consideration of subsequent symposiums, it was noted that reviews of macro - economic performance are conducted regularly by a number of research institutions, including, the World Bank, the African Development Bank, the Ethiopian Economic Association , Ethiopian Policy Research Institute and the like. Hence, it was realized that it would be more fruitful if alternatively, we facilitate research and organize focused forums which offer the opportunity for intensive and comprehensive deliberation on specific economic issues of critical importance to the country's prevailing economic reality. Accordingly, Food Security and Agricultural Technology Options in Pastoral Areas was chosen as the topic for the symposium of 2010.

The pastoralists in Ethiopia survive on arid and semi-arid ecologies with unreliable and low rainfall, that are mostly ill-suited for crop production. To overcome their vulnerable livelihood, through centuries of experience, they have developed commendable adaptive strategies to the environment. Thus, despite the unfavorable ecology they survive on, their contribution to the national economy is quite significant - a fact rarely realized nor properly appreciated.

As the agricultural development of the country advances, the pastoralists are increasingly facing serious challenges to manage their livelihoods due to the vagaries of nature, encroachment by expanding mechanized agriculture and some developmental policies.Consequently, as a wealth of evidence witnesses, they have become the most vulnerable community to the nation's food security risks. Hence, the essential purpose of the 2010 symposium was to critically address this problem and explore new potential policy measures to mitigate it.

facing serious challenges due to factors such as the encroachment of agricultural land, food insecurity and competition with other kinds of livelihood. The symposium is intended to explore how the pressures on pastoralist livelihoods can be mitigated. This includes possible policy measures and identifying the right agricultural technologies to be promoted. Ato Tamrat concluded by thanking the presenters and the discussants, and the Swedish and Norwegian governments for providing financing for the conference. He also thanked CEWARN for cosponsoring the event.

The first presenter of the conference was Dr. Angela-Raven Roberts. Dr Roberts is currently the Regional Emergency Advisor in the UN Geneva for East and Central Europe. Her educational background includes a PhD in development anthropology, a M.Litt from Oxford, and a BA in African history and social anthropology from London university. Between 1984-1991 she served in Ethiopia with Oxfam America and Save the Children U.S, and from 1992-1998 she worked with UNICEF as emergency program officer in the Horn.

Dr. Roberts began the presentation by stating that this is a crucial and important time in Ethiopia with regards to development. The issues of food security and agricultural technologies have had a long history in Ethiopia. There have been major contributions from many research centers since the 1950s addressing the issues from varied viewpoints. The debates have been primarily two tracked. On the one hand, the issues have been addressed by focusing on the history of agriculture, environment, and land tenure development, as well as the state's role in these processes and how this influenced development in Ethiopia. The second approach focused on acute crisis such as the effects of the different food shortages in the country, including the causes of famine, starvation, and food insecurity. Global economies also have specific relevance on the issue of food insecurity. Factors such as climate change and global economic volatility are relevant to discussions on pastoralism.

The current decade on the other hand, has witnessed an ethnic based rationalization as one form of federalism with the principle of power decentralization. In this context, most pastoralists seemed optimistic about their future with a right to determine their destinies and development interventions on the basis of their own values and priorities. However, it is unfortunate to see them in an unimproving economic fate with their age-old problems not addressed through coherent development policies and strategies. The mere fact is not the access to federal principles but still lack of access to an appropriate policy and strategies in the period of their self-administration era.

Before looking into the detailed implications three points are highly important to mention in view of past vis-à-vis current pastoral development issues since the past 50 years period and up to now.

During the Imperial Period:

During the Emperor Haileslassie regime, pastoralists were not as such politically empowered but represented by a hierarchical representation based on traditional clanship with a fair rangeland / livestock development interventions with the objectives of political/ security stabilization. Despite this, however, pastoral development policies were lacking power and rather commercial plantations had an upper hand in pastoral areas as a matter of policy support. The theme was to make Ethiopia 'a bread basket'. However, this approach did not work or was not effective.

During the Military Regime:

During the 'Derg regime', pastoralists had enjoyed an autonomous political leverage, but with too little or no provision to improve their livelihoods. There were no defined policies that can ensure a sustained development except a good share of attention for preventing animal diseases. Nonetheless, quite a fair attention was given by the government and efforts were made to establish and improve livestock markets and marketing facilities. However, the tar-

Ecologists, development economists, policy experts, ethno-biologists, and environmental legal experts to deal with natural resource management and use

- System specialists specially with bias on ecology, agronomy and land use analysis
- Information technology such as modeling, geographic information systems (GIS) and remote sensing
- Sociologists, anthropologist, and integrated resource experts to undertake research on the indigenous knowledge base, culture and traditions that govern access, control and management of natural recourses
- Resource management including agro-climatologists and natural resource economists
- Range land experts in the drylands

What is needed is a new brand of scientists capable of addressing the complex multi-disciplinary dryland challenges who will be involved in participatory research and resource management.

Policy: assessment of past and current issues for pastoralism development

As summarized below, it is important to review and assess the previous approach in developing the pastoralist areas to improve the production and food security and their livelihood to suggest policy recommendations.

Among sub-Saharan African countries, Ethiopia encompasses the largest pastoral and agro-pastoral production system both in terms of area coverage, human and livestock population and resource diversification, it is the only country that has **no clear and defined pastoral development policy and strategy**, except a trial and error range development project. Most efforts in the last 50 years ended unsuccessful due to lack of visionary policy guidelines and development strategies.

The presenter next summarized the history of the food security and agriculture in Ethiopia in broad strokes. There has been a shift from production supply issues to entitlement issues. The initial bout of food insecurity, production and supply failures led to large scale international responses i.e. the food aid disbursed in the 1980s. In the 1990s-early 2000s, attention was redirected towards addressing livelihoods. A consensus began to emerge that when dealing with food security there needed to be a more holistic approach looking at the varied influences on livelihood. Issues such as poverty reduction, ensuring food security, and reducing vulnerability were identified as core strategies in the livelihood framework, and understanding that political, economic, and gender inequalities can influence a community's descent into crisis situations. There were also attempts to identify linkages between HIV, drought, and productivity. This produced a new variant in food security and famine situations, looking at how combinations of health crisis can impact agriculture and food security.

Debates have now moved into a different sphere following the new global food crises, particularly the food crisis in 2007-2008, and the economic downturn. Research has been forthcoming in trying to address these phenomenon's. Emerging topics include assessing the commodity process, and debates on food security and its impact on achieving MDGs (Millennium Development Goals), climate change and the combination of factors that led to food shortages. The need to increase staple food crop productivity has led to import subsidies to improve food security and long term investment in agriculture. This coincided with the economic downturn which revived arguments supporting national self sufficiency. Wider debates are ongoing on new areas such as risk reduction and adaptive social protection.

Dr. Roberts next addressed the Ethiopian government responses to food insecurity and agricultural production. Both the current and previous regimes have highly focused on issues of agricultural production and food security. This is also reflected in the newly announced Growth and Transformation Plan. An accelerated food security focus was first witnessed in 1996 with the development of

national food security policy, the ADLI (Agricultural Development Led Industrialization.) In 2003, due to a drought crisis, the whole system was revamped and a new coalition on food security concerned with finding lasting solution to secure basic household needs was formed. Safety net development became the new focal area especially in arid, challenging areas. This was encapsulated in PASDEP (Plan for Accelerated and Sustained Development to end Poverty) initiative which was started in 2006.

In addition to these initiatives, there have been other programs supporting poverty reductions and food security in the country. The UN, NGOs and other development partners promoted programs on micro finance, extended credit, diversification, improved seeds, etc . Maize has been introduced as part of new agricultural model, replacing teff in some areas. Government led strategies tackling food insecurity include a national nutrition strategy, a national disaster management system and the creation of a commodities exchange. A national nutrition strategy has been developed which integrates health and nutritional needs as part of national strategic approaches. The National Disaster Management system is being reviewed to reflect a renewed focus on early warning, and to track past vulnerabilities and also document how they have been dealt with. The system is accelerating ways to advance warnings so response can be accelerated as well. Another innovative development was the creation of a commodities exchange system. Alongside this development there has been increased recognition of urban vulnerabilities i.e. how urban communities are being impacted by global and national crises. As a result, urban agriculture, urban agro industries and the linkages with global fluctuation are emerging as key areas of concern.

Currently, there is renewed interest in industrialization, for example water, mining, irrigation, etc. All of these initiatives are part of the effort to increase overall economic security in Ethiopia. Among these industrial efforts, agricultural business and new developments in commercial farming are part of global movement towards niche agriculture. This entails the production of specific types of crops for export.

which is supposed to be a relevant institution for research and development.

The relationship with MoFA is critical since the pastoral affairs coordination is handled by this ministry. Of course, in the PAP areas for the implementation of RDPS the institutional arrangement at the federal level include:

- Pastoral Standing Committee(PSC) in the House of Representative,
- Inter-Ministerial Board consisting of nine Ministers, coordinated by the Ministry of Federal Affairs,
- Pastoral Areas Development Departments, under the Ministry of Federal Affairs (MoFA)

This structural set up seems to be relevant, but the coordination and linkage of the research and development practices with other institutions is very poor. The contribution of MoFA to the pastoral development and food insecurity is rather limited, and this has been indicated several times in different forums (Demese et al 2010).

For example, there is pastoral extension system in the Ministry that tries to employ the extension system and practices of the highlands which is not relevant to the pastoral areas.

Lack of capacity in Human power and Research facilities

The drylands were marginalized in research and development in the past and this has limited capacity in human resource and facilities.

Virtually the previous governments have failed to mount research and technology development programs tailored to drylands. Currently, there is a critical shortfall in the country of the following staff cadres:

Research structure

The research program includes crop, livestock, soil and water, forestry and mechanization. The research system is based on the commodity approach, and is not agroecology-based. There are other satellite programs also, e.g., socio-economic and research and agro metrology section.

However, the commodity approach is not integrated to address the problem of all agricultural activities, such as crop, livestock, and NRM. In addition, it does not fully encompass important sectors including the dryland agricultural research and pastoral and agropastoral which were the core programs for conducting research in these areas. These were very strong programs in the previous research system aiming to develop technologies for the pastoral areas. Therefore, removing these programs from research systems is not justified. These programs were established to cater for the research and development in the pastoral system.

Coordination of research and development

Kidane Georgis, 2003. Land degradation adoption, low soil fertility and water stress: the major issues for improving crop production and food security in the dryland areas of Ethiopia, In the Proceedings of the food security conference 2003 (Ed. 13-15), challenges and prospects food security in Ethiopia, UNCC, Addis, August `3-15, 2003. pp 201-216.

There are many government institutions working in the pastoral areas including NARS, MoARD and Ministry of Federal Affairs (particularly the PCDP), CGIAR centers such as ILRI. These institutions are all working or are supposed to work in pastoral areas but not organized in their work. They do not plan and work together, thus there is duplication of efforts and wastage of resources.

There is no clear understanding about the role and function of the various actors in the pastoral areas. It is particularly important to know the role and responsibilities of the Ministry of Federal Affairs,

Other examples of reinvigorated approaches towards the economy include the upstart flower industry. Additionally, land has also been leased to Saudi Arabian and Indian companies for the purposes of food/crop production. However, since export crops are vulnerable to global markets/international trade, social protection and risk reduction for this sector will be key issues because global vulnerabilities can influence farming labor. The increased attention awarded to international trade has been reflected in the Ethiopian government policies. The Growth and Transformation Plan shows that a focus on aid has been redirected to a focus on trade as the key economic driver. This has been infused with targets for promoting agricultural growth, reducing risks and protecting livelihoods. Climate proofing is a key issue in global development debates, and has been included in the Ethiopian government's strategy. The combination of a multi sectoral, holistic disaster risk management system, productive safety net systems, and a complementary range of industrial and other sectoral developments will also ensure economic security. The main issue now is how these approaches will be implemented throughout the diverse and multiple livelihood systems in Ethiopia. Community pathways out of poverty by themselves are insufficient, and there need to be modalities to respond to internal hazards and external vulnerabilities, such as climate change. Other key recommendations highlighted by the presenter included:

- The need for a comprehensive risk reduction strategy built into all aspects of development and investment policies, including options and strategies for mitigation.
- Maintaining participation, accountability and communication. Communities need to be involved in the decision making and implementation process. Gender and youth representation should be addressed in these considerations.
- There needs to be a strong partnership between all stakeholders to address risk analysis.
- Livestock and pastoralist systems need to be embraced in national discourses. However, there is a need to re brand

pastoralism in order to heighten the stature of pastoralism concurrently sensitizing the global community on the pastoralist way of life.

Ato Tamrat provided some remarks following the presentation. He highlighted some of the important points of the presentation, which addressed the history of food security, and interventions of various Ethiopian governments.

The next presenter was Dr Bekele Hundie, an assistant professor of economics at the Ethiopian Civil Service College. He wrote his Ph. D dessertation on pastoralist livelihoods and food security in the Afar region. Dr. Bekele has published over 25 research papers, working paper and other publication on pastoralism, food security and livelihood issues. The presentation for this symposium is entitled "Livelihoods and Food Security in Pastoral Areas of Ethiopia, Current Situations and Future Prospects."

Dr. Bekele started his presentation by elaborating on the nature of pastoralist livelihoods the current state of pastoralists in Ethiopia. He noted that pastoralists are found in extensive areas in Ethiopia particularly the lowlands of the east, southeast, northeast, central rift valley, west and southwest. Somali pastoralists constitute over 50% of Ethiopia's pastoralists, Afar pastoralist constitute approximately one third of the pastoralist population, and 10% come from the Oromia pastoralist population. Pastoralists produce 40% of cattle, 25% of sheep, 75% of goats, and all the camel production in Ethiopia. Despite their strong contribution to livestock production in Ethiopia, the pastoralist population is facing serious challenges emanating from food insecurity.

Theoretically the concept of food security entails that individuals in a certain geographic space have access to adequate foods at all times. There is a demand and supply side to this equation. On the supply side, the main factors are suppliers, and consequently whether adequate amounts of food are being produced. On the demand side the main factors are consumers and whether they have ade-

It is therefore, important to assess the research institutional approach, structure, capacity and strategies of the NARS.

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Institutional arrangement of the NARS

EIAR is the institution which is mandated to coordinate all research programs in the country. The agriculture research system of the country includes EIAR, RARIs, HLI, IBCR, and Ethiopia based CGIAR affiliated institutes such as ILRI.

The major problem in this regard is that the institution which coordinates the research program nationally, EIAR, seems to be not actively doing the coordination of the NARS currently. This is a policy problem; the NARS have the mandate to do research of regional importance and EIAR is mandated to coordinate nationally. Thus, if EIAR have to coordinate research, to avoid duplication of efforts and save resources then EIAR should be able to coordinate research based on farming systems and agroecology through out the country. This assists to do research beyond political boundary covering all relevant agroecologies and farming systems.

The existing problems of coordination are mostly institutional. The GOE has started to take a measure to rectify the problems between EIAR and RARIs. Some RARIs still seem uncomfortable with the measures being taken. Some members of RARIs also relate some of the issues to the Federal and Regional Constitutions and the rights enacted for them to discharge their duties and responsibilities. In short, there seems to be a serious institutional arrangement and coordination mechanism problem that needs to be resolved by the concerned bodies in the soonest possible time. This is urgent for the agriculture research systems to remain as the key players in the scaling up/out, enhanced interventions in natural resources conservation, as well as the commercialization of smallholders' agriculture via the possible import substituting agro-processing business ventures development strategies in the, National Five Year Development Program (NFYDP). This is rightly indicated in the Ethiopia's Agriculture Sector Policy and Investment Framework Ten Year Road Map 2010-2020 (Demese et al 2010).

High mortality rates: About one-half of all lambs/kids born die due to various causes. This is a very important constraint limiting productivity. For example, annual mortality in all classes of stock averages 23% for sheep and 25% for goats;

Inadequate veterinary coverage: This results in high mortality and morbidity. Certain disease conditions are also causing Ethiopian animals and products to be banned from export markets.

Long marketing channels and lack of market information: Producers do not have access to market information. The system lacks market orientation, which is an important driving force for increased production.

Low product quality: Poor quality of live animals and small ruminant meat and meat products prevents penetration into many export markets.

Absence or inadequate provision of credit services: Livestock owners have difficulty obtaining credit to begin or expand production, purchase inputs, increase stock, etc.

Low average reproductive rates: Typical reproductive rates average as low as 55 lambs and 56 kids born per 100 mature females per year.

Problems of research approach and strategy planning in the pastoral areas

Despite the economic, social and political importance of pastoralism in economic, social and political in the country, it was marginalized by research and development. There was very limited research of relevance to the pastoral and agropastoral production including livestock breed development, feed resources, disease and pest management, rangeland conservation and management, socioeconomic aspects and marketing studies.

quate access to food. Previously, particularly in the 1970s-1980s, the focus had been biased towards the supply side due to the belief that once adequate amounts of food is produced, it could be easily distributed. This view has now been modified. Currently, there is a focus on both the demand and supply sides, although there is still a predilection towards focusing on the supply side. There are diverse ways through which people are entitled to food, through production or trade based entitlements. At present, food security has expanded to include nutritional security.

The presenter next addressed the linkages between the theorems of food security with current developments in Ethiopia. Ethiopia's economic path is guided by the broad framework of the ADLI. The focus of the program is to ensure food security by increasing domestic production. A separate food security strategy was prepared in 1996 which was later refined to include upcoming problems and challenges. The national agenda now includes national development strategy components such SDPR (Sustainable Development for Poverty Reduction), and PASDEP. These approaches address both the demand and supply side of the food security framework.

On the supply side there have been attempts to boost agricultural production to reach the level of self sufficiency. Addressing the demand side includes increasing individual entitlements to food by improving incomes, for example by expanding small scale irrigation, and the expansion of food credit. These have been primarily seen in highland areas. In pastoralist areas the main focus has been on voluntary sedentarization.

Three livelihood strategies are evident in the pastoral areas of Ethiopia: mobile pastoralism, agro pastoralism, and pastoralism combined with other livelihood alternatives. There are variations in herd composition in different areas, due to variables such as climate, vegetation and socio-cultural settings. Groups that practice mobile pastoralism produce and sell several types of livestock and purchase food grains, so they possess trade based entitlements to grains. Groups that practice agro-pastoralism combine livestock and crops. They

are not extensively mobile. Crops are grown around permanent settlements using rain or irrigation. Women are usually involved in crop production because they are likely to remain at the homestead. They also have a production based entitlement to food and sometimes produce high value crops. Agro-pastroalists have both production and trade based entitlements. The combination of pastoralism with other types of livelihood often includes practices such as farming and other types of casual work including charcoal burning, cross border trade, petty local trade, hand crafts, non timber forest products, salt mining etc.

Dr. Bekele noted that pastoralists are generally faced with food insecurity. Almost all pastoralist areas were insecure in 2008. The situation was similar in 2010, although some improvements were seen in the Somali region. He pinpointed some of the causes for food insecurity in pastoralist areas which include:

- Low livestock production and productivity, low price for livestock and livestock product, and weak performance of alternative livelihood strategies. The root case for these factors is the pervasive state of food insecurity.
- Intermediate causes leading to the failure of alternative livelihood strategies include conflict, scarce pastoral resources, low quality of range land, and weak integration of pastoral economy to external economies.
- Underlying causes leading to the failure of alternative livelihoods include land expropriations, natural causes (drought) weak infrastructure and low local capacity.

There have been both internal and external responses to food insecurity, including coping and adaptive strategies such as food management and livestock management. The former refers to attempts by pastoralists to protect their food consumption by attaining access to free food, i.e. food aid. If that is not possible, they diversify food consumption. Livestock management includes strategies such as the slaughtering of male animals and having their meat preserved during drought, and splitting herds and managing them separately. Adaptoral community. These scourges have occurred several times even at shorter intervals of less than five years. However, documented information on magnitude of displacement, loss of life and productivity of the animal is rare. The data available in various meteorological stations have not been utilized to indicate the magnitude of climate variability and changes that have resulted in the catastrophic loss of animal. Geo-referenced early warning systems need to be developed for drought, flood, and disease occurrence in aiding traditional mobility patterns of the pastoralists. This gap is a major problem for appropriate design and planning of research in the livestock sector.

In livestock research, the information gap in the past research and development intervention on impacts of climate variability and climate changes and the associated food insecurity on livestock production and productivity need to be bridged.

At this juncture it is important to summarize the major challenges of the livestock production to indicate what should be the way forward to improve the production and develop adaptation strategies for climate change. The major challenges to livestock production in Ethiopia are summarized below.

Scarcity of feed: the feed resource base for livestock production in Ethiopia is natural grazing and crop residues. The quality and supply of these resources is seasonally variable. Grazing resources in the lowlands are diminishing due to increases in cropping land, bush encroachment and overgrazing;

Lack of infrastructure: Infrastructure necessary to transport livestock or livestock products from remote rural communities, where production is concentrated, to urban markets is lacking. Livestock are generally trekked long distances for marketing, often without adequate water and feed. They are also trekked similarly long distances in search of feed and water. There are very limited market centers and stock routes with the necessary facilities such as feeding and watering points;

ration, planting and weeding. These implements were tested on farm trials in order to evaluate their agronomic efficiency and gauge farmer's reactions.

Mechanization of small and large scale farming is a critical factor for food security and sustainable development in Ethiopia; as a result, several implements have been developed by the implement division of EIAR. These include implements such as tied ridger for water conservation, moldboard plow for land preparation, winged plough, sub-soiler, sowing and weeding implement (these implements are good for conservation tillage, and controlling weeds) which are important for excellent crop performance and yield increase in the agropastoral areas.

Several post harvest machines which are useful for threshing, and storage were also developed by EIAR engineering division. These implements are low cost and most of them could be made using local materials. They are also found to be easily adopted by the cultivators.

The major problem is that there is no manufacturing enterprise which could manufacture the implements in bulk and distribute to the users. In addition there are appropriate implements developed in other countries such as India, China and others. The problem is there is no technology importation policy in the country.

In addition to these constrains lack of availability of pesticides and other chemicals for disease and pest control limits agricultural production. Limited technical knowledge on the application of these chemicals is also a problem, indicating that there should be policy attention to solve these critical problems.

Problems Associated with Planning Appropriate Research and Development of Livestock improvement

Drought and flood, the death of animals, loss of reproductive and productive efficiency, and deterioration in quality and productivity of grazing lands ultimately result in increased destitution of the pas-

tion strategies include the diversification of livestock species, and the adoption of other livelihood strategies.

External responses have been witnessed from both governments and NGO's, and there have been both emergency responses as well as developmental approaches. The Pastoralists Community Development Program (PCDP) has undertaken projects in several areas through the implementation of programs termed phase I and phase II. Pastoral safety net program, which was extended from experiences in highland areas, is being implemented at a pilot stage. There have also been several NGO interventions, such as the GL-CRSP through PARIMA project in the Borana areas which has a pilot programs on risk management activities and institutional capacity building. Best practices are being re-implemented by the umbrella group PLI-ENABLE, a consortium of NGOs. NGOs such as Farm Africa have also been active in natural resource management and agricultural development.

The presenter identified both internal and external responses for the way forward. Initiatives have been highly adaptive to local contexts but pastoralists have limited capacity to address current livelihood challenges. Pastoralist efforts to reduce vulnerabilities through mobility are hindered by land encroachments, resource degradation and conflicts among pastoralist groups. Although there are a great number of NGO's working in pastoralist areas, insecurity is still evident because interventions are not implemented appropriately, for example in some cases duplicative initiatives are implemented concurrently. This is also evident in government operations. For example the Ministry of Agriculture and the Ministry of Federal Affair sometimes engage in duplicative efforts due to poor coordination.

Food aid is the most dominant form of emergency response in these areas, but studies indicate development initiatives are more favored/prioritized among the residents of these communities. This reveals that the assistance should focus on long term development initiatives. Post-crisis interventions should also be made more responsive. Emergency responses are delayed up to 6 months in some cases. The delay in post crisis intervention can also be mitigated by

strengthening pre-crisis interventions. This would enable pastoralists to protect pastoralist assets. The current attention on development initiatives in pastoralist areas is a positive progression; however, prejudice towards mobile pastoralism should be avoided. The focus on sedentarization is limiting; heterogeneous responses should therefore be considered.

The presenter concluded by postulating three alternative development pathways. First is market oriented pastoralism, which includes improving livestock marketing, rangeland management, and conflict management. The mobile aspect of some pastoralist livelihoods should be tackled by providing mobile basic services for example mobile education, veterinary services etc. Second is market oriented agro-pastoralism. This entails a contextual balance between livestock and crops. It would also require basic infrastructure in settlement areas. Third is exploring other livelihood alternatives. This includes promoting handcrafts, trade and eco tourism. Pastoralists need to become beneficiaries of revenues attained from tourist flows. This should be combined with complementary measures such as discouraging harmful practices, promoting cooperatives and working groups. Institutional capacity building should also be explored; with an experience sharing element i.e. successful experiences/initiatives seen in one community can be implemented in another.

Ato Tamrat Kebede followed the concluding comments by highlighting the main recommendations of the presentation. Firstly, there needs to be a coordination of efforts in pastoralist areas, including interventions. Secondly, there should be diversified approaches to development. Thirdly, there is a need for increased focus on pre-crisis and long term development efforts.

The discussant for Dr. Bekele's paper was Dr Alula Pankhurst, an independent consultant and researcher who has undertaken a number of studies on pastoralist livelihoods. He began his remarks by emphasizing that the paper was comprehensive and informative, and that his comments would highlight important points as opposed to critiquing the presentation.

the traditional farm implements such as the *Maresha* (ox plough) for land cultivation are not efficient in finishing the activities on time.

Labor shortage is one of the major crop production constraints in the traditional farming systems in the dryland areas of Ethiopia. This is particularly true in the semi arid areas because the duration of the rainy season is very short and all the farm activities such as land preparation, planting, weeding has to be performed within very short period of time. This situation is aggravated by the lack of appropriate and efficient farm implements such as improved plough, row planter, weeder etc. For example, the major traditional small farm implements available to the smallholder farmers for land preparation in the Ethiopia are mainly the traditional plow Maresha and the local hoe, which are not efficient in terms of time.

Developing of multi-purpose implements to accomplish tillage, seedbed preparation, rainwater conservation, sowing sole and intercrops, fertilizer application, weeding and harvesting is therefore, very important. But, the Ethiopian agriculture is only blessed with either plow-culture or hoe-culture depending on the location. There is a dire need for time and labor saving devices, which ease labor peaks for improved crop management. What good does it do to recommend row planting or early weeding and use of tied ridges when farmers have little chance of adopting them for lack of appropriate implements suited to their circumstances? Crop management recommendations must be backed by the appropriate technologies that facilitate their adoption by farmers. This leads to the simple but important conclusion that crop management research is multidisciplinary and must be integrated across disciplines.

One of the major constraints in extending the available agronomic technologies to end-users has been the lack of appropriate farm implements particularly in terms of crop production. However, with the active collaboration of the Agricultural Implement Research and Improvement Center (AIRIC) staff and dryland farming agronomists over recent years, several simple oxen drawn farm implements, such as tie-ridger, row planter and row weeder have been identified. This assists in reducing labor bottlenecks for land prepa-

this issue needs a series attention to improve production and achieve food security.

In conclusion as indicated earlier, it takes a long period of time and intensive work to develop improved cultivars through the breeding program. Farmers to benefit from these technologies and increase crop production they need to get the seeds of improved varieties at the right time, with sufficient quantity and good quality and reasonable price.

Fertilizer input

Soil fertility is a declining asset in much of the semi-arid ecological zone particularly in the pastoral and agropastoral areas. Inorganic fertilizer is lower on the average than any where else. However, according to the survey made by consultants who prepared Ethiopia's agriculture sector policy and investment framework: ten year road map (2010-2020) draft report, now the availability and use of inorganic fertilizer in Ethiopia is increasing.

The fertilizer use efficiency is also low in Ethiopia. To increase the efficiency of fertilizer use it should be used with water conservation or under irrigation. In addition, ideally it should be used in combination with organic manure, which is not scarce in the pastoral areas. This will have great impact in increasing production and productivity and leads to solving food and feed insecurity problems. Furthermore, the effects of fertilizer application are enhanced with the use of improved varieties on which a multiplying effect on coefficient of response is obtained.

Farm implements

Appropriate farm implements are required to perform agricultural activities in time with the required efficiency. This is particularly true in crop production since length of growing period in the agropastoral areas in particular, and the drylands in general is short and a lot of the farm activities have to be performed on time. For example,

Dr Pankhurst had three comments regarding the contents of the presentation. In the introduction pastoralism is defined as an ancient mode of life. However, numerous researches have shown that pastoralism appeared at a later stage in human history, possibly following the agricultural period. There is a danger in branding pastoralism as an ancient mode of living as it may lead to an automatic assumption that it's a disappearing custom. Instead, if it is seen as a viable sustainable way of life i.e. a dynamic livelihood, measures to sustain pastoralist livelihoods would be better envisioned and garner more focus. This includes underlining the contributions of pastoralism to the national economy.

Dr Pankhurst further commented that, although Dr. Bekele highlighted that pastoralism exists everywhere in the world, there needs to be an emphasis on the fact that they are being pushed to the margins i.e. isolated areas. Agricultural, commercial, and state interests are encroaching on natural resources. Statistics on pastoralist's access to basic services have shown that they have fallen below the fault line.

Dr. Pankhurst next highlighted on the issue of pastoralist distribution in Ethiopia. Although most pastoralists in Ethiopia are in the Afar and Somali regions, there are pockets/units of pastoralists in different ethnic groups. These small clusters of pastoralists within larger communities are important because they show significant, adaptive ways through which food security can be attained. For example the Horr pastoralist groups have produced 56 different varieties of sorghum. Dr. Bekele 's recommendations of three livelihood alternatives is useful as an analytical tool. However, an interlink between the analytical models is lacking. For example, most pastoralists do not subsist from their own livestock products. This is because pastoralist economies are heavily dependent on the trade of goods.

In addition, when there is expropriation of resources, such as land and water through the support of private investment, the mobility of pastoralists is automatically affected. Other types of livelihoods

are also interlinked with livestock and crop production. Pastoralist areas cannot support their population through the current way of life. Population control needs to be addressed otherwise these areas cannot sustain the current population growth.

While agreeing with Dr. Bekele 's descriptions of the natural factors for food insecurity, Dr. Pankhurst emphasized that the underlying issue of resource competition needs to be highlighted. Commercial competition, resettlement, highland-lowland dynamics and investments in the flower farms have seriously affected all forms of pastoralist livelihoods. One issue that needs to be addressed is how to balance and share the benefits of state interests with the needs of the local community, especially since these interests affect natural processes: natural factors are exacerbated by manmade, socio-political factors.

In the responses highlighted in the paper internal and external coping and adaptive strategies were divided according to state and NGO initiatives. The discussant also highlighted that the suggestions in the way forward were highly pertinent. Mobility as a response is compromised due to various obstacles such as land expropriation. Food aid is described as the most important type of response. One question that arises from these discussions is whether there should to be targeted responses to those who are most in need, or whether there should be a focus on building institutions within the pastoralist communities so that they can help the needy themselves. The prejudice towards the pastoralist community was also not addressed. Settlements are not the preferred option for pastoralists as mentioned by the presenter. Customary ways of managing the environment can be enhanced rather than undermined. The need for conflict management systems was also mentioned by the presenter, and some of the strongest conflict mediating institutions can be found in pastoralist communities. There need to be linkages between state mediation and traditional mediation mechanisms.

Interventions to improve agro-pastoralism need a contextual balance between livestock and crops. Analysis is required to ascertain who is benefiting from access to certain resources i.e. who are the

Since the seed is the key link between the technology developed and end users it should be a national strategic agricultural input and needs emphasis with its complexity starting from production up to marketing distribution and use. Quality control and the integration and working relationship among **public and private research**, development and multiplication agencies should become vital to facilitate the production and supply of improved seeds to the farming communities.

However, this relationship is weak and the desired level of integration and coordination and as a result lack of adequate quality control measure, and certification of improved seeds. Furthermore, the existing system is not giving a fair competitive ground for ESE as well as private seed enterprises. ESE is at a cross road of being a profitable parastatal and a non-profit making development supporting enterprise of the government functioning with controlled prices and protected labor.

The private sector is not supported to expand particularly in the area of having support to access credit. Both Ethiopian Seed Enterprise (ESE) and RSEs as public enterprises need also to adjust to the production of pre-basic and basic seed living space for the private seed producers, including farmers, to handle the certified seed production. In general, the system should be reassessed in terms of organizational and relational aspects so that all actors can work closely i.e. the public, private sector dealers, CSOs, specifically the newly organized Seed Association, NGOs, development partners as well as those enterprises working in the seed business but located in neighboring countries.

This issue continued to be a problem in Ethiopia. Farmers have always been not willing to adopt new varieties because seed production was not reliable and the seed was not available in sufficient quantity and at the right time and reasonable price**.**

Due to lack of improved seed varieties the pastoral and farming communities were not beneficiaries from these technologies. Hence,

sector. While this move is easy to undertake, it also could overlook some of the useful public services that the parastatals did perform. A number of the services the parastatals were rendering are not being continued by the private sector and this is especially difficult for the drylands. For example, the Ethiopian Seed Enterprise had produced reasonably high quality seed including teff, grain legumes and oilseeds in the past. However, with the governmental directive of 1994 to become profitable they have focused on hybrid maize and wheat and have largely and discontinued the production of seed for the drylands and pastoral areas including teff, the principal staple of Ethiopia. The Ethiopian Seed Enterprise now imitates private sector behavior and has little, if any, interest in seed markets of the orphan crops in the drylands the pastoral areas. This needs attention from the Government.

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Several policy issues revolving around the seed system need review. These include mandates and responsibilities of the public and private sectors for production, pricing and distribution, seed import and the issue of harmonization with other countries seed system, as well as the extent of government intervention in the private seed enterprises operations as rightly indicated by the Ethiopian Agricultural sector policy and investment framework: ten years road map proposal (Demese et al 2010 draft document).

stakeholders, how is the local community benefiting, etc. For example, pest resistant and drought resistant crops are being replaced by high yielding crops that may not be as sustainable. Additionally, interventions should enhance other livelihood alternatives because areas where pastoralists currently reside cannot withstand population pressures. In promoting alternative livelihoods stakeholders should be wary of local interest, for example eco-tourism have led to serious issues over control and power. In addition, the promotion of state parks has excluded pastoralist consideration. Case studies from other African countries have shown that fencing out pastoralists is not the most efficient scenario, and including them in the park processes has proven to be much more beneficial and sustainable. Pastoralists are an integral part of the ecology, and park ecologies were created through the interaction of human beings with livestock and other types of wildlife. Rather it is the introduction of poachers, which is changing this dynamic.

As part of the effort to discourage and control harmful practices there is a need to identify external issues such as urban demand (for example, the demand for charcoal) which may sustain more positive, market oriented practices. As long as there is a demand for such products there will be continued production. One way of linking such enterprises with national markets is creating group cooperatives. However, the cooperative sector was undermined during military regime, which has created a trust deficit for promoting this type of structure. The cooperative sector is a possible way forward once linked to markets and once communities are sensitized on the benefits of such structures. The use of micro- credit may not be the best solution for most needy because they are most likely to be impacted by socio-economic shocks. Consequently, they need a safety net/insurance to buttress them from acute crises, a system currently lacking in micro credit schemes.

The discussant further stressed the need for deliberation about rights within the context of pastoralism. The rights of women to livestock, women's influence on the production process, as well as women's rights in polygamous arrangements and during divorce are all important issues that should be addressed by such a discussion.

Another point highlighted by the Dr. Pankhust was the need to avoid treating pastoralist areas as homogenous entities. The practice of pastoralism is a heterogeneous process. This extends to the configuration of cross border relations, for example the interaction between Ethiopian pastoralists in Gambella and those in South Sudan, and pastoralists in the Somali region of Ethiopia and Somalia. Among some groups there are massive clan structures that create strong cross border linkages, while other groups form smaller clusters created by the links between small pastoralist groups. The assumption of homogeneity is dangerous because it may lead to homogenous responses. A case specific approach would be a better alternative in addressing the heterogeneous nature of pastoralism. Dr. Pankhurst concluded by stating that national revenues should be utilized for these areas, in order to avoid marginalization and isolation.

The last speaker at the symposium was Dr. Kidane Georgis, who presented a paper entitled "Food Security and Agricultural Technological Options in Pastoral Areas of Ethiopia." Dr. Kidane is a researcher and consultant at the Ethiopian Agricultural Research Institute. He has extensively researched and published on dryland agriculture, NRM, crop improvement, soil-plant-water-relationships. He has also coordinated different dryland research programs at federal, regional and higher learning institutions.

Dr. Kidane stated that the main objective of the paper was to provide an analysis of the available agricultural technologies in pastoral areas, provide a comparative analysis of these technologies, and identify problems associated with the transfer of these technologies. The presentation also assessed the appropriateness of and benefits from existing technologies in pastoral areas.

The presenter next provided a brief background of pastoralist production systems in Ethiopia, which encompasses 8-10 million people (based on a PASDEP study) with an area coverage of 620,000 km2 including 122 woredas within 7 regions i.e. 60% of Ethiopia. Data on pastoralist areas shows that the rate of evapora-

horticultural crops, basic food crops, animal production is picked up in the following sections.

Problems of Adapting Technologies in relation to crop production

In the above sections the technologies developed for the drylands pastoral areas to improve food security are discussed. However, the important issue which should be considered is that whether this technologies developed are being used by the farming and pastoral communities to achieve food security. Thus, the problem of technology transfer and other problems of policy or similar hindrance to the use of technologies is discussed in the different agricultural and natural resource management practices in the following sections.

Crop improvement program

As discussed above there are several technologies developed to improve crop production in the drylands agropastoral areas and some in the arid pastoral areas through irrigation. The impact of these technologies is very low and the major problems associated with this problem are listed below.

Lack of Improved Seed System, fertilizer, farm implements:

Seed input

Improved crop seed for humans and forage for animals is the link between researchers and end users. After several research efforts, improved varieties should be developed in time and made available for use by the farming and pastoral community with required quality and enough quantity. The lack of improved seeds is a major problem in Ethiopia. Addressing this problem is the key issue for the research system, development workers and above all policy makers.

Both the public sector and private sector should be strengthened to produce improved seed, however, recently there has been a push to do away with parastatals and encourage the evolution of the private

ited production and where food insecurity prevails, it is an important means of survival.

What is important is improving the livelihood through increasing the income of stallholders in the drylands. It was observed that annual income of beekeepers increased from about 5000 US dollar in 1998 to about 1.8-2.1 million US dollar benefiting 10,878 households in 2007. In the same decade, average honey productivity increased from 5 kg to 30-50 kg/hive/year and price of quality honey increased by eight fold. In many areas of the watershed program similar success has been obtained.

The watershed improved the availability of forage for increasing the production and improved the market linkage. This facilitated the price increase of honey thereby the income of farmers.

High quality honey is produced by the farming community under watershed in Tigray region and is changing the income situation of farmers and improving livelihood. This is clearly shown in the following section which part of the success stories in the integrated watershed management in Tigray region and could be easily adapted to the pastoral areas.

In conclusion it should be noted that tree crops have far greater importance to households and society than their simple values in production or trade. Trees are assets that farmers can often use as collateral for obtaining credit, provide a multitude of by products such as fuel wood and medicines, and perform many environmental functions such as curbing soil erosion, sustaining biodiversity, and sequestering carbon. Tree crops also help to integrate local economies into wider markets by providing local, national and world-scale economic chains, incorporating numerous enterprises of all sizes and leading to a high multiplier effect.

The part of the document on watershed role, concepts and experiences in Ethiopia in NR conservation and management, food security integration, agricultural production factors, crops particularly

tion is high due to high levels of heat. A high potential of crop production was identified in the Benshangul Gumuz region. Some of the problems identified in the pastoralist regions included: ethnic conflict, marginalization of pastoralists in decision-making processes, demographic pressures, the exclusion of relief and reconstruction programs, the introduction of big rangeland management programs which ignore the value and high productivity of existing pastoralist production systems. Most attempts have failed due to a lack of input from pastoralist communities. Although rainfall is limited in pastoralist areas there are rivers and underground sources that could be tapped int. However, the irrigation potential in areas has not been utilized.

Dr. Kidane identified the different technologies that have been utilized in pastoralist areas:

1. **Breed improvements**. These include: sheep and goat which were introduced by MOARD and USAID project ESGPIP; and Dropper sheep**,** a South African mutton breed from the initial crosses between Dorset Horn and Blackhead Ogaden and Blackhead Persian. These breeds are highly productive and high quality with natural tolerance to high temperatures, droughts, pests.
2. **Boer Goats**: one of most popular breed with excellent carcass quality . It is contributing to the community's adaptation to climate change and food insecurity.
   Issues for consideration identified by the presenter included whether these breed fundamentally address food security. Especially considering that while the livestock productivity is high, feed requirements are also high. Camel breed improvement has not been properly addressed primarily due to limited research.
3. **Feed Improvement**: Duplicative efforts have been witnessed in this sector due to numerous NARS (National Agricultural Research Systems.) One example of such an initiative is the crop resistant crops produced by ILRI.

There are also various crop technologies utilized by Ethiopian pastoralists. Rice is becoming very popular especially in the Somali region. This is partly due to the fact that it is a high yielding crop e.g. Nerica 6 (which is a type of rice.) Pastoralists use a variety of crops as food. Crop improvement has thus far mainly focused on varietal development. There has been a concentration on selection and adaptation as opposed to drought tolerance and resistance.

Although agronomy research is a key component of crop improvements, it has not been given sufficient attention. In Ethiopia, there are constraints related to the lack of soil, which is being eroded to Somalia and Sudan. However, yield can still be improved by almost 100 % with the introduction of crop variety. Currently, there is a focus on high value, market oriented and multi-purpose crops which were neglected in the past. In addition, NRM (National Resource Management) which used to be marginalized is now being addressed with renewed focus. On the other hand agronomic management, which is key to crop production on a sustainable basis has been marginalized in all aspects.

The presenter next addressed problems related to the adaptation of technologies in relation to crop production. These include; the lack of an improved seed system, fertilizer and farm implements, and the unwillingness of farmers to adopt new varieties because seed production is not reliable and was not available in sufficient quantities.

The presenter concluded by highlighting some recommendation;

- Policy makers and planners should be able to integrate environmental concerns into country economic planning and social development.
- Drought preparedness should be a primary concern. Too little effort has been made to design policies that will reduce both the short term and long term impacts of drought.

The basic preconditions for improving dry lands and pastoral management are government concern, political will and commitment.

NTFPs: Implication for Policy Dialogue in Food Security

Non-timber forest products include variety of fruits, nuts, seeds, oils, spices, resins, gums, honey and beeswax, medicinal products, firewood and many more products and/or services specific to the particular areas from which they originate specially the drylands. These resources are rich in all pastoral areas, in the Somali region Dolo Odo are as the survey of the researchers of EIAR and SOPARI staff indicates. This unexploited resource and due attention should be given to these areas urgently and we are bringing this to attention to the regional and federal policy makers of Ethiopia (Kidane and Adefres 2008).

Ethiopia's forest products related export articles for centuries are mainly NTFPs such as gums, incense, spices, honey and wax. For instance, in the period 1996 - 2003, Ethiopia exported 13,299 tons of natural gum and earned 141,064,151 Birr (≈18, 000,000 USD), while there has been large import of lumber during the same period. In addition, national level forest industry (timber related industries) based employment amounts 9,583 employees, compared to 20,000 - 30,000 employees in gum and resin related business alone. Similarly, over 85% (approximately 60,000,000) of the population of Ethiopia depend on herbal/wild medicines for their primary health care and biomass-derived fuel for their energy. The dependency on herbal medicines and biomass based fuel has saved the country a huge import of modern drugs and petroleum.

This is very important particularly for the dryland forestry and should be considered in the program of climate change adaptation (Kidane et al 2010).

Bee keeping NTFP: Beekeeping is and has been widely practiced in many households and contributes significantly to the livelihood of the rural farmers. Beekeeping is particularly important in areas where rain-fed agriculture is less favored in drought prone such as the pastoral areas. In the highly degraded areas where there is lim-

pand their market value. They are important security in the rapidly changing global environment as wild reserves of biodiversity for human use. However, the challenge now is many of the plant species used as wild food are rapidly disappearing, even before known to science.

Non-timber forest products (NTFPs) for improved food security and livelihood

Pastoral areas are endowed with natural resources. Among these resources woodlands consisting of Acacia, Boswellia and Commiphora species represent important biological resources with significant economic and ecological functions. Although data on the extent of these resources is largely unavailable, some estimates on woodlands well-stocked with economical important tree species put the real extent is estimated to be about half a million ha (Mulugata and Habtemariam 2008).

The woodland resources are a source of income, food and medicine for the local populations, but most importantly these woodlands represent the source of export products such as gum, gum olibanum and myrrh generating tens of millions of birr annually (Mulugeta and Habtemariam, 2008). In terms of ecological functions, the woodland resources increase the resistance of the local ecosystems against the ever expanding desertification frontiers in the peripheral areas of the country. The woodland resources also play a significant role for stabilizing local climates and also sequester carbon, which is important to minimize the effect of climate change.

However, the research and development efforts are minimal despite the economic, food security and the importance of the current fight 0f the threats of climate change and this should be the focus of future research and development by researchers, planners and policy makers. In This discussion paper the author wants this to be emphasized.

The discussant for the last presentation was Dr Alemayehu Seyoum, a senior research fellow at the International Food Policy Research Institute. The discussant began by highlighting the main points of presentation, which outlined the growth potential of pastoralists, then assessed technologies and obstacles that will influence this potential. The presentation noted a number of areas where research has advanced in forwarding solution alongside gaps that still need to be addressed. Four key tensions were identified ranging from systemic gaps to narrower, niche gaps. First is the tension between knowledge gaps and the urgency for action. Immediate action should be taken in these areas and stakeholders are aware that there are dire knowledge gaps that impede the realization of these objectives. There is also a need to establish a hierarchy of diagnostics based on what is known, prioritize the information, and invest in filling the knowledge gaps. The second tension is the collision between traditional and "new" practices. Although traditional practices are important, it has been established that increases in productivity cannot be solely attained through traditional practices. This doesn't signify that new practices are always better; rather combining both approaches may lead to more effective results. Although traditional knowledge are efficient in smaller localities, attempting to scale them up or transplanting them to other areas is not always a feasible task. Instead, focusing on clear intersections between stakeholders and communities, maintaining the involvement of communities, and creating mechanisms that exploit synergies could be a more viable process.

The third tension highlighted by the discussant is the debate concerning large economic space versus small economic spaces. Pastoralist areas represent local economic spaces. However, this does not connote to less importance. This space is encompassed by larger economic dynamics, which the previous discussant had alluded to. Pastoralist problems are often seen as local problems that require local solutions, however there needs to be an identification of the linkages between the local and national economic spaces. For example, in Morocco there was a delineation of production according to highlands and lowlands. Highland areas produced grains while low land areas specialized in livestock. In 25 years. this arrangement has

been reversed and Morocco is now a food secure country. The Morocco example shows how radical thinking should be considered and may succeed. The fourth issue is the tension between change and maintaining the status quo. Broadly, there is a depiction of this tension as modern life versus traditional systems. The symbiosis between these two modes of existence needs to be agreed upon. There is an evident romanticization of the traditional way of life, which ignores some of the harsh realities of traditional systems. The dichotomous perspective of modern versus the traditional needs to be reassessed. For example, how to combine sustainability and individual initiatives, since sustainability looks at collective control over resources.

Discussions following the presentation were moderated by Ato Tamrat. A participant questioned the lack of a clear definition of pastoralism and pastoralist in the presentations. The participant also stated that there are new developments in policies related to pastoralism, the AU is currently developing a policy framework for Africa. The policy defines what constitutes pastoralist livelihoods. This effort coincides with the need to appreciate and realize the effects of governance on pastoralists, especially in the context of marginalization. Issues such as food security, development, and health access, are usually excluded in the decision making process of policy makers. The participant echoed the comment by a previous speaker that localization of pastoralist problems ignores the national and international levels of some of the issues faced by pastoralists such as terrorism, organized crime, and commodity prices. A second participant asked Dr. Roberts to share her assessment of the current food security situation in Ethiopia, and questioned whether there are options that have not been entertained and could be discussed in this forum. One such option that could be discussed is the use of community based risk reduction as a development option. Lastly the participant asked Dr Georgis about the tendency to concentrate on supply side technologies. Technologies should not just be viewed as scientific processes; local communities should have an input into it as well, and the adaptation of technologies by pastoralists was not addressed. A paradigm challenge is evident in that local practices and local solutions are not seen as technologies. For example, the

Noble Traditional Practice use of wild Plants for Food and Feed Security in the pastoral and agropastoral areas

The role of wild plants as food source is widespread in Ethiopia, especially in food insecure areas, including most pastoral areas, where a wide range of species are consumed). The consumption of wild plants is a necessary part of the strategies adopted by people in order to survive in harsh environments and periods.

There are 120 species of plants recorded as wild food plants in Ethiopia, and 50 of these species have been listed and classified as typical "famine-food" plants (Kidane 2010). Many pastoralists do not store and carry food over long distances, but rely on the seasonal products of forests in the pastoral areas.

Some examples include ripe fruits of *Cordia Africana, Balanites aegyptiaca, Dovyalis abysssinica, Ficus* spp., *Carissa edulis*, and *Rosa abyssinica* are commonly consumed in many rural Ethiopian regions particularly by children. Fruits of *Opuntia ficus indica* and *Borassus aethiopum* are consumed and traded in the market for cash generation in the dryland areas Tigray in Humera and Afar pastoral areas and other drylands.

In general, the food values of the Ethiopian trees and forests have *little*, if anything, been systematically explored and documented. Despite frequent recurring famine problems, these have so far been given little attention. The reluctance to systematically catalogue the food values of the Ethiopian trees and forests is further persuaded by rapid destruction of the natural forest vegetation and the low level of dependence on forest food as compared to eastern and southern African countries. Therefore, the experience of these neighboring countries should be used to up scaling this practice and improve the food insecurity problem.

This wild plants are therefore, very important for food security particularly in terms of the current threats of climate change. There is substantial opportunity to domesticate these wild plants and to ex-

Cactus pear can convert water 4 or 5 times more efficiently to dry matter than most efficient grasses. Cactus is actually a dryland crop so very important in the semi-arid and arid regions pastoral system.

Cactus used for animal feeding: abundant, easy and cheap to grow, palatable & can with stand prolonged droughts, very important as a dry season feed when other fodder crops are not available. It is becoming a standing feed for livestock in many areas. The feed from cactus is deficient in protein and need to be supplemented with protein source. For example mulberry leaves were found to improve the forage potential of cactus.

With decline in demand for the tender young pads at the end of the kremt, they are alternatively used as dairy cattle fodder. Local dairymen maintain that a cactus pad are essential for good lactation, imparts a better flavor and quality to the milk and enhances better quality for butter.

Opuntia is a good fruit species and source of animal feed, but with a potential invasiveness, and any attempt for introduction should make sure that it would not get out of control and escape into natural habitats. In Tigrai adaptation trials have been made to different places, and the species demonstrated that it is weedy and highly invasive for example in Werer and Jijiga in the Afar and Somali areas respectively. Thus, it is strongly advised to try it at a pilot level under controlled condition and then upscale it to other areas.

External Experience of Cactus as a Feed and Rangeland Rehabilitation: The most extensive use of cactus occurs in Brazil where O. ficus-indica has been grown as a fodder for more than 80 years. The use of cactus for fodder minimizes the fodder shortage and this assists in minimizing the effect of overgrazing and it enhances soil resource conservation.

productivity of local feeds has not been sufficiently researched.

Participants also questioned the relationship established between constraints on mobility and the expansion of commercial agriculture. The issue needs to be seen as a dynamic process that should be addressed progressively as opposed to a policy failure. Furthermore, the shift from food security to a concentration on livelihood betterment should be given due consideration. Save the Children UK has identified thresholds for livelihoods as well, based on a distinction between survival thresholds and livelihood protection threshold. The former looks at calorie intake, while the latter looks at nutritional and basic requirements of households. Food security and livelihood thresholds are interrelated. The participant added that most stakeholders are aware of the recommendations that have been presented in the symposium. The primary focus should be on the implementation of the recommendations via practical engagement. Finally, a participant asked why the food insecurity data showed improvements in 2010, as compared to 2008.

Dr. Bekele was the first presenter to respond to points raised during the plenary. He stated that there is no specific definition of pastoralism. According to a broad definition pastoralists predominantly depend on livestock, and could encompass ranchers as well. They are not necessarily constrained to dry land areas. Pastoralism in the Ethiopian setting is defined as people who exercise traditional livestock management systems and depend mainly on livestock production for their livelihoods, groups that are mostly mobile and utilize land collectively/communally. There is a pastoralist affairs standing committee at the Federal Parliament and special projects are designed by the government to address the needs of pastoralists. However these have not been sufficient in resolving the challenges faced by pastoralists and pastoralist areas are not getting the emphasis they deserve.

The implementation of recommendations and initiatives has been the major dilemma. In addition, the focus on sedentarization is detrimental because it not viable uniformly, which pertains to the het-

erogeneity of pastoralist groups. Livelihood options require some improvements, for example while alternative livelihood option are being exercised traditionally they are not given the sufficient policy emphasis. The tensions mentioned by Dr. Alemayehu Seyoum are important in this regard. Continuity and change can be seen as simultaneous processes. But the process of change needs to be disaggregated i.e. what initiative to promote and what initiatives should be relegated.

Dr. Bekele ended his comments by stating that there is a need to scale up best practices in pastoralist areas, and that the improvements in food security witnessed in 2010 in the Somali region may be related to climatic improvements.

Dr Georgis was the next respondent to the discussion points. He emphasized that traditional management practices are important, and pastoralists have many good practices. One entry point is scaling up these good practices. For example, there was a study on pastoralist development which documented all best practices with particular emphasis on agro pastoralist. The primary obstacle in this process is the lack of data centers or resource centers which researchers and practitioners can access. Consequently, there is no concrete knowledge on who has done research in different areas. Dr. Georgis added that there is a gap in rangeland management. The presenter concluded by stating that there needs be follow through on the recommendations presented at the symposium, and one way forward is transmission of the information to the government. Plans that address pastoralist need to be ambitious and all encompassing.

Dr. Roberts continued the discussion stating that currently there are factors that contribute to food security vulnerabilities, but are not addressed in statistical data regarding food insecurity. Such factors include floods, which increase food insecurity, however they are not encapsulated in food insecurity statistical data. Interlocking vulnerabilities need to be addressed, whether in pastoralist or agro pastoralist settings. This includes looking at old, new, local and global vul-

Cactus (Opuntia ficus indica)

Cactus is very drought resistant multipurpose with multiple uses. It is used as human food, fruits and leaves, forage for livestock, cash crop fruits sold fresh and processed as juice or jam, medicinal purposes, Cochineal, lice grown on leaves of Opuntia from which a natural red dye called carmine is produced which are used worldwide in cosmetics, food and pharmaceuticals.

Cactus grown particularly in the dryland areas of Northern of Ethiopia is a food and feed security crop. But also grows in many pastoral areas including Somali, Afar, Oromia, Borana and Central Rift valley. It is drought resistant crop and good climate change adaptation. A typical cactus plant grown in the drylands pastoral and agropastoral areas is presented below:

Fig 1 **Cactus plant grown in the dry lands**

ment and an avenue tree around homesteads and along roadsides. This crop is now important is becoming popular in the drylands Afar, Somali, Tigray. Neem is important for soil and water conservation, minimizing pests' infestation in agricultural production system; provide medicine (in controlling malaria infestation) etc as indicated above. Thus this crop conserves resource; mitigate some important disease and pests which are threats to humans and animals which are manifestation of climate change.

In summary the message here is neem is multipurpose in terms of health issues such as malaria control and control agriculture pests in the pastoral communities and more research and development should be pursued in the future.

Moringa stenopetala (*Bak.*) *Cuf.*

Moringa Stenopetala is often referred to as the African Moringa tree because it is native only to Ethiopia and northern Kenya. It is multipurpose tree and all parts of the tree except the wood are edible, providing a highly nutritious food for both humans and animals. The flowers are a good nectar source for honey and the seeds are a rich oil source for cooking and lubricant uses. Many parts of the plant have been used in medicinal preparations.

Therefore, moringa Stenopetala economically, for food and feed security, for medicine preparation and contributes to health improvement and nutrition. This crop produces high value cooking oil and lubricant and this high value products which can improve the lively hood of the pastoralists.

Whole plants have been used as living hedges, fences, and windbreaks. The wood is very soft; useful for paper but makes low-grade firewood and poor charcoal. The crush seeds could also be used for cleaning water for drinking. This crop is traditionally grown in the Konso area, south Ethiopia and has been found to adapt to the dryland particularly the agropastoral areas of the central Rift valley.

nerabilities as well as addressing the nuances influencing different production levels.

The plenary continued with suggestions that commercialization of land issues and how it contributes to food insecurity issue could have been assessed more critically. More information should be provided on the issue of livestock branding. A participant commented that while Dr. Bekele 's presentation was informative, the focus on livestock precluded other factors, for example the Somali region is soil rich which could be developed for other types of usages. Additionally the analysis of government responses to food insecurity did not include regional responses. The participant asked what the specific policy related problems are in pastoralist areas. The participant also questioned whether the issue of expropriated land as a problem area is exaggerated. Particularly considering that commercial farming and parks are usually placed on unutilized/unusable land. The participant concluded by questioning Dr Georgis' assertion that pastoralists are excluded in decision making processes is incorrect; the participant asserted that due to the decentralization process in Ethiopia pastoralists have local channels through which they can voice their concerns. A second participant stated that practitioners are lacking necessary knowledge on pastoralist areas. Tackling fragile systems and vulnerabilities within pastoralist systems require a knowledge base. There is also a need to assess recent developments in food security programs, and how they reflect on pastoralist livelihoods. The participant reiterated that there is a need to identify/ highlight the specifics of policy related challenge in pastoralist areas. The participant concluded stating that technology applications need to be based on an understanding of different agro pastoral sectors.

Following the conclusion of the plenary session Ato Tamrat provided the closing remarks for the symposium. He highlighted 6 recommendations extracted from the presentations and discussions:

- There is a need for a firm commitment and political will to transfer policies into action.
- There needs to be support of pastoralist livelihoods as

major component of national economy, exploring alternative livelihood strategies that differentiate the various objective condition and needs of the different pastoral areas and communities. Specifically, addressing food insecurity in pastoralist areas requires:

- Coordinated and comprehensive participatory development interventions aimed at ensuring benefit sharing of new developments and promoting good governance.
- Coordinated focused research to identify pastoralists needs and priorities.
- A national agriculture technology policy on the use and transfer of technology.
- The integration of traditional conflict management skills in current efforts.

for animal feed, fuel wood or as a green manure or mulch to improve soil fertility.

In the traditional agroforestry, Ethiopian trees are kept by small-farmers for various uses. Some of the important uses farmers attribute to trees are fertility maintenance; soil and water conservation; feed source; crop, animal and human shade; cash source and extra production; and farm wood and the likes. This also well documented and a useful practice for the pastoral areas.

Multipurpose Tree Crop technologies for Food and Feed Security

In recent years, interest has grown in the utilization of 'multipurpose' trees particularly tree crops. The variety of products that can be obtained from them and the number of uses for which these trees can be put into have pushed these multipurpose trees to **the** forefront in rural development in the development plans in Ethiopia (Kidane Georgis 2009).

Through the introduction and adoption there are some important trees species including **neem** (*Azadirachta indica*) and other useful shrubs pigeon pea (*Cajanus cajan*) and Cactus (*Opuntia ficus-indica*) which are currently used to conserve the soil and water and improve agricultural production food and feed security in the pastoral and agropastoral areas. Some of the important ones are indicated below.

Neem (*Azadirachta indica*):
The crop has various uses for forestry, agriculture, environmental it has not been given sufficient attention so far in Ethiopia (Personal communication with the Ethiopian association for the promotion of Neem). The fundamental uses of neem tree are in the control of agricultural insect/pests, medicine for malaria and other aliment.

Neem was introduced to Ethiopia about some 3-4 decades ago, and some trees have been grown in parts of the hot lowlands, such as: Asayeta, Humera, Dire-Dawa, Awash and Ogaden as shade, orna-

support the involvement of the private sector. Policies that pledge and support the private sector to make these inputs available to farmers in remote areas through incentive mechanisms are vital.

In this study a deliberate focus is made on technologies developed by the NARS which integrate crop/livestock and natural resource conservation.

Dryland Forestry Technologies for Improving Food and Feed Security in the Pastoral Areas

Agroforestry, its contribution in soil water conservation and improving crop/livestock production with climate change perspective is well known and this is important in addressing the major production constraints in the pastoral areas.

In these section agroforestry technologies in improving crop livestock production on sustainable basis through improving soil water and fertility conditions is discussed. It covers the technologies developed and the use of best traditional practices by farming communities in the drylands.

Alley cropping

Experiments conducted in the drylands pastoral areas in the central rift valley areas and northern Ethiopia on alley cropping leguminous shrubs (pigeon peas, *L. leucocephala* and *Sesbania sesban*) with annual crops sorghum, maize and beans resulted grain yield for human consumption and fodder for livestock feed (Kidane 1987). It indicates that there was a possibility of producing two crops without reduction in yield. Both stover and grain yields of food crops from the alley cropping system were better than yields from pure stands. At Melkasa in the central rift valley a grain yield of the annual crops increase up to about 30%. This was obtained when haricot bean was alley cropped with *C. cajan* compared to sole cropping. In addition, the legume trees, especially S. Sesban and C. cajan, produced substantial amounts of dry matter (biomass yield increase of 2-3 t/ha of Sesbania was obtained in the agropastoral areas which can be used

Food (in) Security in Ethiopia.
Agrarian Technology and Pastoralist Food Security in Ethiopia

Angela Raven-Roberts, PhD[1].

Introduction

On August 5, 2010, the Ethiopian government launched a five year Growth and Transformation Plan (GTP), at the core of which is a radical aim to transform agriculture and restructure the basis of Ethiopia's food security. This plan follows a five year period of an unprecedented (and to many, a startling) era of economic growth. Even as the ink is drying on the strategy paper, there are still uncertainties (insecurities) that the Plan will be inadequate to address Ethiopia's complex demographic and environmental challenges.

Much has been written on agriculture and food security[2] in Ethiopia from archaeological and historical perspectives, through economics, anthropology and other social science lenses, and grounded in environmental science perspectives. The great famines of 1970s and 1980s generated a wave of 'public nutrition' and food security issues that spawned extensive research on relationships between food security and humanitarian crisis, developed in conjunction with debates on responding to extreme malnutrition and the effects of socio-political crises on communities. Research institutions and specialist non government organizations (NGOs) developed measures of food insecurity and technologies and practices to address household hunger and food management practices. Meanwhile, the issue lies at the heart of many government polices to alleviate poverty and increase agricultural productivity.

[1] The views expressed in this paper in this paper are the sole opinions of the author and do not represent any institutional perspective or position.

[2] According to the UN's Food and Agriculture Organization, "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

Notwithstanding, narratives of food insecurity and recurring famine in Ethiopia underpin a core of discourse and imagery that disproportionally projects Ethiopian existence, life, culture as the victim of the failings of successive regimes and government policies.

This paper is presented as a background and literature review for the symposium on food security in Ethiopia. It presents an overview of the history and challenges of food security in Ethiopia and the strategies adopted to address them. It summarizes key debates, critiques of various policies, and the range of alternative strategies and technologies proposed to increase agricultural production and livelihood stability. It concludes with recommendations on measures to be considered to make policy interventions more effective.

Background

Food Security Issues in Africa and the Horn: Studies, Strategies and Concerns

The ways in which food security issues have been studied historically is an important factor in understanding linkages to the directions in current and recent debates on Ethiopian food security. In Africa during the colonial period, colonial administrators oversaw social and physical re-engineering in order to increase agricultural production. In more modern times, a country's level of food security is seen to reflect progress in the agriculture sector as well as economic and recently political and governance performance more broadly.

Concern for food security in Africa is a predictably annual feature of international food security policy reviews and media reports alike.[3] The global food and economic crises (combined with growing concern over the impacts of climate change) have

[3] For one example among many, an August 2010I FPRI report stated, "the situation in Africa is stagnant or worsening. More than 200 million Africans now suffer from malnutrition. Similarly, the FAO Director stated at the launch of the 26th Regional Conference for Africa on 5 May 2010, "In Sub-Saharan Africa since 2009, over 265 million people are malnourished and 30 per cent of the populations suffer from hun-

Farmers and pastoralists have not benefited from these technologies as expected. This can be shown by the assessment made of the growth of the food grain over sixteen year period. The gain in production has come largely from area expansion and not improved technologies (Table 2). The crop yields obtained from research stations is substantially higher than that in field trial and farmers yield.

Table 1. Food grain yield (t/ha), research station and farmers' field

Crop	Research Station	Field Trials	Farmer field	Average Farmers
Teff	2.4	1.8	0.8	0.8
Maize	9.0	5.0	1.2	1.7
Wheat	5.3	3.2	0.9	1.2
Sorghum	5.0	3.0	1.2	1.4
Barley	5.5	4.9	0.8	1.1
Haricot Beans	2.5	1.8	0.7	0.7
Horse beans	2.9	1.5	0.6	1.1
Field beans	1.3	1.0	0.6	0.7
Ground nut	4.5	3.5	0.3	na
Sesame	2.0	1.1	0.3	na

Source: (Kidane et al 2010)

One major reason for the above gap in yield from the research station conditions and farmers filed is lack of inputs and improved management practices. The poor research- extension linkage is also a problem in the promotion of recommended management practices. Thus there is a need to improve input availability and affordability to farmers in all areas through strategic public investments that

Traditional Practices: such as land preparation and optimum planting, seeding rates, weed control have been developed to exploit the genetic potential of the improved food crops and forage crops developed and this is well documented.

Water conservation and its efficient utilization

Tied ridges, in situ water harvesting: Use of tied ridges have been found be very effective in soil water conservation and results in 50-100% grain and 80% straw yield increase was obtained compared to the traditional method of plant in the flat seedbed in many agropastoral areas. It is widely adopted in many semi-arid areas.

Adaptation areas: include Eastern areas Jijiga and Meiso, Central Ethiopia: central rift valley, Ziway, Melkassa areas and other dryland areas in the Oromiya region. Better management of rain water with tied ridges as well as being important to increase productivity is also effective means of reducing climate induced risks.

Improving Water Productivity

Improving rainwater management alone cannot deliver increased productivity. Water management must form part of a farming system practices that includes a whole range of inputs such as fertilizer, pesticide, improved seed and adequate farm power.

Thus, in the drylands in general, the key problem in crop production is water stress and so water should be conserved and to make it more productive it has to be integrated with other improved agronomic practices so that the soil water retained could be used efficiently. Weeds should be controlled as early as possible to avoid competition. Fertilizer need to be applied at recommended rate.
These integrated management practices resulted for example in increased maize yield in the range of 37-117% as compared to the farmers practice, which is without water and soil conservation, no weed control or late weeding, nor fertility improving practice etc.
Impact of technologies developed in Achieving Food Security in the

refocused attention on the perceived vulnerability of African agricultural systems.

Renewed calls for strengthened policies and accelerated programmes to promote agricultural innovations, implement disaster risk reduction strategies, protect natural assets, and expand trade and market strategies have followed.[4] Alternative models for boosting agricultural production are emerging in what is referred to the 'New Agriculture Countries" where labour intensive crop production to produce 'niche' products such as fruits, flowers, and unique foods cultivated for industrialized countries. Following successes developed in Brazil and Thailand, African models include soybean production in Nigeria and Guinea and flowers in Kenya and Ethiopia. (Smith M. 2003).

The vulnerability of African agricultural systems is said to be especially acute within the countries of the Horn particularly due to the rapid rise of populations in this region. Other factors specific to the region's vulnerability have been characterised as increasing levels of poverty, low levels of insurance and asset protection, weakening social systems, land degradation and encroachment of agriculture into fragile semi-arid regions. The situation of the pastoralist modes of production in this region continues to attract policy interest. With declining grazing areas, increased weather unpredictability and population increases, there are questions as to how systems that has evolved originally as a response to harsh conditions can be sustained. Local and transboundary conflict continues to exacerbate the situation, restricting mobility and further eroding the coping capacities of communities. These trends and characteristics have been described as "the most difficult anywhere in the world" (FAO 2010).

The issue of conflict and its consequences for food security crises has also resulted in the region's heavy reliance on external humanitarian and peace-keeping interventions whose positive contributions

[4] See *Climate Change Implications for Food Security and Natural Resource Management in Africa*, FAO, May 2010.

to the most vulnerable are also offset with the associated 'burdens' of image, dependency and hegemonic international scrutiny.

A recent report by the IFPRI has painted a sobering picture of the predicted impact of climate change on the Horn of Africa. Key projected trends are presented as:

a. Climate change associated with variability and length of growing season will lead to changes of land use, for example, from food crops to cash crops, resulting in increased food insecurity.
b. Changes in temperature will also impact exposure to human and livestock diseases, e.g., wider spread of malaria to higher altitudes, cholera along lake shores. Livestock diseases (as in the past) will also have negative impact on intra-regional trade.
c. .Evaporation of wetland areas (traditional 'pasture' reserves for livestock) will increase vulnerability of pastoralist and agro-pastoralist communities.
d. Intensification of crop-livestock systems predicted to double by 2030. This in turn is predicted to elevate risks of vector borne diseases as well as risks of animal to human transmission due to changing ratio of human and animals (Kinyangi, Herrero, Omolo, Van de Steeg & Thornton 2009).

Additional (under-researched, under-resourced) areas of consideration include the role of gender and generation in the various livelihood systems in the Horn of Africa and the specific contributions that women and youth do and can make towards promoting agricultural development and creating resilient livelihood systems. Ethiopia, for example, has one of the largest youth populations in Africa and have long played a major role in the household economies of agricultural and pastoralist societies. (Abebe 2007). For their part women also undertake many duties in agriculture as well as in pastoralist economies such as care of livestock and processing and marketing of milk products. (Ridgwell, Flint 2007; PFE/OXFAMUK)

ous natural resource conservation in the past.

Vegetable Crops

One of the approaches used by the watershed programs to increase the income of the farming community is the advancement of the production of vegetable production high value, economically important and with good market demand. These include onion, tomato, garlic, hot paper, cabbage, carrot, pumpkin etc. It should also be indicated that vegetables seeds of potato, garlic and cuttings of sugar cane were distributed to farmers with water harvesting structures. The success of these is mainly attributed to use of supplemental irrigation.

Several success stories in increasing the income of farming community by increasing production of vegetable crops particularly in the semi-arid areas of the north both Tigray and Amhara regions can be cited. There are several cases which show farmers who became successful in vegetable crop production and changed their life, became economically beneficial. For example, In the south Wello zone Harbu integrated watershed in Adis Alem area one farmer (Mohammed Amin) obtained about 15,000 birr per year though the production and sale of vegetable crops such as tomato and onion though the use of small scale irrigation supported by the Water Action project (Water Action, CRS, and EIAR 2001).

Technologies on resource conservation and management to improve crop production

A summary of the conservation oriented crop, soil and water conservation practices are describes below:

pastoral areas. The sesame is well adapted to the pastoral areas and very high yield potential even by world standard was obtained in the Gode area the research systems in Ethiopia have developed several varieties for both irrigated and rainfed conditions for the pastoral areas.

These crops are economically important as they can provide cash income to the pastoral communities and improve the food and feed security. These crops were tested and specifically developed for the Somali, Gode, Kelafo, Jijiga areas, and Afar and Borana areas in Oromia (Kidane Georgis and Bedru 2010).

The oil crops all but particularly sesame is high value crop, economically very important and should get high priority in the research and development agenda. Thus, diversification of production of these crops with livestock production to sustain production in the pastoral area can lead to food security and change the livelihood of the pastoralists. This should be considered in the pastoral areas in the future.

Horticultural crops

The research by NARS previously focused on basic food crops/ cereals only, but now there is a paradigm shift and more attention is given high value crops such as the horticultural crops. As a result, particularly in the watershed projects the research concentrated on the selection and use of high value and market oriented horticultural crops vegetables and fruits.

The major aim was to improve the income of the farming communities. The effectiveness and acceptance of watershed practices would likely be faster if they offer some kind of immediate and visible economic benefit and at the same time are able to promote natural resource conservation. This is a good move and should be encouraged and up scaled to othe farming systems and agroecologies of the country. However, enough attention has not been paid to the short-term economic advantage of the farming community in previ-

In recent years, the role of women in the emerging horticultural sector has been important. (Tiruwaha & Helmsing 2010). Polices to support their access to educational, nutrition and health programs will be vital, while better understandings of how climate change and global economic issues impact women and youth should be an important feature of policy strategies.

Within development studies, the focus on food security has shifted over time, drawing from various disciplines seeking to explore relationships between food production and poverty. During the 1970s, food security was linked to food supply, global and national food stocks, and the ability of nations to withstand shocks (market failure, floods, crop disease, drought, etc.) The focus of national policies on agriculture reflected these concerns and was aimed at securing aggregate food supplies and providing adequate storage in order to meet expected consumption demands. Given this view of supply and demand, between the 1960s, 1970s and into the 1980s (reflecting Malthusian logic of the 1700s) population growth–or rather 'overpopulation'–featured at the heart of international concern over global and national food security. In Ethiopia (as elsewhere), this led to specific policy measures, by the Ethiopian government and the international community that sought to deal with food availability issues in drought prone or food deficit areas. The Government developed its controversial resettlement programme–relocating entire populations from deficit areas and also implemented a massive food-for-work (FFW) intervention (the largest FFW project in Africa in terms of resources committed), supported by the UN World Food Programme (Pankhurst 2009).

Over time, however, theories of food security have evolved from an exclusive focus on food supplies and production at a national level to perspectives augmented by more holistic and contextualised understanding of agrarian livelihood systems. A focus on livelihood reveals the ways in which rural populations cope with crises and manage related risks and hazards to make a living while balancing short- and longer-term survival, e.g., trading hunger for the preservation of a valued portfolio of assets. This perspective can be traced

in part to the 1974 and 1984 famines in Africa which revealed that food security did not depend on food availability alone; other factors also determine access and utilisation of food to combine to determine the nature of food (in) security. Amaryta Sen's work described and modelled how economic, political, cultural and social factors shape the management of and response to food crises at the household level. From the mid-1980s to the early 1990s, research methodologies led to the development of livelihood frameworks attempting to capture a wider set of factors and processes affecting the ways in which households managed risk and developed strategies to make a living (Chambers and Conway 1992).

Anthropological studies also contributed much to the study of food production and agriculture in developing countries, specifically at the level of the household. Anthropological perspectives have enhanced understandings of the dynamics of specific livelihood systems such as pastoralism which form the livelihood basis of approximately 50 million people in Africa. Studies of how pastoralist risk management systems function and the role of adaptive strategies to the environment have contributed much to the general understanding of vulnerability as well as community coping and risk management systems. The implementation of policies and ways in which communities respond adapt to or resist policy "performance and practice and the ways in which these are also 'narrated" have also become interesting areas for ethnographic research (including the role of researchers themselves in contested discourses!). (Mosse 2005, Gould & Marcusseen 2004) At the same time, anthropologists have long campaigned for the establishment of the principle that all development actors devise mechanisms for the participation and inclusion of communities and their perspectives in all aspects of policy and planning decisions affecting their livelihood strategies.

Inter-disciplinary approaches and frameworks for the analysis and advocacy of livelihood promotion and risk management are now evolving further to capture the range of strategies necessary to ensure the security or 'Social Protection" of communities facing a wide spectrum of insecurities. There is also a move to fine tune

Grain legumes are important food and feed crops in the dryland areas of Ethiopia. Several legumes exhibit good drought and heat resistance and this make them potentially very valuable for crop diversifications in low rainfall conditions. There are also crop species and several cultivars, which combine earliness with drought resistance and this provides them especial attribute and makes them important for increasing animal and crop production on sustainable basis Through selection of crop species and varieties for drought, heat resistance and early maturing several species and varieties have been developed for the pastoral areas (Kidane Georgis and Bedru 2010).

The grain legume species cow peas, pigeon peas, haricot beans, mung bean with different varieties are important crop species and varieties. They should be up scaled in all pastoral areas.

Oil Crops

Oil crops such as sesame, ground nut, and safflower are drought, heat, resistant and can adapt to the harsh climatic conditions of the

tivities were maintained at marginal levels. Furthermore, these development efforts were piecemeal in nature (Farah 1994).

Crop Production in Relation to Food and Feed Security

The NARS have developed crop species and varieties which are drought resistant, early maturing and heat tolerant crop species and varieties for the pastoral areas including the Afar, Argoba Liyu wereda, Afambo, Somali, Jijiga, Gode, Oromiya Borana, central rift valley; and Southern region, South Omo. More attention is given to the multipurpose crops which integrate food and feed production. These crops include cereals, grain legumes, oil crops and fiber crops.

Cereals: the major cereal crops in the dryland areas include sorghum, maize, tef, millets. These are the major food crops for human's diet and also provide feed for animals, The improved varieties are developed by the NARS in Ethiopia in collaboration with CGIAR centers such as CIMMYT, ICRISAT, ICARDA.

The crop varieties and the adaptation areas and growing conditions of all the crop species and varieties which are developed for the pastoral areas are documented (Kidane Georgis and Bedru 2010). They include sorghum, maize, tef and wheat which are drought resistant, early maturing and disease and past resistant and the agropastoral and pastoral areas. Some of the cereal crops developed for the food insecure areas of the highland areas of Tigray region are shown below.

Fig Improved cereal varieties in Tenbien, Tigray

Grain Legumes

strategies to support how communities adapt to the challenges and constraints of climate change. Current research is conceptualizing terms such as 'adaptive social protection'. (Devereux-Wheeler, 2009, 2010). The emphasis here is to bring together elements of livelihood promotion, disaster risk reduction, prevention and provision of safety nets. A new 'transformative' element is also being introduced aimed at ensuring that these strategies go beyond the mere mechanisms of insurance to ensuring rights and equity that will help move people out of poverty. (Davies, Guenther, Leavy, Mitchell, Tanner 2008).

The Specific Ethiopian Context

There are two competing perspectives on development in Ethiopia; one of pride and progress, the other of pity and scorn. One sees a rich environmental and cultural history, e.g., the "cradle of humankind," the origin of many technologies and interesting species of animal and food varieties, a varied and beautiful landscape, a potential 'breadbasket' for Africa, a long history of sovereignty, independence and statesmanship, a source of pride for colonized and marginalized diasporas, etc. The other provides a persistent narrative of famines and failing states, with international humanitarian and development actors accused of creating and perpetuating the image of Ethiopia as a permanent icon of unceasing starvation, environmental degradation and site of seemingly endless social and political crises.

Agriculture plays a major role in the Ethiopia economy, providing 45% of its annual GDP. It is estimated that 85% of Ethiopia's population are engaged in agriculture with XX% in livestock production and pastoralism. Two-thirds of the country is arable but only 15% is under cultivation, with a mere 3% of the 3.5 million hectares of irrigable land under irrigation. Ethiopia has approximately 25 million head of livestock, the largest in Africa; leather and hides are the second most important agricultural export after coffee and Khat. Ethiopian agriculture systems have evolved over centuries, and has adapted to the extensive range of ecological

conditions found throughout the country. These unique systems have been classified into 18 major and 49 minor agro-ecological systems. Despite this variation, diversity and potential, Ethiopia has long struggled with food deficits resulting in many years of dependence on international food aid. The general consensus is that food shortages have been caused by a variety of factors, including:

- High population rates
- Shrinking landholdings and productivity
- Low level of agricultural technology and innovation
- Environmental challenges, desertification, soil fertility, etc.
- Recurrent cycles of drought (and, to a lesser degree, floods)
- Lack of alternative employment and diversification.

Debates and research on agriculture and food security in Ethiopia have evolved along two related and intertwined tracks. One focuses on the status and characteristics of agriculture, horticulture, livestock production and its challenges; the other considers acute food crisis and famines, their definitions, causes and characteristics, the role of food aid, and immediate to long term responses to the effects of nutritional and hunger related crises. (Devereaux 2000; Vadalal 2009).

Ethiopian scholarship on agriculture and food security has a long and rich history and owes its origins to collaborations among several universities, agricultural colleges and research stations since the mid-1900s. Ethiopia's unique indigenous medicinal, "wild foods" and edible plant, cereal and crop species such as *teff*, *ensete*, coffee and sorghum varieties, chat, herbs, and spices have inspired innovative research by Ethiopian academics, many of whom work on global food issues in research stations around the world. Understandings of the diverse food production systems has been closely tied to the study of the diverse socio-political aspects and legal histories of land tenure, as well as Ethiopian governance systems through the ages and their impact on social conditions, economic progress and livelihood security. (Hiwet 1975; Hussein 1975; Wolde-Mariam

The technical basis of rangeland development policy, requires a thorough appraisal to properly reflect problems, perceptions and aspirations of inhabitants. Development planning and successful execution of specific development programs are thus to a large extent dependent on an appropriate policy framework.

The colonial government felt that the greatest challenge in North Kenya was to make the nomads amenable to governance. This was to be achieved through the implementation of the **territoriality concept**, using Special District Law Ordinance of 1934. This empowered the Provincial Commissioner of Northern Frontier District (NFD) to define grazing and water boundaries for different ethnic and sub-ethnic groups in an attempt to avoid armed conflict; trespassers were punished through arbitrary stock fines (Farah 1996).

This concept of territoriality had three negative consequences for northern pastoralists. These were: assuming clan territoriality could be discerned; limiting the ability of nomadic pastoralists, whose production system is based on flexibility in resource utilization to meet their needs; fixing boundaries and control of the movement of pastoralists undermined mutually beneficial interactions between them and cultivators.

Livestock development by the colonial government was based on development plans prepared for the semi-arid lands (rainfall of 600-800mm per year) - e.g. the ALDEV plan (1946 - 1955) and Swynnerton plan (1954). Their main thrust centered on management of rangelands and development of livestock covered areas such as: (i) adherence to wet season/dry season utilization of range resources within clan territories; (ii) veterinary services provision; (iii) water development; and (iv) livestock marketing, which was overseen by the livestock Marketing Division (LMD) established in 1963 (Farah 1996).

The colonial government's livestock policy lacked goodwill and ac-

the major parts of the infrastructures constructed were demolished during the Ethio-Somalia conflict in 1977/78.

The World Bank funded Rangeland Development Project, more commonly known as the Third Livestock Development Project, established in 1975. It had the objective of developing infrastructures and natural resources management to support livestock production. To facilitate the objectives, three sub-projects were established namely: the NERDU, the JIRDU and the SORDU. The project was successful in the areas of water ponds, roads, veterinary clinic construction and provision of veterinary services. The project however, terminated without significant success in changing the livelihood of pastoralists.

Experiences of other countries

Like in Ethiopia, rangeland projects in Kenya were less sound, especially given that the policy was based on the mainstream range management view without considering the socioeconomic and institutional aspects.

The technical basis of rangeland development policy did not reflect problems, perceptions and aspirations of the inhabitants, the pastoralists. The development plans and policy were not based on the actual condition of the pastoralists and the project failed.

In most African countries, rangelands constitute two-thirds of the total land, but with a population of about 25%, and yet are a source of national economic livelihood in terms of livestock industry and wildlife tourism (Farah 1997). In Kenya the arid and semi arid lands (ASAL) form 80% of the total landmass. They support 25% of the population and 50% of the livestock (Pratt and Gwynne 1977). Most of this population is made up of pastoralists (14.5%), who occupy 67% of Kenya, and own most of the livestock in these areas (Farah 1997). However, past development projects in Kenya rangelands such as the Grazing Blocks of North-eastern Kenya and Group Ranches of South ranges are singularly characterized by failure due to faulty project promises and assumptions in the socioeconomic and ecological sense (Farah 1996).

1984; Rahmato 1987; Anderson&Johnson 1998; McCann 1998).

Ethiopian agricultural sciences and scholarship are complemented by a long tradition of research in the social and political sciences, economics, and public administration where the focus has been on the challenges facing development and investment in Ethiopia. The debates over the causes and characteristics of Ethiopia's underdevelopment, its lack of agricultural progress and similar concerns have filled journals, books and blogs and have been the subject of numerous workshops and seminars within and outside of Ethiopia; Moreover, such issues have been at the heart of radical student movements and subsequent political ideologies and parties that have attempted (since the revolution of 1974) to transform social and economic relations within the country. (Tiruneh 1993; Zewde 1994; 2005).These debates continue today and are pertinent with respect to issues such as land tenure and the role of the state in direct involvement in development and shaping of systems of social security. (Edigheje 2007, Taylor&Mbabazi 2006).

These changes and policy debates remain important not only for understanding the assumptions, models and form of current Ethiopian development policies but also for their contributions to global debates on issues such as the role of the state in humanitarian governance and relationships among agriculture, risk management and social protection.

Harvey 2009). Ethiopia's experiences with managing risk and vulnerability have generated considerable research and technologies for risk management. As Africa in general and Ethiopia in particular face new threats caused by climate change while also managing evolving relationships with new drivers and actors in the world economy, the implications of the related risks and challenges of these modern directions continue to offer salutary lessons with national, continental and global applications.

The prevailing model of famine theory in Ethiopia since the 1970s

has been termed a "food first bias".(Pellitier 2002) Over the past two decades this model has influenced the policies, institutions and processes of humanitarian response in Ethiopia that have been important for generating emergency responses (Lautze et al., 2003). However, following the robust response to Ethiopian crisis of 2002/03 (generally considered "successful" because a major crisis was averted), this bias began to lose ground to more holistic models of social protection, as well as humanitarian measures that focused on a wider range of interventions beyond food aid. Although the 2002/03 response was deemed successful, the number of people requiring chronic food assistance in Ethiopia each year – despite good or poor rains – continued to increase drastically. (Maxwell et al., 2008). The problem of food insecurity was not resolved; rather it was a growing trend.

In Ethiopia in the 1990s and early 2000s, many food security studies focused analysis on the multi-faceted nature of risks and vulnerabilities as well as declines in household resilience over time due to longer-term natural and socio-economic processes (Lautze et al., 2003). The analysis and frameworks offered was based on an understanding that food crises in Ethiopia came from the realisation of threats to people's livelihoods as opposed to solely declines in food availability and access. Additionally, views that famines were a sudden-onset disaster were replaced by analysis that argued that fames were slow-onset disasters resulting from a specific combination and sequence of events or threats that eroded livelihood resilience over time (Middlebrook, 2008). Ensuring food security through strengthening resilience and reducing the vulnerability of livelihoods systems was viewed to be as (if not more) crucial than providing food aid alone. The livelihoods debate further developed to view sources of disasters and food crises as embedded in social, economic, political and environmental processes rather than natural occurrences; these processes lead to famine-related destitution, malnutrition, morbidity, and mortality and are often over-shadowed, under-analysed, and inadequately managed (Pankhurst 2009). Thinking revolved around combating food insecurity and poverty reduction, the way the poor live their lives, and the importance of structural and institu-

The Ethiopian Experience in Rangeland Development

The research and development in the pastoral areas in Ethiopia and many African countries were not in generally holistic in nature mainly focusing on rangeland conservation and development. They did not consider the socioeconomic and ecological perspective. Thus it was not participatory and did not involve the main actors or beneficiaries, i.e., the pastoral communities.

In Ethiopia past governments have attempted to undertake rangeland development programmes over a total land area of **311,170 km²** rangelands, which covers about 27.7% of the present national area. These include the Allideghe Development Unit 100% arid, the North-Eastern Rangeland Development Unit (NERDU), 85% semi -arid and 15% arid, the Jijjiga Rangeland Development Unit (JIRDU), 60% semi-arid and 40% arid, and the Southern Rangeland Development Unit (SORDU), 70% semi-arid and 30% arid (ILCA 1994).

Ever-since the establishment of Ethiopia's first rangeland project news of success has been very rare. The first project initiated in the 1950s, which was funded by the World Bank in Afar Region of Allideghe area and which aimed at improving water for livestock ended with failure due to persisting conflict between the Afar and Issa ethnic groups.

Next, the USAID-funded Yavello Pilot Project in 1964, that was intended to improve and develop rangeland use and efficiency through pond construction ended up with more natural resource degradation and terminated with failure.

The second livestock development project, which was also funded by the World Bank was designed and managed by the Livestock and Meat Board (LMB) with the aim of developing livestock markets and infrastructures. It succeeded in constructing some 48 terminal markets, 6 primary markets and 2500 km of stock routes. However,

very good adaptation to drought and can grow with as little as 200 to 250 mm annual rainfall, whilst buffel grass (*C. ciliaris L.*) and veldt grass (*Ehrharta calycina Sm.*) require about 350 mm to grow (Humphreys 1980). Other tropical genera which perform well in drought conditions are P*anicum, Pennisetum* and *Sporobolus* (Harlan 1983). All these grasses species are tested in the drylands of Ethiopia and could be used to solve the feed problem and increase livestock production.

Many tree and shrub species are important feed resources in dry areas, especially for goats. The major species browsed for fodder in these areas in Ethiopia are Acacia senegal Willd, *A. tortilis* (Forsk.) Hayne, *Balanites aegyptiaca Delile, Bauhinia rufescens Lam., Combretum aculeatum Vent., Colophospermum mopane* (Kidane 2005).

Probably the most important leguminous fodder tree indigenous to Ethiopia is Acacia (including Faidherbia). This genus has about 130 species widely distributed in Africa. Many are very drought-tolerant and can survive over a wide altitude range. One of the most widespread and useful Acacia species is the umbrella thorn (*A. tortilis*), whose pods and seeds are an important feed resource for livestock and wildlife in Africa (Menwyelet et al. 1994; NAS 1979). From the nutritional analysis of seeds of different Acacia species, Aganga et al. (1997) concluded that they could partly help solve the shortage of energy and protein feedstuffs during the dry season and supplement low quality forage grazed by ruminant livestock.
This analysis indicates that there are many feed source in the pastoral areas which could be used to adapt to climate change and increase livestock production on sustainable basis thereby leading to feed and food security.

Livestock production is based on rangeland and several initiatives have been taken by the government of Ethiopia to conserve and manage the rangeland areas in the past. This efforts is assessed and reviewed and the strength and weakness identified in the following section.

tional issues. From the 1990s to the present, there has been a move from a material perspective focusing on food production to a social perspective that focuses on the enhancement of peoples' capacities to secure their own livelihoods and on more holistic views of the activities and capital assets that households draw upon to make a living (Carney et al., 1998; Scoones, 1998; Ellis, 2000; Bekele, 2008).

Critics of food aid have questioned the effectiveness of 'in-kind' food aid as well as the efficacy of links between food and development goals in persistent disasters. Such views prompted assessment by agencies regarding the most appropriate and cost-effective ways of managing and preventing food crises and famine (Oxfam, 2009). Subsequently, the cash transfer 'lobby' gained momentum in the early 2000s. Debates focused on gendered and market impacts of cash transfers, which tended to be overlooked. More recent focus has been on whether tying conditions to cash transfers affects behaviour and outcomes more positively than unconditional cash transfers and whether public works create useful assets (Sebates-Wheeler and Devereux, 2010).

The cash versus food aid debate is ongoing and highly politicised. Sceptics have used the recent global food crisis to argue that cash transfers are inappropriate in weak economies, pointing to the inability of many large-scale programmes (such as Ethiopia's Productive Safety Net Programme) to increase cash payment rates in line with price rises, leading to falling purchasing power among the most vulnerable of program participants. Questions arise about the ability of cash transfer programs to respond to dramatic price rises, about donor budget flexibility, and about appropriate combinations of cash and food transfers in the context of unpredictable and volatile food prices. The global crisis has given fresh impetus to the cash versus food debate and has brought to the forefront the advantages of food aid alone or complementary to cash in volatile global and national markets and in line with local seasonal variability (Sebates-Wheeler and Devereux, 2010).

Food Security and Livelihoods: Government Responses

The Imperial, Socialist and current regimes each has attempted to develop policies to tackle Ethiopia's food security situation through agriculture. The evolution and impacts of these initiatives are well documented. Over the years there have also been various agricultural polices as well as strategies for Conservation, environment, water management, forestry etc.

Food security reforms were initiated in 1996 when a specific National Food Security Strategy was first issued (and later updated in 2002 under the umbrella of the Poverty Reduction Programme). The targets of the original strategy were primarily chronically food insecure households in rain deficit and pastoral areas. The central objective of the 2002 updated strategy was to ensure food security at the household level within the Agricultural Development-Led Industrialisation (ADLI) policy with a focus on water harvesting and promoting high value crop production. The return of famine in 2002/03, led to the establishment in 2003 of the New Coalition for Food Security, which was based on concern with finding lasting solutions to secure the basic food needs of households (Pankhurst, 2009). The key feature of the Coalition, in addition to strengthening agriculture, was the establishment of safety nets aimed at protecting household assets against shocks and promoting asset creation through labour-based public works. Additionally, the Ethiopian government promoted a new resettlement programme (Pankhurst, 2009). The Ethiopian's government's food security strategy was reiterated in the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), Ethiopia's second Poverty Reduction Strategy Programme developed in 2006 .

In addition, new ideas were implemented to go beyond emergency aid and address the needs of food insecure households in more sustainable ways. Building on the ideas of the New Coalition for Food Security, the government with multi-donor support, designed the Productive Safety net Programme (PSNP) in 2004. Ethiopia's PSNP arose partly out of a concern that emergency appeals were regularly falling short of their targets or providing late and erratic support (IRIN, 2009).

age shrub for small ruminants and cattle. They provides protein and minerals (especially salt bush) needed by ruminants.

In addition, backyard forage production has shown an encouraging results especially in some dryland areas. Most farmers at the present have started growing livestock forage as backyard or even on part of their farm plot. These farmers aside from fulfilling their feed requirement are making better cash income from the sale of forage seeds and this should be extended to the pastoral areas.

These forage crops are very effective in soil and water, and soil fertility improvement and rehabilitate degraded areas as proved in most watershed areas in Ethiopia.

In addition, there are several feed resources including forages identified by the NARS and CGIAR (mainly ILIRI) which are playing an important role in drylands by having multipurpose value to the farmer, other than as a feed resource for his livestock. A large number of indigenous forages, which can be screened and selected for use as feed, grow in the dry rangelands of Ethiopia. The germplasm available and suitable species for use as livestock feed in arid and semi-arid environments in Ethiopia and Africa are available. Thus large quantities of these germplasm can be evaluated and promising species identified for incorporation into livestock production systems.

Some examples of the available forage resources and their utilization in the dryland areas of Ethiopia include, Acacia, *Alysicarpus, Cassia, Crotalaria, Indigofera, Rhynchosia, Stylosanthes, Tephrosia, Vigna* and *Zornia* are among the most important leguminous genera, which are well distributed in arid and semi-arid areas. Among these *S. fruticosa* is indigenous to Ethiopia and other dry areas in East and West Africa and is an important feed source in rangeland areas.
Grasses are very drought tolerant and tend to have a wide distribution in the very arid areas in the Sahel. Important indigenous genera include *Aristida, Cenchrus, Chloris, Echinochloa, Eragrostis, Panicum, Pennisetum* and *Sporobolus*. Bird wood grass (*Cenchrus setigerus Vahl*) shows

Screening drought resistant multipurpose forage crop species

1. Hillside	
Before project	After project
Open access and poor vegetation cover (about 6 to 7% only)	Vegetation cover increased by about 80% in closed area 420 ha, soil loss dramatically reduced
Erosion hazard was serious	The down slope damage stopped
The area was considered as unproductive	Grass production increased and animal feed made available
No sense of ownership about the communal land	Natural regeneration of indigenous trees, system developed by the community to sustainable manage and utilize the resources
Cultivated land	
Little have been done to conserve the cultivated land	Intensive soil conservation with both physical and biological measured applied
Erosion was serious removing the top soil leaving the land unproductive	Soil erosion on cultivated land minimized
Big gully formed dissecting the farm land	Gullies rehabilitated become part of the productive land
No moisture retaining structures and crops suffer form moisture stress	Moisture resorted though the various integral soil and water conservation measures leading to vigorous plant growth

Animal feed is the major problem in livestock production in the country. Therefore, drought resistant herbaceous legumes and grass species have been promoted to improve the fodder quality. The community members have been organized into groups and formulated bylaws and regulations within the context of the regional state land use guideline. Communities have got a considerable benefit from harvest of grass to feed their animals and get cash income from the sale of the long grass (locally called Senbelet) used for roofing rural huts. In this approach the community participation was the key for the success.

Several leguminous shrubs which are drought resistant leguminous forage crops such as pigeon pea, saltbush, *Senna artemisioides* and *Opunti* (Beles) were identified by the NARS. This forage crops can grow at little rainfall as 200 mm. They are nutritious perennial for-

The main objectives of the programme were to ensure that poor households in chronically food insecure woredas were protected from asset erosion during periods of seasonal food insecurity and to promote asset creation through involving food insecure households in public works. A further objective of the programme was to encourage households to be more involved in production and investment activities, increasing their purchasing power and strengthening markets (Pankhurst 2009). Some main critiques and debates are summarised below:

PRO	CON
– Innovative attempt to tackle chronic (rather than just transitory) food insecurity and to break Ethiopia's dependence on food aid. – Initial positive effects on income growth and food security – especially for food only and mixed (cash plus food) payment households benefiting from the programme. – PSNP "food" recipients enjoyed accelerated income growth relative to cash recipients – commodity-based transfers retain their value during price rises. (Sabates-Wheeler and Devereux, 2010) – The drought shock component of the PSNP incorporating improved contingency planning, capacity building, and better early warning systems with built-in funding triggers is a first attempt to approach risk in a social protection fashion. (Maxwell et al., 2008)	– No allowance made for price differentials between (and even within) regions or for price fluctuations during the year. Conversion rate of PSNP cash transfers into food staples was highly variable from woreda to woreda and from month to month. Purchasing power of cash recipients (receiving un-indexed cash transfers) eroded by rising commodity prices; (Sabates-Wheeler and Devereux, 2010) – Locally, adjustments in the PSNP and finding donors prepared to fund have been difficult. (Lautze et al., 2009) – No clear strategy for households to "graduate" from dependence on safety-net programme and thereby allowing for other households to be included in line with the Government's Plan for Accelerated and Sustained Development to End Poverty (PASDEP). – Confusion exists over the notion of "graduation" (and how to measure it) and whether it refers to graduation from the PSNP, from dependence on food aid, from food insecurity, or from chronic poverty. – The current format linking the PSNP with Other Food Security Programmes (OFSP) may not be the most appropriate option for certain types of households – particularly labour poor households (e.g. female-headed and HIV AIDS affected), those with risk-averse tendency related to credit packages, those with insufficient knowledge of technologies and concern about adequate extension support, and those who prefer smaller loans. – Limited support for non-agriculture related loans when certain groups such as female-headed households rely on non-farm activities (Pankhurst, 2009)

Recent years have been characterised by reinvigorated promotion by government, UN agencies, donors and NGOs of a variety of

Generally speaking, the main cause for Natural resource degradation is human and livestock interference. This includes deforestation, overgrazing, inappropriate land use leading to unsustainable production system. This has led to highly degraded land areas with little or no vegetation, highly eroded soil and water resources and barren land in many cases particularly in the drylands pastoral areas.

In many drylands, area closure is found to be effective in rehabilitating land resource in many parts of the country especially in the most highly degraded areas. The natural forage was improved through **area closure** allowing the natural pasture to regenerate and enrichment plantation was also carried out to fill the gap between natural vegetation. This work was conducted in the southeastern area of Ethiopia in the Oromia region Borana area and is found to be successful. Highly degraded areas were selected and enclosed in many areas particularly in dryland areas to allow the natural pasture to rehabilitate and vegetate.

Area closure was found to be successful because it was participatory and included the stakeholders which were organized by the administration and development agents and the advantage and disadvantage was discussed with the end users. Finally the communities came up with the common understanding and consensus to rehabilitate such degraded hillsides (CRS 2008). This experience should be up-scaled to other similar areas for wide scale use by the pastoralists.

The details of the success in conservation are given in the following Table. This success story is well documented of watershed management as an approach to improve agricultural production in food insecure areas in the highland semi-arid areas (Kidane 2009). This success stories is obtained in the Tigray, Amhara regional states.

Table 1 Situation of the degradation area before and after watershed project implementation

Source: (Water Action 2005)

and get serious policy attention.

Technologies and practices developed to increase Feed resources for Improving Livestock Production and Food Security

Animal feed and nutrition are vital elements in the Ethiopian livestock development context. Thus, feed shortage is becoming a very critical issue in the lowlands where rangeland is degrading at fast rate in the pastoral areas, aggravated by invasive weeds which are spreading rapidly. In the midst of this, the expansion of compound animal feed industry by the private sector is non-existent.

The households are still following the traditional livestock rearing system, which is open grazing. An alternative livestock rearing, feeding, and management system need to be sought. A system which can augment the productivity and production of the nation's livestock resources with a well designed policy and strategic goals, including the maximization of livestock owner's income and improving their living standards is needed.

The NARS has recognized that feed shortage is one of the major constraints in livestock production in Ethiopia. Several research activities were carried out to address this problem in order to improve feed security and livestock production and to increase food security. These include natural pasture improvement, backyard forage introduction and development, integration of forage legumes into cereal production systems and various forms of utilization of feed resources for livestock production in the drylands.

Area Closure for Rehabilitating Highly Degraded Areas to Improve Feed Security

intermediate and advanced agricultural technologies in Ethiopia. These have included extended credit and micro-finance schemes to encourage diversification activities as well as the purchase of farm inputs such as fertilizer, pesticides and the use of new seed varieties. Extension services have been improved and expanded with greater number of Farmer Training Centres (FTCs), expanded training for development agents (DAs) and accelerated experimentation and expansion of reforestation schemes, seedling nurseries, water harvesting, irrigation and introduction of api- and avi-culture.

One of the most dramatic and visible of new initiatives has been the exponential spread of maize which after the introduction of new varieties under the Sasakawa 2000 plan.. This program has increased the growth of maize throughout Ethiopia and has nearly replaced *teff* as the staple food crop. Debates continue over the nutritional value of maize, and its spread and associated risks, including of malaria (due to the apparent relationship between the incubation of the larvae and maize pollen (Asnake,McCann,Yemane,Kiszewiski 2009).

Specific livestock interventions have also been developed with a focus on supporting the pastoralist sector in times of crisis as well as development of markets, veterinary and other outreach services (as reflected in other papers prepared for this workshop).

Additional recent innovations related to agriculture and food security issues have been the establishment of a Nutrition Strategy under the leadership of the Ministry of Health. In recognition of the multiple causes and threats to malnutrition and the need to engage all sectors, the strategy lays out the mechanisms for the coordination and development of a sector wide approach. (Jennings,Hirbaye 2008). The importance of integrating health and nutrition concerns into all aspects of food policy will remain a high priority to reduce household vulnerability. In terms of disaster response and management the National Policy on Disaster Prevention and Management (NPDM) which was endorsed in 1993 is currently being revised hopefully, to continue to strengthen relief to development linkages,and mainstream inter-sectoral approaches and enhance

proactive disaster prevention strategies. (World Bank & ISDR 2007, Lautze et al 2009)

Interesting work is also being done by the Ministry of Agriculture and Rural Development to map the diverse agro-ecological zones and concomitant livelihood systems of Ethiopia as well as to map and document the history of and emerging patterns of vulnerability affecting various regions over the last fifty years. This information is designed to inform a more comprehensive and nuanced Early Warning system able to capture the complex range of hazards with a potential to impact community life. As such it will also be a vital contribution and foundation for the implementation of a coherent risk reduction strategy across all sectors of development.

The setting up of the new Ethiopian Commodity Exchange (ECX), the Drought Insurance Scheme and a new Disaster Risk Management Strategy (which will be shortly presented to parliament) reflect new directions in risk reduction and management.

Between 2007 and 2008, in response to the impact of global food crisis, the government initiated an urban grain market stabilization program and reduced taxes to help communities weather the brunt of the increased prices. The global food crisis has led to better recognition of urban food vulnerability; studies such as those commissioned by the Tigray regional government, Unicef and WFP are paving the way for more detailed analysis on urban vulnerability, with recommendations for future strategies to ensure social protection in urban areas (2009 Food Security and Vulnerability in Selected Towns of Tigray Region Ethiopia).

These innovations reflect a notable increase in public spending. According to government statistics, government investment has been increasing by 36.6% a year since 2007 and constitutes 80% of capital expenditure in the agriculture, education health and rural development sectors. (MoFED 2009)

Further changes implemented by government and designed to promote growth are witnessed by the numerous infrastructural

Boer buck weighs between 110-135 kg and does between 90 and 100 kg. The Boer goat has also excellent carcass qualities, making it one of the most popular breeds of meat goat in the world.

The introduction of small ruminant breeds is contributing to adaptation to climate change and food security and improving the livelihood of the communities of the drylands.

However, the main question is to what extent these technologies are contributing to food security. One can argue that they are newly introduced, but their implementation should be well coordinated with the extension and research system.
The other issue associated with the introduction of these breeds is that, while they are productive, their feed requirement is also high. With current situation in the pastoral areas feed is a major shortage, and this issue needs to be addressed first in order to get benefit from this technology.

Camel Production

Camels are important to the lowland people and pastoralists in particular. They are uniquely adapted to the lowlands of Ethiopia and contribute significantly on the food security of the pastoral households. Their most important use is for milk production and transport for household and commercial goods.

In terms of food and nutritional security, the protein, fat and vitamin-C content of camel milk is vital for pastoralists living in an environment that lacks vegetables. Pastoralists also use camel for ploughing.

Despite their importance, Ethiopian camels are raised under traditional management and studies on camel husbandry are very few. The multiple changes in the dryland environments and lack of veterinary services, coupled with the low productive capacity make camel raising difficult; it is a slow process than goat raising. This has to improve through research and development. In this regard, camel production should be among the focal areas of research by NARS

survive. The other good characteristics include high fertility rate with unrestricted breeding season,

They also have fast growth with mature rams weighing between 100 and 125 kg. Mature ewes average 73-100 kg and have excellent meat qualities. A live weight of about 36 kg can be reached by the Dorper lamb at the age of 3-4 months ensuring a high quality.

The Dorper has a thick skin which is highly prized and also protects the sheep under harsh climatic conditions. The Dorper skin is the most sought after sheep skin in the world and is marketed under the name of Cape Glovers. The skin comprises a high percentage of the income (20%) of the total carcass value. Thus these breeds could contribute to food security and economic growth in the pastoral areas.

Boer Goats, Highly Productive

The present day Boer goat appeared in the early 1900's when ranchers in the Eastern Cape Province of South Africa started selecting for a meat type goat. The general characteristics are that the Boer goat is a large; double muscled animal developed specifically for meat and hardness. Boer goats have a high resistance to disease and adapt well to hot, dry semi-deserts.

The high fertility rate, kidding rate of 200 %, is common for this breed. Puberty is reached early, usually about 6 months for males and 10-12 months for females. The Boer goat also has an extended breeding season making possible 3 kidding every 2 years. Producing weaning rates in excess of 160%, the Boer goat doe is a low maintenance animal that has sufficient milk to rear an early maturing kid. Boers are reported to have superior mothering skills compared to other goats.

Performance records for this breed indicate exceptional individuals are capable of average daily gains of over 200 g/day in a feedlot. More standard performance would be 150-170 g/day. The mature

projects visible to all newcomers and past visitors to Ethiopia. Never since the earlier road and the great mountain blasting operations of the Swiss and French has such a building and infrastructural development been seen in Ethiopia. Menelik started on the railway and some developments to Addis Ababa. Haile Selassie initiated The imperial Highway Authority to establish the foundation of a road system to link the provinces; a few dams were built to improve the energy supply.

Village architecture and settlements were rearranged during the time of the Dergue when people were moved around in huge numbers and put in resettlement sites following a distinct and uniform linear pattern and layout echoed also in the Villagization schemes, but these were as ephemeral in structure as they were in policy and soon disappeared as villagers returned to their original homes and most of the structures disappeared. North Koreans were appointed briefly to work on irrigation projects in the southwest, and the Italians built a major dam and irrigation program in the northwest along the Ethio-Sudan border.

The concerted aim of harnessing Ethiopia's river system had in the past proceeded in fits and starts due to lack of sufficient investment. Based on Ministry of Water Resources the irrigation potential of Ethiopia's rivers is estimated at 3.7 million hectares. Current plans are targeted at all nine of the country's river basins and the next few years should show major contributions to both improvement of energy as well as agricultural development and the country's exports. Similar developments are taking place in oil and mineral prospecting, another sector targeted for future expansion and potential contribution to employment and economic growth. These initiatives like many issues in Ethiopia, are not without their critiques and there is currently vigorous debate going on vis a vis the actual impact, the statistics on growth outcomes and on issues such as environmental impact of major structural projects such as dams. Evidence based debates are healthy for policy and practice. There should be room to go beyond points of extreme controversy and find compromise on solutions that will promote the well being of communities as well as the protection of the environment

and national heritage sites. Development should be for all and nuanced and adapted approaches are needed to ensure that specific characteristics of livelihood systems or ecological zones are taken into account when designing major projects.

The potential and challenges of commercial agriculture.

A major component of Ethiopia's strategy to increase food production and reducing poverty is the development of commercial agriculture and land leasing to private investors. Approximately 22 million hectares of land had been leased as of 2009 (Braun et al 2009) and the number of individuals and companies are growing (GTZ 2009). Commercial agriculture in Ethiopia is not a new phenomenon and 'concession seeking" has a long history (Zewde 2008). Many of the current areas under lease are in areas where, since the early 1960s, there have been periodic attempts by Ethiopian, Dutch and other investors to develop large scale agricultural enterprises. (Bondestam 1974) This, coupled with renewed focus on voluntary resettlement, is seen as offering new opportunities to increase production, promote exports and contribute to poverty reduction.

As noted, the renewed impetus for commercialization has been inspired by successful models of niche farming in other countries coupled with demand from the hungry "Tiger" economies in South East Asia and the Middle East. Countries in these regions, in order to protect domestic food security, look for direct country-to-country relationships to lease land and grow special food crops for direct export. Here, for example, one sees models from Sudan to grow food for Saudi Arabia and the Gulf countries, Mozambique and Madagascar for export to India and Malaysia.

There is as yet little detailed research on the ways that leases are negotiated and of the impact of land leasing on poverty reduction and unemployment. A major conference is being organized by the Institute of Development Studies at Sussex University in April of next year and hopefully there will be participation and shared experiences from Ethiopia. Limited research so far has identified the following risks:

Sheep and goats have higher survival rates under drought conditions compared to cattle. Moreover, because of their reproductive rates, flock numbers can be restored more rapidly. With regard to goats, water economy is also an important biological feature. It is common for goats to be watered every four days and still provide a reasonable amount of production. Being small-sized animals, sheep and goats require a small initial investment. Their small size, together with early maturity, makes them suitable for meeting subsistence needs for meat and milk. Because of all these attributes small ruminants are important for the dryland areas and climate change and food security, and hence are focused in this discussion paper.

Recently, the Ethiopian MoARD in collaboration with USAID have introduced drought resistant and highly productive small ruminants (sheep and goat) through the project entitled Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP) for the dryland pastoral areas. The introduced sheep and goat include Droper sheep and Boer goat breeds which are highly productive.

Dorper Sheep and Boer Goat Breeds, Highly Productive

The Dorper is a South African mutton breed from the initial crosses between Dorset Horn and Blackhead Ogaden also called Blackhead Somali and Blackhead Persian. So these breeds have Ethiopian blood.

Characteristics of Droper sheep: Dorpers are highly adaptable and do well in harsh extensive conditions as well as in more intensive operations. As a strong and non-selective grazer, the Dorper can advantageously be incorporated into a well planned range management system. The characteristics of the breed include the ability to walk long distances and forage well in permanently dry areas and in times of drought.

Dorper sheep have natural tolerance to high temperatures and heavy insect populations most probably due to their Blackhead Persian origin. They are productive in areas where other breeds barely

Livestock breed improvement

The research work done on livestock breed improvement is limited and did not bring any significant impact in the livestock production system.

The research work on camels particularly is very limited and is almost nonexistent. Therefore, in this study the recent research work on small ruminant's improvement is discussed.

Small ruminant improvement

Background of small ruminants

Small ruminants are becoming increasingly important in pastoral areas due to their drought resistance and less feed requirement, their socio-economic significance and role in improving food security.

Pastoralists in Ethiopia keep large flocks of sheep and goats for subsistence income, breeding, restoring wealth and social prestige. Thus they are very useful in the pastoral production system.

The small ruminants are important for food security particularly in dry-semi arid and arid part of the pastoral areas. Goats are kept for their milk, especially as food for children during the dry season and for adults in the time of shortage. They are usually highly productive and are used for milk, butter and meat.

Resource base: With close to 48 million goats and sheep, Ethiopia has the **third largest number of small ruminants among African nations** and ranks eights in the world. Traditionally sheep and goat have served as ready cash and a reserve against economic and agricultural production hardship especially during drought periods (Alemu Yami and R.C. Merkel 2008).

Sheep and goats are widely adapted to different climates and are found in all production systems particularly in pastoral areas. They also have lower feed requirements compared to cattle because of their small body size. This allows easy integration of small ruminants into different farming systems particularly in the drylands.

The land leasing issue raises again the complex issues of govern-

Opportunities and Risks of Land Acquisition and Leasing in Ethiopia	
OPPORTUNITIES	RISKS
Increased investment may bring macro-level benefits (GDP growth, greater government revenues) and create opportunities for raising living standards. Investors may bring capital, technology, know-how, employment opportunities (both on- and off-farm), infrastructure and market access (domestic, regional, and international markets) (IIED, 2009; FAO, 2007; Schulter, 2009). Creation of valuable synergies through knowledge and risk sharing, economies of scale, and resource pooling (Haralambous et al., 2009). Development of rural infrastructure, and poverty-reducing improvements such as construction of schools and health posts. Future global price stability and increased production of food crops that could supply local and national consumers in addition to overseas consumers (Braun et al., 2009).	Loss of access to resources on which people depend, e.g., for cultivation of staples and shifting cultivation, traditional grazing, (including during the dry-season), water, and gathering wild foods, wood, and medicinal plants – depriving them of important livelihoods and safety-net functions (IIED, 2009;Schulter, 2009; GTZ, 2009; Braun et al. 2009). Lack of recognition of existing land uses and claims because people using the land have no formal land rights or access to the relevant law and institutions (especially women and pastoralists) (IIED, 2009; Schulter, 2009; GTZ 2009) Increased conflicts, if important gaps exist between customary and traditional usage rights on land and the formal rights guaranteed through titling. Individual titling may not protect adequately the access of local communities to common goods (Schulter, 2009) Exacerbation of land and water conflicts, increased rural exodus, resettlement or displacement of the local population – if land tenure and land use rights in the areas where land is being acquired are inadequately documented or lack a formal legal basis or due to unequal power (Schulter, 2009; GTZ 2009) Modes of agricultural production through land leasing by large companies could cause environmental degradation, accelerate climate change, cause soil depletion, and deplete freshwater reserves thereby undermining the livelihoods of local populations. (FAO, 2007; Schulter, 2009; GTZ, 2009). Investments could create enclaves of advanced agriculture that are detached from local realities – doing little to improve smallholder production or generate additional incomes and employment opportunities (FAO, 2007)

Opportunities and Risks of Land Acquisition and Leasing in Ethiopia	
OPPORTUNITIES	RISKS
	Creation of markets for property rights on land may lead to distress sales by smallholder farmers facing debts, for instance after a bad harvest. They may also be expelled from their land when the land has been used as collateral to guarantee repayment of a loan. Loss of traditional farming activities as a basis for securing the survival of local populations and as a source of paid employment due to mechanised production and the recruitment of an external workforce by investors (GTZ, 2009) Increase in land prices, thus threatening poor people's access to land by causing or accelerating individualization of land rights previously held in common (Haralambous et al., 2009) In the case of short-term rental contracts, share tenants often, in any given season, receive only part of their marginal product and thus have limited incentives to supply effort; High transaction costs, partly policy-induced, implying that many households are either completely rationed out of rental market participation or unable to use land rental to attain their optimum operational holding size; High levels of risk and imperfections in other factor markets, especially those for credit, implying that even those able to overcome barriers to participation are unable to use contractual forms—or other mechanisms to supervise tenants—that would allow to attain efficient outcomes. (Sources:)

ment policy on land security, tenure, redistribution, rental and the

Good traditional livestock management practices developed by herders and pastoralists could be extended to different areas and be used by the communities without doing any further research. These practices are improving livestock production in the pastoral areas, and are used to minimize the negative effects of drought. They include herd species diversification, keeping large herd size, human and livestock movement, selection of drought tolerant livestock species, conservation of dry season grazing reserves, and the sale of livestock. The details of the good practices developed by indigenous pastoralist are given in Annex 1. These traditional practices can be used to assist livestock herders to achieve food and feed security to mitigate problems of production in the pastoral areas including drought and climate change.

A related task is addressing the problem using the technologies developed by the research systems to increase production under the current scenario of climate change.

The technologies developed by NARS and CGIAR are listed below to enable communities to access them and use them to address the food security problems.

Technologies Developed by NARS to Improve Livestock Production and Address Food Security

As indicated above there are technologies developed to improve livestock production in the pastoral areas. The challenge now is how to get these technologies and practices to be used by the pastoralists to improve production and productivity and achieve food and feed security.

Some of the pastoral communities may require new technologies and others need the revival of traditional technologies and practices. The important thing is to sieve out what works as the best-bet technologies- and then seek ways of making them available to the pastoral communities.

also impacting on livestock production, for example, changes in temperature; precipitation is affecting farming conditions and the capacity of the land resources to produce enough feed for livestock. Recurrent droughts are striking frequently. Livestock disease epidemics are increasing. These events are leading to reduced livestock production and finally leading to food insecurity.

Thus, livestock producers-especially small-scale producers, who form the majority, are suffering from this deteriorating situation. The challenge now is to develop technologies and utilize them to adapt to the ongoing climate change and variability and improve livestock production.

The key issue is to assess whether there are appropriate technologies to address the problems of pastoral production system particularly in relation to food security and natural resource conservation for sustainable production. Indeed, the Ethiopian agricultural research system in collaboration with NGOs and CGIAR centers such as ILRI have developed some technologies in an attempt to address some of the key problems.

The technologies developed by the agricultural system in livestock improvement, rangeland conservation and management, feed resource conservation and management are inventoried and presented in the following sections. The best indigenous practice and knowledge used to cope up with the problems of food and feed security and drought problems are also highlighted. Because it is believed that these practices and knowledge are time tested activities and should be upgraded through up scaling so that they can be used in wider scale by the pastoral communities.

Inventory of Indigenous Practices and Knowledge to Improve Food Security in the Pastoral Areas

different opinions that prevail regarding the pros and cons of land reform.(Rahmato 2004, Deininger, Ali,Alemu 2007, Dercon,Hill 2009) The government involvement as 'guardian' of land in Ethiopia is based on a strong belief that land is the safety net for Ethiopian farmers; allowing them to sell it would recreate feudal relations with a class of wealthy land owners and a class of millions of landless peasants forced to seek a living in the urban areas. However, many Ethiopian farmers' current landholdings are unsustainably small. As a result of persistent degradation, loss of fertility and seasonal shocks, such land is not a productive asset, but rather a 'starvation plot" where survival is most precarious (Rahmato 2004 Devereaux 2000). Further, destitution increases when farmers are forced to sell off all other assets such as food, tools, clothes, animals, etc., to cope with recurrent crises. Destitution studies in Ethiopia have contributed to an appreciation that intensifying poverty trends are eroding not just material assets but also important social networks which traditionally provided mechanisms of reciprocity, exchange and other forms of social support (Sharp, Devereaux, Amare 2003).

The voluntary resettlement program and land leasing are envisaged as opportunities for farmers to take advantage to 'empty' or underutilised land. For the smallholder, the ability to fully take advantage of new sites remains dependent on the accessibility of quality agricultural support, and access to markets and credit for seeds, tools, fertilizers and other inputs.

A compromise may be slowly emerging. Whilst direct land sales are still prohibited, there are opportunities for local, medium-level 'renting' and other initiatives where small plots are consolidated. The recommendations of many to encourage rentals and assure owner security through land registration may be coming into fruition. (Gebre-Selassie 2006)

For those who diversify to go and work on the bigger commercial farms, the issue is their ability to earn an adequate income under

decent working conditions that can ensure reasonable livelihood security.

Whilst many of these farms are being developed to provide food for countries such as India, Saudi Arabia and other areas, how they will and have contributed to food security within Ethiopia *per se* remains to be seen. Farms based on producing export crops such as sesame, coffee, flowers, potatoes etc., are subject to the vagaries of international trade; through this mechanism, farm labourer vulnerability may thus transferred to (and from) the global market place. The ways in which farm labourers will be protected against these shocks and their own opportunities to ensure food security remains an issue.

Conclusions: New Opportunities, New challenges

The Ethiopia of the new millennium has embarked on projects and strategies that inspire both pride and consternation.

Ethiopia is pursuing a strong engagement with countries such as China and India and sees in these countries' transitions from socialism and growth, a reflection and resonance with its own historical and ideological trajectory. The model of international 'aid' has been found wanting, with 'trade' and investment from the new "Tigers" of the global economy identified as the main driver for internal economic progress and self sustainability. The 'Lions' within Africa are not excluded from this vision; as one of the largest countries in Africa, Ethiopia has a potential for both driving and benefitting from the growth of internal African markets as well and resource rich and dynamic economies such as South Africa, Nigeria, Angola, Gabon (and potentially DRC) who have the potential to be future consumers of the rich and varied agricultural and livestock products of Ethiopia.

The latest Growth and Transformation Plan (GTP) launched in August 2010 aims to double Ethiopia's food production and put a

poor pastoralists. Nowadays many more herd less pastoralists can be seen, tending the flocks of the rich people in their communities or clans. Destitute pastoralist gathers in relief centers or small towns. They have fallen out of the pastoral production system. In view of the shrinking size of the pastoral lands, these people cannot be expected to become herders again. They have to look for other income opportunities, but they generally lack the skills needed, hence are restricted to low grade jobs.

At the same time, the land uses that replace pastoralism are often not successful. Dryland cropping is very risky, and irrigation schemes are capital intensive and have a very poor economic record, even without factoring in their negative effects on the pastoralists they replace.

To address these problems the NARS developed technologies in each sector including livestock, crop, and natural resource is reviewed below.

Livestock and Livestock Production in Ethiopia in Relation to Food Security

Background

Ethiopia has the highest number of livestock in Africa and it is the tenth largest in the world. Livestock in Ethiopia in general, and the pastoral areas in particular are the principal capital for farmers (4.0 TLU per household). The sector if properly managed and utilized has potential for economic development. It is the mainstay for the pastoralists and agro-pastoralists who are the main victims of drought and climate change. Livestock production gives opportunities for economic and social development that goes beyond the objectives of food security. It is therefore economically, socially and politically an important sector in the country's agricultural system.

The major problems of livestock production in the pastoral areas include: shortage of feed, water, disease and pest, marketing problems and degradation of rangelands. In addition, climate change is

and Rural Development, because 60% of the country is classified as rangeland, mainly fitted for livestock.

Marginalization of pastoralists in decision making to manage their resources

In the past decades pastoralists have been affected by a number of processes that have seriously reduced their capacity and responsibility to mange their own grazing and water resources. This has led to resource degradation and its associated loss of production. The major issues are outlined to assist discussion.

- Outsiders have invaded their land, always taking the best areas. They have introduced individual title deeds, undermining the traditional, communal land ownership. They have established national parks, game reserves, large scale farms and big irrigation schemes.
- Pastoral areas have been the scene of civil wars and cross-order conflicts. This has cut pastoralists off from large areas of grazing. Sophisticated weapons are now available everywhere, leading to high insecurity.
- Big rangeland-management programs have tried to introduce other livestock practices, ignoring the value and high productivity of the pastoralists' existing production systems. All these attempts have failed.
- Demographic pressure forces small-scale crop farmers to encroach upon the pastoral lands, again taking the most valuable pieces.
- Many relief and reconstruction programs have neglected local methods of coping with droughts. This has led to a loss of independence, self-esteem and pride among pastoralists.
- In the interaction between highland and lowland communities, extracting water upstream harms the downstream pastoral production system by decreasing the availability of water for grazing land and flood-recession agriculture.

These processes of marginalization have undermined the production base of the pastoralists. Now much less land, of lower quality, is in their hands. This has increased the difference between rich and

'final end' to dependence on international food aid. According to media and government reports on the plan it is built on a seven "pillar" strategy that combines inter sectoral links among social, industrial and agricultural sectors. It is based on a "best case scenario" of 11% average economic growth with the highest target aimed at 14%. It combines a new push for expansion of commercial agriculture, access to wider internal and external markets and accelerated industrialization. Support to small farmers will entail the continuation and intensification of irrigation schemes, rural roads and rural electrification, and expansion of agricultural research and public health facilities.

Energy, transportation and infrastructural development is set for considerable expansion, e.g., current energy from 2,000MW to 8,000MW; roads from 49,000km to 64, 5000 km, etc. Perhaps the most dramatic and interesting development is the envisaged expansion and development of the Ethiopian railway system covering a renewed system linking Addis Ababa to Djibouti, with new outreach services to the south and west.

The GTP targets the challenges of Climate Change and Carbon Emissions by expanding Ethiopia's involvement in innovative programs such as Farmer Managed Natural Forest Regeneration (FMNR) schemes. These are newly emerging practices under the Land Use, Land Use Change and Forestry (LULUCF) program currently being implemented in Kenya, Uganda, Madagascar, Congo and India. It is designed to promote community resilience and social and ecological adaptation in combination with income generation. (www.twnside.org.sg/-title2/climate/news/TWNBarcelona.up.

12docand). The primary goals of 'transformation' are, on the one hand, the evolution from commercial agriculture to agribusiness and, on the other, moving from small-scale 'subsistence' farmer to a 'surplus' producing farmer.

The five year plan (2010-2015) coincides with the UN and international community's trajectory and ambitions as articulated in the

MDGs. As such, it encapsulates Ethiopia's own commitment and contribution to the achievement of the MDGs by striking a major blow at the roots of the persistent poverty that has long undermined development in Ethiopia.

The new opportunities and strategies for enhanced agriculture in Ethiopia (in theory) are infused with principles and targets for promoting agricultural growth, reducing risks and protecting livelihoods. Government's stated commitment is also to ensure 'climate proofing' of development initiatives. The combination of a reinvigorated, multi-sectoral and holistic disaster risk management system, various productive safety net systems, and a complementary range of strategies for industrial and other sectoral development may yet ensure that this is achieved.

The issue now is perhaps to review these developments in terms of how they are translated and implemented to fit the context of Ethiopia's diverse and multiple livelihood systems. Close review is needed to understand how they can influence and support not just community 'pathways' out of poverty but also ensure modalities for responding and adapting to the multiple internal hazards as well as external risk of a global environment shaped by challenges from climate change and economic volatility alike.

Mozambique is often presented as a model for alternative strategies in agriculture. It is useful to conclude with recent research that has examined precisely this issue:

> Disentangling the pathways in the response space to provide general lessons is useful. However, it is important that not all stories of success are seen as transferable because the effects of climate change are spatially and socially differentiated. Oversimplified adaptation frameworks can lose sight of the strength in diversity and subtle differences in place-based opportunities for adaptation to changing climate-related risks. The development agenda needs

soils. This is a major problem limiting production in the rift valley areas.

Insect Pests and Diseases

Apart from drought, up to 40% annual losses are estimated to be caused by a large number of pests, which damage the crops and livestock.

Invasion by noxious plants such *prosopis juliflora, parthenium hysterophorus* and other brows plants are noxious to range resources. In addition, the bush and shrub encroachment in open lands of Borana plateau is a serious drawback for the grass-dependent livestock such as cattle and sheep. On the contrary, the brows dependent Stock raising system shrubby and bushy vegetation is highly valued.

Tsetse infestation is also a major threat in the high potential grazing areas western and southwestern rangelands including Benishangul Gumuz, Gambella and SNNP regions. This reduces the high potential grazing areas in this western part of the country.

Similarly, termites are serious insect pests in many pastoral areas particularly in the central rift valley, Gambella and Assosa areas especially for seedlings of many crops and the pasture. These insects are particularly serious problems in rift valley areas, Gambella, Benshangul Gumuz and other similar areas.

Socioeconomic issues

Ethnic conflicts: Inter and intra clan disputes cause much disruption. Animosity between neighboring tribes is a constant source of tension, especially over water and grazing rights. A good example is the chronic conflict between the Afar and Issa, between Afar and Karayu.

Lack of trained manpower particularly in rangeland management: this is particularly a major problem for the Ministry of Agriculture

inevitably change the dryland biodiversity. Under-grazing and over-grazing can also have negative effects, but overgrazing has become an increasing problem.

The human growth and associated livestock growth is also another problem in increasing the pressure on the rangelands. Because individuals aspire to have many livestock for subsistence as well as other purposes, this leads to overstocking the range for unlimited period of time which results in devastation of the resources. Furthermore, The major dry season grazing areas of the middle and lower Awash River basins were converted into state and private farms.

The conversion of grazing areas into large-scale sedentary agriculture through large scale irrigation is also marginalizing the grazing areas. The establishment of the recent large irrigation project comprising two dams, one in Tendaho and one in Kassam-Kabana at Sabure, launched in 2005 under joint auspices of the Ministry of Trade and Industry and the Ministry of Water Resources are jargonizing the grazing areas in the Afar region. The project has established a large sugarcane plantation as well as two factories in the lower and middle Awash valley. So far land clearing activities already caused shortage of grazing areas and the resulting overgrazing has over triggered ecological degradation. For example, through the encroachments of the *prosopis juliflora* that replaces the more nutritive browsing varieties. This has resulted in sharpened conflicts between land users over pastures and water resources over recent years (PADS 2003).

Salinity

The current extent of salinity and alkalinity hazard in Ethiopia is alarming particularly in the Afar region in the irrigated areas. A number of researchers have reported the wide spread occurrence of salt affected soils. Salt affected soils in Ethiopia cover a total land area of 11,033,000 ha and it is the highest in Africa (Kidane et al 2005).
Several studies indicate that a considerable area of land has been abandoned for cultivation due to the prevalence of salt affected

> to confront the location-specific nature of adaptation to climate-related risks through building opportunities for resilience, a workable goal to promoting sustainable livelihoods in the face of uncertain change. Making resilience a specific objective for a range of policy interventions has benefits. However, we need to recognize the inevitable limits to adaptation for resource-constrained communities experiencing potentially radically altered resource availability imposed by externally driven climate shifts in the coming decades. (2010 Osbahr, H., C. Twyman, W. N. Adger, and D. S. G. Thomas. 2010. Evaluating successful livelihood adaptation to climate variability and change in southern Africa. *Ecology and Society* 15 (2): 27. [online] URL: http://www.ecologyandsociety.org/vol15/iss2/art27/)

Recommendations

The key challenge is how policy will be translated into practice at national, regional and local levels. The capacity of regional authorities to implement policies, negotiate with the various stakeholders and analyse impact of strategies will be critical. So, too, is the importance of communicating the rationale and justification for these processes and polices and ensuring feedback from communities as to how these strategies are evolving and what impact they are having.

The following are some suggestions for discussion and consideration:

Risk reduction as a comprehensive strategy built into all aspects of development and investment policies and practices.

Embracing livestock production and supporting appropriate pastoralist livelihood systems as a key pillar of Ethiopia's agricultur-

al economy. Supporting ways of "Branding" Ethiopia's livestock products in much the same way as coffee has come to be a unique product of the country**.**

Research: Tracking and collecting the evidence of impact of polices. Support to relevant Agricultural and Social Science departments in the Universities in the regions to be trained in current cutting edge methodologies to analyse local livelihood systems as well as to evaluate impact of implemented strategies and polices in order to inform policy decisions.

Participation: Mechanisms agreed on for regular consultations and participation of communities, youth, women etc. Regular dialogue and consultations at local level on new initiatives, setting up of new commercial farms, major irrigation projects etc.

Accountability: As above, ensuring engagement with impacted communities and provision of channels and mechanisms where community concerns can be discussed, complaints registered and corrective actions taken.

Communication; As part of participation and accountability ensuring that communities have advanced information and rational of planned polices and projects.

Education. Risk reduction and climate change issues to be integrated into curricula of schools and colleges. Educational institutions at regional and local level to act as conduits to help communicate development strategies as well as risk reduction issues. Schools and teachers to act as 'agents for change and encourage new innovations at community level.

Youth. Harnessing youth as agents for change, supporting access to ITC to disseminate knowledge especially on market related issues, new innovations, early warning, etc. Using the American Model of 'Young Farmers of America" youth can be encouraged to join special associations that will not only foster their knowledge and

impact on biodiversity of the drylands of Ethiopia. Consistent shift in the rain pattern and recurrent drought are becoming more prevalent, while rainfall patterns are expected to become more erratic. Agro-ecosystems consequently are vulnerable to food and feed shortage. This problem in some situation is likely to become even more difficult in the future. As the **GCM** (Global Circulation Models) scenarios for east Africa point out to an overall reduction in soil moisture availability.

All research and development activities in drylands and pastoral areas should be conducted with water as a nucleus and watershed as a unit.

Land Degradation and Low Soil Fertility

Land degradation in most agricultural lands in Ethiopia, particularly in the dryland areas is taking place at alarming rate. The major causes are the ever increasing human and livestock population and the associated demand for the basic natural resources such as land, water, forest and other agro-biodiversity resource and their products (Kidane 2005). Pressure in the drylands is expected to increase in the next decade, as the growing population both human and livestock increase.

Human and livestock population increase is leading to the conversion of lands unsuitable for cultivation to crops. Therefore, sloppy highly degraded areas not suitable for crop production are cultivated. In addition, poor soil and water management also leads to degradation in many pastoral areas of Ethiopia (Kidane Georgis 2003).

Grazing Pressure

In the drylands in the agropastoral and pastoral areas, there are huge numbers of livestock and considerable number of wildlife. Therefore, the impact on dryland biodiversity through tripling and removal of biomass, alteration of species composition through selective consumption and changed inter-plant composition is becoming a serious problem. Changes in grazing intensity and selectivity will

Objectives

- Analyze the relevance and availability of the past and current agricultural technologies developed by the NARS to address food security problems in the pastoral areas,
- Provide a comparative analysis on the use of agricultural technologies by the communities indicating whether the agricultural technologies are benefiting the end users. If not, explore the major problems associated with the transfer of the technologies and provide examples from developed and developing countries.
- Assess on how agricultural technologies should be selected to increase production on sustainable basis and forward recommendations and suggestions to the policymakers particularly relevant to the current threats from climate variability and the need to change to improve food security.
- Overall, the study aims at developing a strategic long term plan in research and development to improve food security and livelihood in the pastoral areas.

Problems and challenges in pastoral areas in relation to food security

A brief account of the pressing problems in the biophysical, socio-economic and institutional and policy problems hindering the development pastoral areas of Ethiopia is given. This will give a background to assessment of the relevance and impact of the technologies developed to the food insecurity problems.

Drought and Water Stress

The key problem in the pastoral areas and drylands is water stress and the drought associated with it. Water stress is a universal problem and common denominator to all dryland areas where the majority of the pastoralists reside. It means that in dryland agriculture, water is the central production factor affecting sustainability and food security.

Climate change is also a consistent threat in the pastoral areas. Long -term change in temperature and rainfall patterns is having serious

connections with the land but also have access to new innovations in agriculture.

Gender. Scaling up transfer of technologies to women farmers and pastoralists ensuring their representation in planning dialogues and supporting their own access to agricultural colleges, encouraging participatory research on gender impact of proposed new initiatives.

Enhancing Intermediate and Appropriate technologies. E.g. utilising the variety of Ethiopia's faith based institutions in the rural areas-monasteries, mosques, churches, centres of pilgrimages etc to play a major role as custodians of Ethiopia's environmental diversity. Acting as botanical conservation centres they can also, enhance and disseminate knowledge of traditional foods, herbs, etc. These centres can also be sources of information on using intermediate and appropriate technology for households' horticulture and food processing and preservation techniques which would have both nutritional as well as income generating possibilities.

Partnership and Principles of Good Practice: The government could initiate a series of consultations with all stakeholders, community members, farmers, pastoralists, private investors, development organizations etc to agree on and establish a set of principles or 'code of practice on "Livelihoods and National Economy and Patrimony." This could be a kind of self regulatory mechanism as well as agreed set of standards and framework which would ensure that all actors agree to review implications of new programs as well as ensuring that all projects contribute to equitable livelihood promotion and protection of Ethiopia's rich ecological, environmental and cultural heritage.

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has become a persistent problem in the pastoral areas.

Introduction

The research systems in Ethiopia have been struggling to develop agricultural technologies and to increase productivity and production on sustainable basis to achieve food security and improve the livelihood of the Ethiopian population. In these research endeavors, the lowland of eastern and southeaster and southern, the pastoral areas of Ethiopia have almost been neglected. Research and development efforts have focused mainly on the more densely populated highlands, where sedentary agriculture is a norm.

In light of this fact, it is important to review research strategy, status, technological achievements and the way forward in the pastoral and agropastoral production system. The research outcomes will therefore be assessed in terms of their impact in bringing food security on sustainable basis without jeopardizing the natural resource base and overall livelihood of the pastoralists. The research conducted in all sectors in the pastoral areas, including livestock, rangeland conservation and management, crop, forage, agro-forestry, is assessed and analyzed in line with the objective of achieving of food and feed security in the pastoral areas.

The steps taken and the progress made in building the human capacity, research facilities to develop technologies for pastoralists is reviewed. The contribution of national, regional and international institutions in building the research and development capacity is also highlighted.

First, it is vital to review the major problems constraining the production and productivity leading to food and feed insecurity in the pastoral areas in Ethiopia. Subsequently, it is assessed if the technologies developed are appropriate to address the production problems in the pastoral area.

proving this sector to achieve food and feed security thereby improving the overall livelihood of the pastoralists.

The opportunities include untapped resource potential for national development, huge livestock number, diversity and export potential that gives an opportunity for economic and social development that even goes beyond food security. The pastoral areas have also rich wildlife that is known for tourist attraction. They have also water resources including surface water and underground water and fertile soils particularly in the valley bottoms. Energy resource also includes gas and petroleum and geo-thermal sources in the Rift Valley as well as mineral resources in many parts of the pastoral areas.

The pastoral areas also bear significant values of anthropological and archeological importance. The origin of Homo sapiens (for example LUCY) is believed to be from this area and has further stimulated the attention and interest of world anthropologists and archeologists. This suggests that Ethiopia could be the primary land for human origin and civilization. More than monetary values and benefits, this fact would further benefit the tourism industry, increase the hard currency earning and improve the livelihood of the pastoralists.

However, all these resources are not used properly to increase agricultural production to improve the food security situation and livelihood of the pastoralists. Therefore, it is pertinent at this stage to indicate the major challenges contributing to this problem. Some of these factors include recurrent drought, poor infrastructure, and encroachment of agriculture on grazing lands, unsuitable administrative organizations, and internal conflicts, limited market integration and access to education and often unsuitable curricula, poor understanding of pastoral way of life, limited production systems and income.

These factors contribute to progressive marginalization of the pastoralists and often result in poorly designed research and development interventions that are not useful to protect assets and contribute to sustainable livelihood in pastoral areas. Thus, food security

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age, human and livestock population and resource diversification. In Ethiopia this production system is an important means of livelihood for more than 8 to 10 million people.

Pastoralism/agro-pastoralism are predominant production systems in the dry lands of Ethiopia. They are mainly prevalent in the arid and semi-arid agro-ecologies but also exist in the dry sub-humid areas. These systems deal with rangeland based livestock production. Semi-arid rangelands in the north and northwestern lowlands include Tigrai, Oromia (part of wellega) and Amhara regions (western Gojam and Gonder) and the Benshangul area. Ranges in the southern lowland parts of the country comprise Oromia (South Sidamo and Bale), towards the Kenya boarder, Gujji and Borena territories reaching Chew bahir to the west. Ranges in the eastern lowlands lie in the Oromia and Somalia regions, southern Bale and southern and southeastern parts of Hararghe (Ogaden lowlands). Part of the rift valley also belongs to the semi-arid rangelands category (refer to Map 1).

Map 1 Pastoral and Agropastoral areas of Ethiopia

The pastoral and agropastoral areas cover around 620,000 km^2, which includes 122 Weredas divided into 7 regions the Weredas are in the Afar, Dire Dawa, Somali, Oromia, SNNP, Gambella and Benshangul Gumuz. The total area represents 60% of the entire country (PADS 2003).

Despite the importance of the system, however, research and development activities in the pastoral and agropastoral areas were marginalized. Most of the development and research efforts were concentrated in the highlands crop-livestock production system in the sedentary farm areas, disregarding the importance in the economic, social and political developments of the pastoralists.

The lack of attention of research and development focus in this production sector by researchers, policy makers and planners has led to food and feed insecurity for both the people and livestock in the area. However, there are high potential opportunities for im-

The study also looks at good practices in the management of rangeland and dryland farming, pastoral development, community based natural resource management and drought preparedness both at local and external level, which could be adapted in line with the government's aim to achieve fast development.

Several problems in the front line in the development of pastoral areas including food and feed, water shortage, recurrent drought, natural resource degradation, socioeconomic conditions etc. are highlighted. Although, these are problems threatening the livelihood security of people in the pastoral areas, there should be perhaps more focus on possibilities for future development efforts. The study, therefore, points to many possibilities for improving the productivity of the pastoral area on sustainable basis. A doubling or more increase of yields should be within reach in many areas. The natural base, including water for irrigation, fertile soils particularly in the valley bottoms, high potential of livestock and crop resource base clearly indicate these possibilities. In addition, the research results from dryland farming obtained indicated that, with appropriate management practices, substantial increase in productivity of both food and forage crops could be attained in the dryland areas.

The past and current government policies and strategies are also analyzed and assessed to suggest potential improvement measures for future development interventions. A major lesson from the past emphasized in this study is that strategies to improve pastoral areas production system must build on greater appreciation of the skill with which dryland people allocate resources and use opportunities. Intervention by governments and donors must capitalize on the knowledge of the local people.

Background

The pastoral and agropastoral production system is very important socially, economically and politically in Ethiopia. In fact among sub-Saharan African countries, Ethiopia encompasses the largest pastoral and agro-pastoral production system both in terms of area cover-

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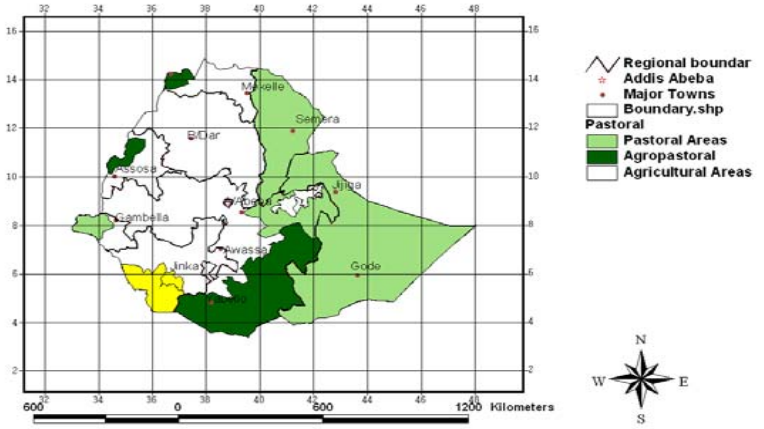

The study also gives due attention to the noble indigenous livestock production system the pastoral community has been practicing for centuries to cope with the harsh environmental conditions. It indicates that there are tremendous knowledge and practice accumulated through generations among these communities, which reside in the pastoral areas. There are useful experiences in natural resource management and/or rangelands, livestock and crop production, which are relevant to the environment and socioeconomic conditions of the area. It reveals that isolated efforts by the previous governments to develop the pastoral production system generally failed because it was not participatory and did not include the practice and knowledge of the time tested experiences of the local people. Participation by the pastoral communities is crucial to improve dryland management, if policies and practices of governments and donors are to succeed in developing the pastoral production system. It must be based on knowledge, aspirations, desire, priorities and decision of the people living there, after all they are the end users and they know what they want.

Food Security and Agricultural Technology Options in Pastoral Areas of Ethiopia

by
Dr. Kidane Georgis

Executive Summary

The objective of this study is to review, analyze and assess the role of current agricultural technologies in improving food security, examine the measures taken to improve production through use of agricultural technologies developed with local and external experiences, and what measures should be taken to improve food security in general and particularly in pastoralist areas.

The study is also intended to review present and past research activities undertaken to increase agriculture production in the pastoral and agropastoral areas of Ethiopia and identify the gaps and recommendations appropriate for development interventions to policy makers and planners.

The ecosystem in Ethiopia generally, and in the pastoral areas in particular, is heterogeneous and has varied and diversified agroecologies with different production systems, socioeconomic conditions and resource base. These factors should be clearly known and documented so that policy makers and planners could be able to use them to intervene in development programs to increase agricultural production with the aim of attaining food and feed security and enhanced natural resource base on sustainable basis. This study reviews these critical elements.

In this study the natural resource base including climate, soils, water, vegetation (biodiversity base and status), farming systems, potentials and constraints of the pastoral agropastoral production systems have been analyzed and assessed. The study gives especial focus to the major problems of production, natural resource degradation and past development efforts undertaken by the government to address these conditions in the pastoral areas.

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by
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1. Introduction

Pastoralism is an old economic activity (perhaps next to hunting and gathering) in human history. Since its emergence it has been expanding all over the world, and nowadays, it exists almost everywhere from the circumpolar region of Eurasia in the north to the tip of Africa in the south, from American dry lands in the west to the dry lands of Australia in the east (Galaty and Johnson 1990; Blench 2001). With this wider geographical adaptation, it exhibits various unique and general features. First, pastoralists are dependent on livestock production for subsistence whereas crop cultivation gets marginal attention, where it exists. This is because pastoral areas constitute arid and semi-arid ecologies with unreliable and very low rainfall which is not adequate for crop production.

Second, mobility is an important feature of pastoralism since rangeland resources (such as water and pasture) are scattered over a wide area of land. Mobility serves at least two important purposes for pastoralists. First, it saves costs of labor because taking animals to places where water and fodder are available consumes less labor than bringing the resources to the animals. In this regard, mobility enables pastoralists to easily fulfill the nutritional requirements of their livestock since the species composition of the pasturage in different places usually varies (Blench 2001). Second, by moving the animals during a certain season of the year, pastoralists reduce the vulnerability of livestock to disease outbreaks that might occur in some places (Roeder 1996, cited in Niamir-Fuller 1999).

Third, pastoral areas are characterized by communal ownership of land and landed resources. Since pastoral lands are low in productivity, animals need to roam over a wide area of land to fulfill their biological needs. For instance, Gilles and Gefu (1990: 103) note that access to 100,000 - 300,000 hectares of land is required in semi-arid tropics to ensure the survival of livestock and their owners. It is

difficult, if not impossible, to own this large size of land individually since the transaction cost of enforcing exclusion rights can be exorbitantly high. Hence, communal ownership bears comparative advantage over private ownership to properly regulate the use of rangeland resources.

In Ethiopia, pastoralists are found in extensive lowlands of the east (Somali), south east (Somali, Borana, Guji), northeast and central rift valley (Afar, Karrayu, Somali and Argoba), west and south west (Nuer, Anuak, Komo, Shinasha, Gumuz, and Benishangul), and south (Hamer, Dassenetch, Erbore, Bena, Tsemay, Nyangtom, and others) which accounts for about 60 percent of the landmass (Figure 1). In terms of population size Ethiopian pastoralists constitute about 12% of the country's population. Large concentration of the pastoralist population are found in Somali region (53%), Afar region (29%) and Oromia region (10%) (Sandford and Habtu 2000). The contribution of pastoralism to the Ethiopian economy is substantial. It is estimated that 40 percent of the cattle, 25 percent of the sheep, 75 percent of the goats, and all of the camels of the country are the outputs of pastoralism.

While the contribution of pastoralism to the national

Figure 1: Pastoral Areas of Ethiopia (yellow shaded)
Source: PFE, 2009

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economy is significant in Ethiopia, pastoralists have been facing serious challenges to pursue their livelihoods. Currently, a large number of pastoralists live under abject poverty, their livelihoods being constantly threatened by natural calamities that are common in pastoral areas of Ethiopia.. This has been exacerbated by interventionist government policies that have largely sought to abolish the traditional way of life of pastoralists on the assumption that pastoralism is a "primitive" and "non-viable" way of life that should be done away with rather than to be conserved.

While traditional pastoralism is by nature resilient to natural shocks, this quality has been eroded gradually, making pastoralists easily vulnerable to natural and policy related shocks. Hence they are currently within the risk of food security and poverty. Meanwhile, there are a number of external interventions (both from government and NGOs) in pastoral areas to mitigate the multifaceted problems there. These interventions have mixed results which can provide important lessons for future interventions. The objective of this paper is to review existing policies and interventions and draw important lessons to achieve food security in pastoral areas of Ethiopia. The analysis is based on a wide range of studies and documents in Ethiopia and elsewhere.

The remainder of the paper is organized as follows. The next section discusses theoretical issues regarding food security. Section 3 discusses the general policy environment on food security in Ethiopia focusing on pastoral areas. Section 4 discusses the situation of livelihoods in pastoral areas. Sections 5 discusses situation of food security and responses to the challenges. Section 6 provides the way forward.

2. Theoretical Issues of Food Security

Food security has been an important concept in academic and policy circles for many decades. The concept has been defined and redefined by scholars taking into account the drawbacks of previous definitions and current concerns. Generally, food security is about

the possibility that individuals, households, communities and nations get adequate food to eat, and reflectss both supply and demand side concerns regarding food. On the supply side, the analysis of food security focuses to the adequacy of food items available for consumers to purchase (Norton 2004). On the demand side, it focuses on whether consumers are willing and capable to pay for the available food.

The previous orthodoxy, which was dominant during the 1970s and before, considered food availability as the central problem associated with food insecurity in developing countries (Ellis, 1992; Norton 2004). This idea is often associated with the Malthusian doctrine which predicts that food supply would fall short of the demand at some point in time since population tends to grow geometrically whereas food production takes a linear trend. According to this view there are two major causes of food insecurity: general food shortage and instability in food prices. The main task of policy makers is to ensure that adequate food is produced at national and sub-national levels, and once this is ensured the produced food takes its "own way" to reach consumers. The other concern, of course, is to stabilize food prices within consumers' income range.

Previous mainstream ideas about food policy formed the basis of policies of many countries in 1970s. Two policy instruments were common: food self-sufficiency and domestic price stabilization schemes. Domestic food self-sufficiency in staple food items was a major area of focus partly to avoid undue reliance on unstable and unpredictable food prices in international markets. Countries aimed to achieve food self sufficiency through a range of policy instruments which include, among others, promoting intensive use of commercial inputs (such chemical fertilizers and pesticides) by providing subsidies and low interest loan, improving access of farmers to new agricultural technologies (such as improved seeds and breeds) by promoting agricultural research, and on specialized large scale state farms. With regard to price stability, the typical approach followed by countries was the creation of a national food

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solve some of the inherent characteristics of accumulating wealth "on the hoof".[4] In this respect, the introduction of MFIs can improve pastoral portfolio management strategies by introducing non-biological forms of savings. Third, MFIs can be used to empower socially marginalized groups such as women and poor households.

- *Addressing gender issues:* The interventions should be gender differentiated since women and men have different roles. Women have more roles in processing and marketing livestock products whereas men tend to specialize in livestock marketing (Little 2006). With regard to handcrafts, women tend to specialize in production of some items while men tend to specialize in others. For instance, Flintan (2007) noted that Afar women make baskets, brooms, goat-skin storage bags, fans, milking vessels, necklaces, sleeping mats, whereas men make furniture, bracelets, knives, milking bowls, sandals and spoons. Therefore, interventions should take into account these tendencies of pastoralists. This will improve efficiency and potential benefits from existing opportunities while closing gaps in gender related power differences.

[4] Livestock are inherently indivisible. Unlike grains, one cannot sell them in small volumes to settle minor problems. Once the animals are sold, relatively large sum of money can be ready for disposal which can facilitate squandering or extravagance. Squandering is most likely to happen in Afar communities where everyone knows who has earned what and ready to ask for some shares. Moreover, livestock are biological assets that can be lost due to natural hazards such as drought and diseases epidemics.

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security stock from which grains were released to defend retail food prices from rising beyond a fixed ceiling during seasons of shortage.[1] This resulted in the establishment of parastatals with wide ranging powers to buy and sell food grains and to regulate the quantity and prices of imported food items when importing was imperative to the nation.

However, this conceptual approach to food insecurity is aggregative in nature because it interprets food security as the national balance of supply and demand, while ignoring interpersonal inequalities of consumption. Since the seminal work of Amartya Sen (Sen 1981), several studies have implied that attaining a positive national food balance is neither a necessary nor a sufficient condition for food security. It is not a necessary condition because countries can close national food gaps through food imports or, for that matter, through food aid. It is not a sufficient condition because even though the nation has a positive food balance some portion of the population may face hunger and malnutrition arising from lack of capacity to command over food.

Current food policies are based on new conceptual thinking regarding food security which takes into account the drawbacks of the past orthodoxy. The definition of food security has been adjusted since the 1980s such that it takes into account the demand and supply sides of food; but emphasis has been given to the demand side. For instance, the World Food Summit of 1996 endorsed the following definition of food security: "a state when all people at all times have physical and economic access to safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (World Food Summit 1996). According to the current mainstream thought, a region or a country is said to be food secure not only if it has the biological capability and resources to produce food of the quality and quantity of food required by people, but also if all of its consumers have enough purchasing power to command

[1] A variety of instruments were employed by different countries to operate food security stocks: some set floor and ceiling prices, some others followed fixed price approach whereby consumers (sellers) are obliged to pay (receive).

over the food (Heidhues et al. 2004; Falcon and Naylor 2005).

Even the capability of the region to produce the required quantity and quality is secondary to the current concept of food security because individuals can be entitled to food through different means. As Amartya Sen (1981) posits an individual or a household may get access to food through one or more of the following means: 1) through own production which is the case in most of the farming community; 2) using earning from trade; 3) using earning from sale of own labour power in labour markets; and 4) through inheritance-based earnings. Since ensuring food security entails a close scrutiny of how individuals and households get access to food, current food policies should constitute a complex set of instruments to address the issue. Moreover, this paradigm shift has entailed a shift in research emphasis from aggregate comparison of national food supply and demand to a grass-roots investigation to know what is happening at household and individual levels.

More recent debates even go beyond the issue of food security and posit that nutritional security is the final goal of any food policy. In this view, food security is an intermediate concept which is a necessary condition to attain nutritional security but not a sufficient one because the diversity of food secured by individuals and their health conditions also matter. Translating food security into nutrition security entails a close scrutiny of intra-household distribution of food, individual level sanitary conditions, access to safe drinking water, and access to health care. In terms of policy design the consequences of new concept are that a fully integrated and inter-sectoral approach (constituting agricultural and economic development, social development, education, and health) is required to realize the final objective of a healthy and productive population (Roetter and Van Keulen 2007).

Household food insecurity can take different manifestations. There are cases of transitional food insecurity where households face food shortages only during a certain season r year. This type of cyclical food insecurity accounts for roughly 10% of the global prevalence

6.3 Interventions to enhance the performance of other livelihood alternatives

- *Promoting handcrafts and trade:* Other alternative livelihood strategies are important for those who are not successful in pastoralism or crop production. Handcrafts and petty trade are practices currently observed in many pastoral areas as livelihood alternatives. There are successful interventions by some NGOs (see section 4.3.2) to enable pastoralists generate reasonable income from these activities. The best practices should be scaled-up to reach more beneficiaries.

- *Promoting ecotourism:* Given that many nature conservation areas (such as parks and wild life sanctuaries) are found in pastoral areas, eco-tourism can be an important alternative for pastoralists. Pastoralists can generate income by serving as tourist guides, translators (if they are trained in foreign languages), etc. Traditional handcrafts can be linked to eco-tourism.

- *Discouraging/controlling harmful practices:* Some livelihood diversification strategies may carry long term dangers. For instance, charcoal burning can lead to environmental damage, and attempts should be made to regulate it**.** While charcoal burning could be found in many pastoral areas, it is quite extensive in Somali region (see section 4.3). This will result in overexploitation of the natural resource base which will, in turn, lead to further deterioration of livelihoods in these areas.

- *Promoting cooperatives and groups:* Cooperatives (perhaps small groups) can facilitate the provision of some services (such as practical trainings) which are important to the performance of alternative livelihoods. Moreover, cooperatives can facilitate the transmission of information thereby reducing information gaps, particularly those related to output markets. Pastoralists can be organized into financial groups through which micro-finance services can be channeled. The introduction of such groups has several advantages. First, a well -adapted micro-finance service can relax the financial constraints of households by increasing access to micro-credits. Second, MFIs can

resources in this case but the combination can be driven by ecological contexts and the overall inclination of people therein.

- *Encouraging intensification and commercialization:* Livestock productivity is quite low in pastoral areas due to poor management and low level of commercialization to use improved feeds and breeds. To ensure food security, pastoral households should be encouraged to intensify their livestock husbandry (by introducing improved forages, improved breeds, and improved techniques of livestock management). Moreover, households should be encouraged and supported to engage in value adding activities such as fattening, milk processing, and high quality hide and skin production. Given that agro-pastoralists also engage in crop production, efforts should be made to improve crop productivity. Since rainfall is inadequate and unreliable in most of the pastoral areas, an important intervention could be development of community-managed small-scale irrigation (where the ecology allows). In this regard, high value crops should be promoted to maximize the gain from irrigation investments. In rain-fed areas, practices that conserve water (e.g. rain water harvesting, soil-moisture management) should be promoted to improve crop productivity. To make the intensification of both livestock and crop husbandries sustainable and successful, the marketing system should be improved.

- *Developing basic infrastructure in settlement areas:* Currently, households in many agro-pastoral areas duel in permanent settlements. There are also moves by the government to settle pastoralists on voluntary basis. In places where settlement has a comparative advantage over mobile pastoralism, investments in basic infrastructure (such as feed roads to link settlements to nearby urban centres, potable water services, human and animal clinics, schools, and others) should get due attention.

of food insecurity. On the other hand, the majority of food insecure households in the world (90%) suffer from chronic food security which is characterised by persistent shortage of food all the time because of lack of basic assets. Recently, another form of food insecurity has been added to the taxonomy bearing a name of "hidden hunger". Hidden hunger is associated with micronutrient deficiencies and is affecting more than two billion people in the world (Von Braun, et al 2005). While we may theoretically separate the three categories, they are practically linked to each other. Recurrent shocks may lead to chronic food insecurity of transitory food insecure households by depleting their asset base and hence by debilitating their capacity to recover after shocks. Also it tends to be the chronically food insecure who face the hidden hunger due to their lack of access to more diverse and high quality food.

A number of policy instruments are suggested to address the problem of food as well as nutritional insecurity. Supply side instruments include promotion of efficient use of water in agriculture (small scale irrigation, water harvesting), use of improved technologies and inputs (improved seeds, fertilizer). While the degree of emphasis may vary across countries depending on resource endowments and comparative advantages to procure food items from international markets, domestic food production remains to be a crucial policy agenda for most of the developing countries. From the demand side, instruments such as price stabilization schemes (through domestic buffer stock schemes, food imports, generalized or targeted price subsidies), productive safety net programs, and free food distributions constitute the feasible package. However, tackling the problem of food insecurity entails a policy focus which goes beyond manipulating the demand and supply sides of food. Rather it requires an integrated effort to improve the economic, education, and health status of the poor people (Roetter and Van Keulen 2007).

3. Policy Framework in regards to Food Security in Ethiopia

Since the economic and political reform of early 1990s, Ethiopia's economic development path has been guided by a broad framework known as Agriculture Development Lead Industrialization (ADLI). ADLI forms the basis of other development strategies and policies launched since its formulation. Given that Ethiopia is an agrarian country, ADLI focuses on rural areas aimed at increasing agricultural production and productivity and facilitating the transformation of the economy from an agriculture-based to an industry-based one. While ADLI's major focus is ensuring food security through increasing domestic food production (to attain self sufficiency), a separate strategy was prepared and launched in 1996 to address the specific complexities associated with food security. The Food Security Strategy (FSS), which was the first federal development strategy document since the adoption of the Federal Constitution, was designed to address the problem of hunger and food insecurity at household level.

In order to include some developments in the course of time, a refined version of food security strategy was later prepared. The updated strategy is different from its earlier version in that it targets mainly to the chronically food insecure moisture deficit areas of the country; explicitly mentions pastoral areas as its target areas; makes a clearer focus on environmental rehabilitation as a measure to reverse the level of degradation and also as a source of income generation for food insecure households through a focus on biological measures. In recognition that the pursuit of food security is a long-term and multi-sector challenge, institutional strengthening and capacity building is included as a central element of the strategy.

Food security has also been addressed in subsequent national development strategy documents, namely, Sustainable Development and Poverty Reduction Program (SDPRP) and Program for Accelerated and Sustainable Development to End Poverty (PASDEP)[2].
On the supply side, the strategy emphasizes the need to boost

[2] SDPRP and PASDEP are development programs of the Federal government for the period 2002/03-2004/05 and 2005/06-2009/10. The interim poverty reduction strategy paper (2000/01-2002/03) constitutes the first phase of the 2000/01-2004/05 strategic plan of the Federal government while SDPRP constitutes the second phase.

- *Conflict management:* Conflicts between pastoral groups are likely to occur in mobile pastoralism because of overlapping claims over resources and the fuzziness of property rights. Conflicts are more apparent during drought seasons when pastoral resources (pasture and water) are limited to satisfy the demands of the claimants. Therefore, an effective conflict management mechanism should be in place to mitigate the possible adverse effects of conflicts on pastoral livelihoods. In this regard, it is essential to provide a locally motivated institutional framework in which traditional conflict management authorities play key role. In the meantime, it is important to strengthen legal institutions at district level so that the conflicting parties can present their cases for judgment when mediations fail. In the long run this latter point implies strengthening state security institutions step by step to realize a fully functioning rule of law in pastoral areas.

- *Providing basic services:* it is necessary to provide basic services such education, health, veterinary services in a manner which is compatible with the mobile lifestyle of pastoralists. To be more effective and reduce the risk of brain drain, the focus should be on training local youngsters to provide these services.

6.2 Interventions to enhance the performance of agro-pastoralism

- *Contextual balances between livestock and crops:* Agro-pastoralism entails the coexistence of livestock and crop husbandries in one place. Given that land is getting scarcer in pastoral areas nowadays, the two husbandries are competitive. Best rangelands across river basins are also preferable for crop production (as in riverine areas across Awash river in Afar and Wabe Shebele and Genale rivers in Somali regional state). This harbours inherent conflicts among different households on how to use the land. Hence it is important to keep the balance between farming and pastoralism in terms of land allocation and managing conflicts which may arise between households pursuing pastoralism and those pursuing agriculture. There is no recipe to determine the best allocation of land and other

6.1 Interventions to enhance the performance of mobile pastoralism

- *Improving livestock marketing system:* Production and marketing can be considered as two parts of the whole system having direct links to consumption. Thus, efficient marking system is as essential as efficient production system to improve pastoral livelihoods given that contemporary pastoralists do not live in a world where autarky can help. Improving the performance of livestock marketing system in fragile pastoral ecologies can serve two important purposes. On the one hand, the existence of efficient livestock marketing system enhances timely sale of surplus livestock induced by good weather. In doing so, it increases the capacity of pastoral households to exploit the opportunities created by good weather conditions while fostering the resilience of pastoral ecosystem. On the other hand, efficient marketing system facilitates timely destocking and restocking activities, thereby improving *ex ante* and *ex post* risk management capacities of pastoral households during bad years. Improving livestock marketing system requires improvements in hard infrastructure (such as roads, en route watering and feeding stations, and quarantine stations), market information services, and regulatory institutions.

- *Rangeland management:* The deterioration of rangeland quality in many pastoral areas because of invasion of unwanted plant species calls for critical intervention to make livestock production in these areas viable. Measures should target both mitigation of the deterioration of rangelands and improvement of rangelands. Good practices (such as that of FARM Africa in Afar on *Prosopis juliflora* - see section 4.2.1) should be scaled up. Traditional range management techniques such as using controlled fire[3] should also be supported. Above all, a well discussed strategy should be devised for the control and management of invasive species and improvement of rangelands at federal and regional levels.

[3] Such practices (used in Borana) are banned by the government.

domestic agricultural production to attain self-sufficiency in staple food crops. On the demand side, it seeks to improve individuals' entitlement to food. Accordingly, it sets three broad objectives, i.e., increase the availability of food through increased domestic production, ensure access to food for food deficit households, and strengthen emergency response capabilities. The Strategy has four essential elements, namely: agricultural production, marketing and credit; pastoral areas; micro and small scale enterprises, and agricultural export and diversification. All focus in rural areas except the activities designed to support micro and small scale enterprises.

Various programs were envisaged for the highland parts of the country, depending on the resource potential of locations. In areas where rainfall is reliable, the strategy focuses on the diffusion of simple technology packages within smallholder agriculture through the national agricultural extension program, increasing the use of commercial inputs, conservation based farming (whereby degraded areas are rehabilitated), promotion of marketing cooperatives, and expansion of rural credits. In moisture stress areas the major focus on efficient use of water resources, expansion of small scale irrigation, promotion of dry land agriculture, and implementation of settlement programs for those people dwelling in areas where land is highly degraded and rainfall is unreliable.

Food security issues in pastoral areas were addressed in all recent policy documents (FSS, SDPRP, and PASDEP). The food security strategy recognizes the complex and challenging nature of pastoral food insecurity mainly because there is significant diversity within pastoralist areas in terms of resource endowments, opportunities and vulnerabilities. It also underscores the need to promote a diversified livelihood in pastoral areas for the following reasons. First, livestock are vulnerable to drought and any threat to the livestock economy strikes at the heart of pastoral communities. Introducing livelihood alternatives improves the capacity of pastoral households to withstand recurrent droughts. Second, a diversified livelihood (particularly growing crops) may protect pastoral households (at least partly) from a declining terms of trade between livestock

and crops during drought periods. Third, increase in human and livestock population has put pressure on rangeland resources resulting in soil erosion, deforestation and bush encroachment, thus increasing the vulnerability of pastoral communities. Improving livestock development and diversification outside pastoralism or directing to agro-pastoralism will strengthen their economic base and reduce their food insecurity.

The document also stresses the need for pastoral sedenterization, which is stated as a long term goal to be implemented in consultation with the pastoral communities. Sedenterization is justified on the ground that pastoralists will get the chance to pursue irrigated agriculture parallel to livestock production while getting better access to basic services (education, health care, veterinary services, etc) which will improve their food (as well as nutrition) security and their overall living standard.

Pastoral settlement was also discussed in the SDPRP as a critical strategy to attain food security and sustainable development in pastoral areas. Associated strategies include consolidating and stabilizing those who are already settled or semi-settled through improved water supply, pasture, and social services, carefully selecting viable and reliable river courses for future sedentarization based on irrigation and link these places through roads and other communication lines, and providing mobile social services including health and education for those that continue to be mobile.

Pastoral settlement is not as such emphasized in the PASDEP as in SDPRP. PASDEP is rather a comprehensive strategic plan which has taken other issues into account to address the problems of food insecurity and poverty in pastoral areas. Activities were targeted to improve pastoral livelihoods and asset basis, improve basic social services, strength institutions and improve governance. The following specific strategies were envisaged, among others: (i) promoting community-based drought early warning systems and mitigation measures, (ii) encouraging livelihoods/asset diversification (fishery, agro-pastoralism, herd diversification, mining etc), (iii) facilitating

pastoralism (as implied in several official documents) should be avoided to bring sustainable development in these areas. It is worthwhile to consider pastoralists as heterogeneous groups in terms of their capability to withstand existing livelihood challenges and the opportunities available to them for livelihood improvements. Settlement may be one option to ensure food security and eradicate poverty in pastoral areas but it is not the only option available. It can be an option for those who have lost their livestock and need to look for alternatives; but it is not a preferable option for pastoralists who could succeed within the framework of mobile pastoralism and in areas where mobile pastoralism lost comparative advantage over other alternatives because of increased urbanization, availability of irrigable rivers, or other reasons. Therefore, development interventions should consider pathways other than 'sedenterization' which aims to convert pastoralists to farmers. Three alternative development pathways are proposed here to ensure food security in pastoral areas of Ethiopia (Figure 6). Areas of interventions in each of the three pathways are pinpointed as follows:

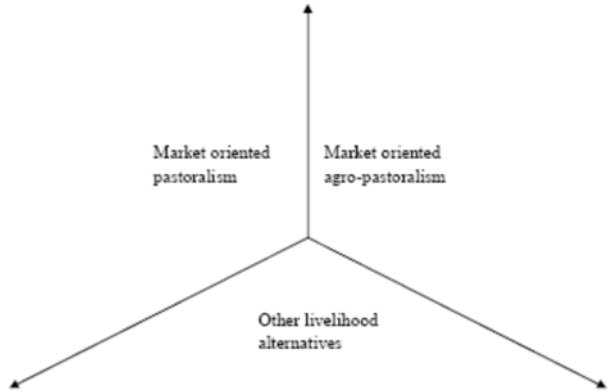

Figure 6: Development Pathways in Pastoral Areas of Ethiopia

A great number of NGOs are operating in pastoral areas but interventions are not well coordinated. The same situation is observed among government ministries; poor coordination and conflicts exist particularly between Ministry of Agriculture and Rural Development and Ministry of Federal Affairs over responsibilities for intervention in pastoral areas. There are also problems in vertical coordination: there is poor coordination among departments at federal, regional, and woreda levels due to lack of clarity on institutional responsibilities (Pantuliano and Wekesa 2008). Poor coordination among different stakeholders is observed partly due to lack of common governing principles in regards to improving pastoral livelihoods and partly because of institutional and organizational gaps. However, interventions should be coordinated and the outcomes should be evaluated with respect to common governing principles.

Food aid is the most dominant mode of emergency response, though it is not the first priority as studies indicate in some pastoral areas (Pantuliano and Wekesa 2008). Rather development interventions are more favoured. Therefore, donors should seek to fund long-term development interventions aimed at building the resilience of pastoral livelihoods and strengthening pastoralist institutions. While the current post-crisis interventions should be made more responsive, pre-crisis interventions should also be considered. Pre-crisis interventions can help to protect pastoralists' assets, and hence prevent further vulnerability in the livelihoods system. This requires an efficient and a reliable early warning system.

Emergency interventions are delayed due to inflexible bureaucratic procedures. For instance, a field report indicates that drought responses in most pastoral areas in 2005/6 were largely late by about 8 months and less effective than expectations (Pantuliano and Wekesa 2008). Moreover, interventions focus on emergency relief while livelihoods development programs are not given the attention they deserve, though things are improving currently.

While current attention of the government to the development of pastoral areas is appreciable, the prejudice against mobile

local and cross-border livestock trading, with better market information, credit provision, and certification for quarantine, restoring the stocker/feeder program through private or livestock cooperatives, and promotion of commercialization of livestock production objectives, (iv) establishing micro finance institutions that are tailored to the needs and livelihoods of pastoralists and support pastoral activities in trading as well as livestock, (v) protecting good and fair range and upgrading of poor or depleted range, (vi) rehabilitating/constructing main and feeder roads, (vii) improving basic social services such as health and education, for example, by developing pastoral friendly curriculums and health service programs, and (viii) strengthening the capacity of local institutions and leadership to manage resources and conflicts.

4. Livelihood Alternatives in Pastoral Areas

Various types of livelihood strategies are adopted in pastoral areas of Ethiopia. For the purpose of discussion, these strategies are categorized into three. However, it should be noted that these are not mutually exclusive categories, and a single livelihood strategy is not exclusively adopted in a given location. Rather, the three livelihood strategies coexist in different location with different combinations.

4.1 Mobile pastoralism

Mobile livestock herding is a long time livelihood strategy in pastoral areas. In a pastoral system, people mainly depend on livestock for consumption and to generate income. Livestock can be considered as technologies that transform grazing and browsing resources, which otherwise are non-usable, into consumable products for human beings (meat, milk and blood) (Galaty and Johnson 1990). Virtually, animals are owned privately and success in accumulating livestock is a measure of individuals' economic and social competence (Gilles and Gefu 1990).

Ethiopian pastoralists rear a number of livestock: cattle, camels, small ruminants and donkeys. Cattle and small ruminants are large in number as compared to camel areas of Ethiopia. In fact, camel is

endemic to the pastoral milieu because of its superior adaptability to the climate and natural resources therein. Nearly all of the camels in Ethiopia are produced in pastoral areas while relatively small proportion of cattle (40%) comes from there (Ahmed, et al 2002). Variations exist in herd compositions depending upon climate, vegetation mix, and socio-cultural settings (Oba and Kotile (2001). Camels dominate among Afars and Somalis whereas cattle dominate among the Boran, Karrayu, Guji and pastoralists in South Omo (Getachew 2001, Devereux 2006, Watson 2001, SNNPR n.d). However, there are exceptions to this general classification. For instance, among the Somali's, the Isaaq and the Ogaden clans are camel-dominated while the Issa clan is cattle-dominated (Devereux 2006). On the other hand, the importance of camel is increasing among some Boran communities as a result of the invasion of their rangeland by bushy plants and the occurrence of recurrent droughts. In Afar, clans inhabiting the northern dry lands (the Asaimara tribe) are known for camel production, whereas those inhabiting the southern part of the Afar region (the Adohimara tribe) incline towards the production of cattle and other ruminants.

Even within the pastoral milieu, mobile pastoralists live in drier areas () (as in Shilabo, Shinile, and Gashamo districts of Somali region, in Eldar and Dubti districts of Afar region, and in Dire and Teltele districts of the Borana zone of Oromia region). But one can add more places to the list. Some inhabit border areas where mobility transcends international boundaries. Pastoral resources (such as pasture and water) are scarce and scattered over a wide area of land; hence extensive mobility is imperative to sustain livestock.

Though livelihoods of pastoralists depend on livestock, they do not exercise commercial economy, i.e. they do not primarily produce livestock for commercial purposes. Livestock are their sources of food. Hence, whenever the livestock economy is affected by unfortunate circumstances such as drought and theft, their direct command over food is hindered and the amount of milk and meat consumed dwindles. Pastoralists cultivate crops whenever the

formed savings and credit association. Evaluation of the intervention was made 2008, which shows that the project was quite successful in improving the livelihoods of poor pastoralists, particularly women (Seyoum et al 2008). The lesson was voluntarily diffused to neighbouring areas.

The best practice of GL-CRSP-PARIMA has been taken up by the so called PLI-ENABLE consortium of NGOs (CARE Awash, Afar Pastoral Development Association (APDA), FARM AFRICA, Action for Development (AFD) and CARE Borana) in their interventions in Afar region and Borana zone (Lemlem, et al 2007).

NGOs are also active in natural resource management and agricultural development. In Afar, FARM Africa is implementing a project targeted to eradicate *Prosopis juliflora* (Dubale 2008). It has designed options to control the expansion of the plant which include: mobilizing communities to uproot seedlings from newly invaded areas, and restoring these areas, cutting matured trees 10-30 cm below the ground level (depending on age of the tree to prevent coppicing) and using the wood for charcoal production, and collecting pods and crushing to use it as livestock feed. In the same region, FAO has assisted pastoralists affected by drought to engage in irrigated farming (Bekele 2009).

6. The Way Forward

Diverse ways of responses can be observed in pastoral areas at present both from within the pastoral communities and from external stakeholders. Internal responses are highly adaptive to local contexts but pastoralists have limited capacity to avert current livelihood challenges. Mutual help mechanisms are getting weaker not because of lack of sympathy of pastoral households for each other, but there simply no enough resources to donate or lend (Bekele 2010a). Pastoralists' efforts to reduce the impact of drought through mobility are hindered by resources expropriations, resource degradations, and conflicts among pastoral groups (Bekele 2010b; Beruk 2003; more citations).

The program is currently on transition from a pilot stage to a full scale implementation and several NGOs such as CARE Ethiopia and SC-UK are in the list of program collaboration.

In addition to government-coordinated interventions, various projects and programs have been implemented in collaboration with NGOs (or consortium of NGOs) in pastoral areas of different regions. In Somali region, the government has been promoting small business development through the Women's Affairs Office and the Cooperative Promotion Bureau (Pantuliano and Wekesa 2008). These offices have been working with NGOs (such as IRC, SOS Sahel, and Oxfam GB) and have successfully established 23 cooperatives in Aware, Aw-Barrey, Degahabur, Harshin, Jijiga and Kebrigeyah districts. Cooperatives have been organized in line with a variety of trade such as marketing of livestock and livestock products (such as hides and skins), diverse petty trade, and marketing of fruits and vegetables. In collaboration with the NGOs, the offices have provided trainings in the areas of entrepreneurship, marketing and business management. Training needs have also been identified in the areas of organisational and business management; agro-processing; livestock marketing; and small scale industry management. There are also practical supports given by Oxfam GB and SOS Sahel in the area of handcrafts.

In southern Ethiopia (mainly Borana), the Global Livestock Collaborative Research Support Program (GL-CRSP) through its Pastoral Risk Management (PARIMA) project has been implementing pilot risk-management activities among poverty-stricken, semi-settled pastoralists by focussing on savings and credit development since 2000 (Seyoum et al 2008, Coppock, et al 2007a,b). First, support was directed to capacity building through a combination of non-formal education to improve literacy in Afaan Oromo, arithmetic skills to the first grade level as well as speciality training in the management of savings and credit associations, microenterprise development and group leadership skills. Thereafter, participants were encouraged to create personal or group business plans and embark on small scale entrepreneurial activities using loans from their newly

weather allows them to do so (known as "opportunistic farming"). This is usually observed after drought seasons as coping strategy.

Pastoralists are increasingly dependent on grains. This dietary shift is not willful but, a compulsive one, in search of cheaper food stuff due to declining livestock economy. Nowadays, most of Afar pastoralists depend on purchased foodstuff (grains) for their subsistence (Bekele 2008; Getachew 2001, Davies 2006). Similar situations are observed among the Somalis (Devereux 2006) and Boranas (Lemlem and Yemane 2007). Although some pastoralists produce grains (when weather permits), they are not usually self-sufficient in grains. In most cases, they possess trade-based entitlements to grains by selling their livestock and/or livestock products (dairy products, hides and skins). Sheep and goats are the first to sell when grains are required for a household; cattle and camels are deployed for market thereafter to fill successive food gaps (Davies 2006).

4.2 Farming/Agro-pastoralism

Agro-pastoralism is a system of mobile livestock production in combination with crop cultivation. Unlike the "pure" pastoralists, mobility is not extensive among agro-pastoralists. They have permanent settlements where some family members (children, women, and elderly) stay throughout the year. The climate in which they live is less harsh: i.e. temperature is relatively mild and rainfall is better as compared to the situation among the "pure" pastoralists. As a result, resources (pasture and water) are better. They move short distances with their livestock during dry seasons. Crops are grown around their permanent settlements using rain or irrigation. Crop cultivation is mainly undertaken by women.

While agriculture is a recent introduction, it is currently expanding in most of the pastoral regions of Ethiopia. The Somali region is notable with regard to crop-complemented pastoralism. Agro-pastoralism is clearly visible in Kebirbeyah, Doboweyn, Cherati, Kelafo, Dolo Odo, and Jijiga districts (Devereux 2006; Fekadu

2008). However, there is variation among them in terms of the degree of involvement in farming. In Kebirbeyah, Doboweyn, and Cherati districts people engage agriculture side by side with transhumance pastoralism. Kelafo and Doboweyn districts are riverine areas and people use irrigation to cultivate crops. In Jigjiga, agriculture is rain-fed but the extent of involvement of people is high due to the existence of reliable rainfall. In the latter three districts people are settled and livestock husbandry resembles that of the highland mixed farming system.

The trend is more or less similar in other regions where the emergence of agro-pastoralism is evident. In Borena farming is expanding especially after the 1995 drought which devastated the livestock economy of the people. Nowadays, people in pure pastoral districts such as Dirre, Moyale, and Dugde-Dawa supplement their pastoral livelihood with crop production (Adugna and Aster 2007, Lemlem et al 2007, Abdi 2007). In Afar, cultivation has a long history in the riverine areas of lower R. Awash valley (such Assayta and Afambo) where people produce crops using traditional irrigation system (Getachew 2001). Rain-fed cultivation also exists in Argoba and Aba'ala districts (Diress 1999; Kebebew, et al 2001). In Gambella and Benishangul regions and South Omo zone of SNNPR traditional pastoralism is complemented with agriculture. For instance, Beruk (2003) reported that the estimated cultivated land in Gambella, Benishangul Gumuz and South Omo are 32,000 hectares, 38,718 ha, and 58,503ha, respectively.

Farming is exercised in response to the declining household food security mainly due to drought (Beruk 2003). It could be also considered as a way of economic diversification (Devereux 2006, Oba 1998). Production of staple crops (when successful) delays sales of livestock to fulfill household food gaps thereby protecting households against deteriorating livestock-crop terms of trade which is observed during drought seasons. Crops grown are dominated by cereals (such as sorghum and maize). However, agro-pastoralists in some districts, such as Kelafo and Dolo Odo grow high value crops (vegetables and fruits) in addition to subsist-

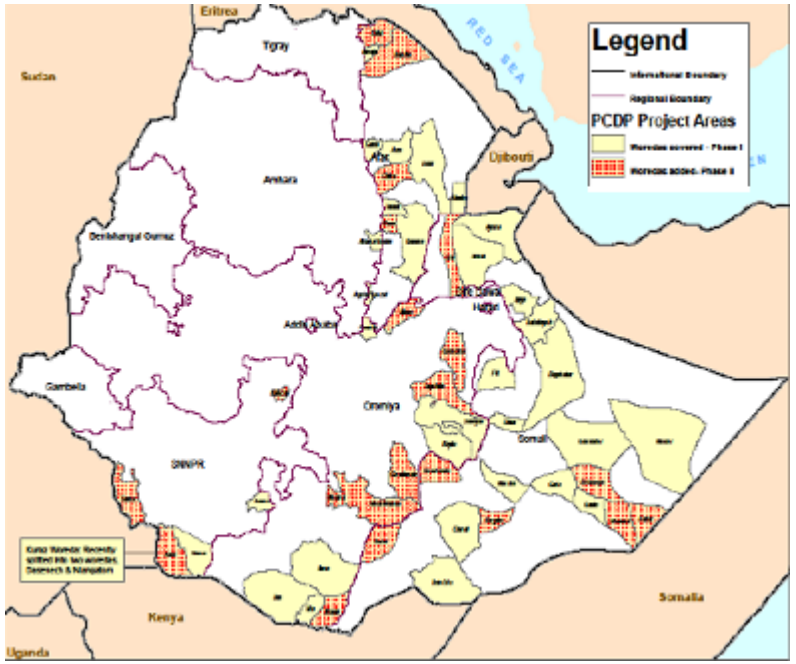

Figure 5: PCDP target areas

The other development intervention coordinated by the government is the Pastoral Safety Nets Program in Pastoral Areas (PSNP-PA). This is coordinated by the Food Security Coordination Bureau (MoARD) and consists of (i) labour-intensive public works – for those households who can contribute labour – selected and designed based on local priorities and opportunities; and (ii) direct support for labour-poor households. The public works element is basically meant for community asset building including the rehabilitation of natural resources e.g. land, water and vegetation. The direct support component will help those who cannot participate in public works (i.e. the elderly, chronically ill, etc.). The programme is designed to serve as leverage for chronically food insecure households to help them graduate to food secure status if, as mentioned earlier, they are also able to participate in development activities designed to boost food availability and access (FDRE/FSCB, 2004).

coordinated by NGOs or implemented alone. The Pastoral Community Development Program (PCDP) is among the largest development intervention programs in pastoral areas. It is financed by The World Bank and IFAD and is coordinated by Pastoralist Development Department of the Ministry of Federal Affairs (MoFA). With a plan of implementing three overlapping five-year projects, PCDP started in 32 pastoral woredas of Afar, Oromiya, Somali and SNNPR regions in 2003(Figure 5). The main objective the program is to build capacity in pastoral areas by establishing effective models of public service delivery, investment and disaster risk management that address priority needs of communities and their vulnerability to disasters.

The interventions have two major components: Sustainable Livelihoods Enhancements (SLE) and Pastoral Risk Management (PRM). Under SLE a number of interventions are being coordinated namely: development of infrastructure (e.g. schools, health posts, veterinary posts, small-scale water supply, and small-scale irrigation) and development alterative livelihood options (e.g. milk collection & marketing, petty trade, livestock fattening and marketing, grain store and milling, and handcraft workshops). The PRM component focuses on activities associated with disaster preparedness and investment (e.g. development of boreholes—new & rehabilitation, rangeland improvement, and development of small dams/ponds and reservoirs). In order to bring on board all actors working on pastoralism, MoFA has created a network called Ethiopia Pastoral Development and Governance Network (EPDaGoN).

ence crops (Devereux 2006). Cereals are produced entirely for home consumption while vegetables and fruits are sold to purchase other necessities. Nevertheless, agro-pastoralists are generally not self sufficient in grain production. For instance, Devereux (2006) notes that agro-pastoralists in Jijiga consume from their granaries in some months of the year (duration of self sufficiency varies according to factors such as landholding and rainfall) and purchase food from market for the remaining months.

Although there is a general trend of shifting from pure pastoral to agro-pastoral production system, livestock remains the dominant source of livelihood in the so-called agro-pastoral areas due to unreliable rainfall. However, farming is a step towards a diversified economy. In addition to farming, a number of other alternative livelihoods are observed in pastoral areas which will be briefly discussed in the following section.

4.3 Other Livelihood Alternatives

Farming is not the only livelihood strategy to supplement pastoralism. A number of other livelihood strategies are pursued by Ethiopian pastoralists. The strategies are diverse and vary across locations, seasons, or depending on other factors. Paid casual work, charcoal burning, fire wood collection, cross-border trade, handicrafts, non-timber forest products, mining, petty local trade, and honey production are among the activities undertaken by pastoralists.

Charcoal burning and fuel wood collections: These activities are common to most pastoral regions. Studies indicate that pastoral households in Somali, Borana, and Afar are engaged in these activities (Devereux 2006, Kebebew, et al 2001, Oumer 2007, Lemlem et al 2007, Little 2006). However, the charcoal industry is quite extensive in Somali region (Devereux 2006, Oumer 2007, Fekadu 2009). An estimation by Oxfam GB shows that roughly 63,000 sacks of charcoal are harvested from Harshin district alone and are transported across the border to Hargeiysa on a monthly basis.

Another study indicates that the Hargeysa population used approximately 516,000 sacks of charcoal in the latter half of 2003 (APD & Interpeace 2006). Not only poor people are engaged in the charcoal business in Somali region. Wealthy business men (some of them from Somali Land) also involve actively in one way or another (as transporters, producers, or wholesalers) to share benefits. The charcoal business is also an important livelihood alternative for pastoralists in Afar. Pastoralists in Awash Fentale and Amibara districts are reported to generate income from charcoal selling (Kebebew, et al 2001, Lemlem, et al 2007, Dubale 2008). Pastoralists in Borana are engaged in charcoal production particularly during drought years as a means of livelihood diversification (Kebebew, et al (2001), Lemlem, et al (2007). Fuel wood collection is also an important activity in most of the pastoral areas (Devereux 2006, Kebebew, et al 2001, Little 2006, Lemlem, et al 2007). In most cases, this is an activity of women.

Trade: Cross-border trade is usually associated with nomadic pastoralism. This is the case particularly among Ethiopian pastoralists because they inhabit border regions of the country. While the pastoralists take only some (perhaps, a little) part of the stake in the business, cross-border trade is an important alternative to supplement pastoral livelihoods in Ethiopia. Livestock, industrial products (used and new clothes, electric appliance—the so-called "white wares", foot wares, etc.) and other goods are transported across borders mostly without legal permissions. The traded livestock and goods flow through caravan routes by the virtue of local social capital (embedded in ethnicity and lineage) to reach their destinations. Most of the livestock in the trade are procured from pastoral areas and are moved to terminal markets through complex market arrangements and channels that involve numerous actors. The destinations of livestock are Nairobi and The Middle East (via Somaliland or Punt Land) (Little and Mahmoud 2005, Devereux 2006). In addition to the cross-border trade, petty local trade is common in pastoral areas. The latter is usually excised by women and includes *khat* retailing, roadside small merchandize trade, tea rooms and restaurants, and handcraft trade. Local petty

Type of intervention	Organization	Location
Food aid	WFP/GOE/SC-US	Borana Zone (Oromia), Liban Zone (Somali), South Omo (SNNP)
Drilling of boreholes, Rehabilitation of water sources	CRS, CARE, LVIA, SC-US, and others	Fentale (Oromia) and Shinile Zone (Somali), in operational areas
Water trucking	CARE, SC-UK	Borana Zone (Oromia), Fik and Shinile Zones (Somali)
Livestock vaccinations and Treatment	CARE, FAO, FARM Africa, SC-UK, SC-US	Southern Ethiopia (Oromia, Somali, SNNP)
Distribution of seeds and tools	FAO	Southern Ethiopia (Oromia, Somali, SNNP)
Commercial destocking	SC-US and MoARD	Liban Zone (Somali) and Borana Zone (Oromia)
Slaughter de-stocking	CARE	Borana Zone (Ormomia)
Supplementary feeding of vulnerable groups	AFD, CARE, SC-US, UNICEF	Borana Zone (Oromia)
Supplementary feeding of livestock in feeding camps	CARE, Mercy, Corps, SC-US, VOCA	Liban Zone (Somali) and Borana Zone (Ormomia)
Supplementary feeding of livestock with concentrate	APDA, FARM Africa	Zone 2, 3,and 4 (Afar)

Source: Pantuliano and Wekesa (2008)

Development interventions in pastoral areas are also diverse. Some are coordinated by government functionaries while others are

Emergency responses are coordinated by the Disaster Prevention and Food Security, Department under the Ministry of Agriculture and Rural Development. While the government has quite limited role in providing assistance, a number of NGOs have provided emergency assistances to pastoral communities. Table 1 shows external emergency responses to the drought of 2005/2006.

Table 1: External Intervention in Response to the 2005/2006 Drought

trade produces small but regular earning with which women support their families (Devereux 2006, Little 2006, Oumer, et al 2007). For instance, Kassaw, et al (2007) reported that women in South Omo could earn between ETB 200 and 500 per week from buying crafts and reselling them.

Handcrafts: Handcrafts are almost everywhere in pastoral region where the survey of the literature has covered. They are embedded in local heritage and culture but also used to earn income. Devereux (2006) reported that handcrafts are important sources of income for women in Cherati, Kelafo, and Dolo Odo districts of Somali region. Basket- or mat making is the most common income-earning activities in these areas. In Borana minority groups such as Warradube and Bonta are smiths and some are engaged in basketry (Watson 2001). Pastoralist women in Elidaar (in northern Afar Region) produce mats from palm tree ('aunga') to generate income (Kassaw, et al 2007). In South Omo, the Mursi lip-plates (made from clay or wood) and the Hamer *berkota* (stool/headrest) are popular among tourists and generate income for the pastoralists. Though seasonal, the income is substantial. For instance, an unmarried girl in Dimeka (South Omo) can make up to ETB 600 in a single market day from handicrafts (and, of course, from photographs) (ibid).

Mining: Traditional mining is an important income generating activity in some pastoral areas. In Afar, Aba'ala district, people produce salt for sale (Kebebew et al 2001). This is quite important particularly during drought seasons to supplement pastoral livelihoods though such opportunities are tightly controlled by certain clans and access is limited (Davies and Bennett 2007). A substantial number of pastoralists (about 3000 people) at a place called Ahmed Ela earn income from salt mining. In Borana (e.g. Dirre district), young men engage in salt and gold mining using traditional means to generate income (Lemlem, et al 2007) whereas in Somali (e.g. Cherati district) people collect and sell precious stones (Devereux 2006).

Other alternatives: Pastoralists are not limited to the above alternative livelihood strategies. They are also engaged in several income

generating activities which vary depending on local conditions. Non-timber forest products are important income sources in Somali (e.g. Cherati) and Borana (Devereux 2006, Getachew and Ridgewell 2007). Selling gum resins serves as an income buffer during drought seasons. According to Getachew and Ridgewell (2007), local people could earn up to one-third of their total household income from gum resins. Similarly, pastoralists in Borana earn 2-3 birr per kilogram by supplying gum resins to Natural Gum Marketing and Processing Enterprise (NGMPE) (Yitebitu 2004). Pastoralists in South Omo and Borana produce and sell honey after satisfying their home requirements (Getachew and Ridgewell 2007). The other important income generating engagement is working for payment as casual laborer. This is reported to exist in almost all pastoral regions. In the middle Awash Valley, Afar and Karrayu pastorlists are engaged in casual works in state farms and sugar plantation to generate income (Bekele 2008, Getachew 2001) whereas in many places of Somali region (e.g. Shinilie, Kelafo) and Borana (e.g. Dirre, Moyale), they earn income from town-based employment opportunities (Devereux 2006, Little 2006).

The list goes on; one can enumerate more livelihood engagements in pastoral areas. The activities are diverse and, in most cases, serve as buffers against shocks caused by climatic fluctuations, livestock disease and market failure. By engaging in these activities, pastoralists reduce the extent of food insecurity which could face their household. Being diverse and non-complex in nature, alternative livelihood engagements, could enable households to command over food in a continuous manner.

5. Status and Causes of Food Insecurity

5.1 Status of Food Security

Ethiopian pastoralists are currently among the most food insecure segments of society (Figures 2a and b). While the extent of food insecurity varies across locations and between years, existing documents show that all pastoral areas except Benishangul Gumuz

permanent activity in many places (e.g. Kelafo, Jijiga, Miesso) (Devereux 2006, Fekadu 2008). Other livelihood strategies (such as crafts, mining, trade, and casual work) are also adapted to supplement the dwindling capacity of pastoralism to sustain households. For instance, some pastoralists in the Middle Awash Valley permanently generate income by engaging in casual employments in state farms. Similarly, households in Borana and Somali (particularly those who do not own livestock) carry on trade and casual employments in urban areas (Lemlem, et al 2007, Devereux 2006).

The adaptation strategies have also brought about other changes in pastoral institutions. The introduction of farming entails private plots, making communal property rights no longer enforceable. This is the case in many pastoral areas (Somali, Borana, and to some extent in Afar). For instance, in Somali region communal grazing areas are being enclosed by private users for the sake of farming and other reasons (Oumer 2007, Fekadu 2009, 2010). The same situation is observed in Borana following the expansion of farming in the area in recent years. Moreover, the expansion of agriculture in pastoral areas has changed the lifestyle of the people therein. Where farming exists, pastoral households have practically settled (at least partly) since some household members should stay nearby the farms to take care of the crops.

5.3.2 External Responses

Governmental and non-governmental actors have made multifaceted interventions in pastoral areas. Some interventions are of emergency type while others are developmental. Emergency type interventions have been dominated by food aid although assistances such as health care, veterinary services, slaughter destocking, etc have been given to pastoral communities. Development interventions constitute activities which directly or indirectly contribute to long-term asset building of pastoral communities, namely, agricultural development activities, natural resource management, and development of alternative livelihoods.

transfers which include redistribution of food, cash, or livestock mainly through remittances and 'soft' loans (e.g. *zakaat* in Somali region, *hantita* in Afar region) (Bekele 2010a, Devereux 2006, Santos and Barrett 2007, Doss 2001). Remittances from the diaspora play an important role during times of stress in Somali Region (Devereux 2006, Pantuliano and Wekesa 2008).

Coping strategies are also reflected in livestock management systems. During drought seasons changes occur in terms of herd size and composition. Male animals are sold and meat are preserved; the proportion of cattle in the herd is reduced by selling more cattle in relation to camels; and the entire herd is split into small herds to graze separately (Kebebew, et al 2001, Yakum n.d). Some adjustments are also made in terms of livestock feed management: opening reserved areas for grazing; moving to far areas in search of feed; and, in some cases, purchasing feed. In addition, animals may be distributed through loans and exchanges with other herders reducing the effects of localized droughts, raids and diseases on stock and at the same time creating and re-enforcing social ties between households (Bekele 2010a, Davies and Bennett 2007).

Adaptation to changing situations may occur within pastoralism or outside of pastoralism. Within pastoralism, the main adaptive strategy followed by Ethiopian pastoralists is diversification of livestock species. Boranas specialized in cattle production; but nowadays they also keep camels because of the drought tolerance of camels (Pantuliano and Wekesa 2008). Afars and Somalis have increased camels and goats in their herds for similar reasons (Bekele 2008, Fekadu 2009). Moreover, reports show that pastoralists (such as Afar) have started to supplement rangeland feeds with hay and commercial forage (Kebebew, et al 2001).

Challenges to pastoralism also compelled the population to resort to other activities as a way of living. Farming is common nowadays in many parts of Somali, Borana, South Omo, and Afar as also discussed above (in section 4.2). While crops are produced in some locations following drought spells only as coping strategy, it is a

region are food insecure. The degree of food insecurity is the highest in Somali region while other pastoral areas such as Borana and Afar frequently suffer from food shortages. The year 2008 stands to be the worst in terms of food insecurity in recent years. During this year, almost the entire part of Somali region (particularly Fik, Warder, Gode, Dagabhur, Korahe, Liben and Afder zones), the Borana zone of Oromia region and a substantial part of South Omo of SNNP were categorized as extremely food insecure areas requiring emergency food aid for at least six months. Afar and Karrayu pastoralists were highly food insecure whereas pastoralists in Gambella region were moderately food insecure.

In 2009, the situation got improved in most of the pastoral areas, but all still stayed within the alarm of food insecurity. Slight improvements were observed in Afar, South Omo, Borana, and part of Somali region. However, the improvement hasn't continued in 2010. Most of the pastoral areas have been reported to be highly food insecure in 2010. As a result, the majority of pastoralists in Somali, Afar, Borana, South Omo, and Gambella sought food assis-

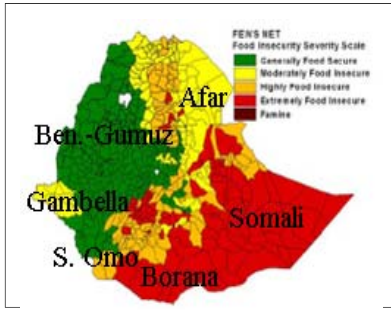

Figure 2a: Situation of Food Security in Pastoral Areas of Ethiopia, 2008

Source: FEWS-NET and WFP, 2008

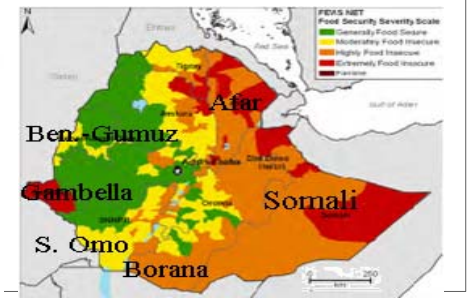

Figure 2b: Situation of Food Security in Pastoral Areas of Ethiopia, 2010

Source: FEWS-NET and WFP, 2010

tance to sustain families.

The assessments of external agents are supported by self-assessment reports. For instance, self-assessed vulnerability reports in Somali

region shows that the proportion of households that are 'doing well' has fallen from over 90% in the mid-1990s to about 30% in 2004/05 whereas, on the contrary, the proportion of households who are 'struggling' to survive has risen from close to zero to above 70%.

Pastoralists are entitled to food mainly through livestock production. Hence, when their livestock economy dwindles due to different reasons, they move down in the food security 'ladder'. Three underlying causes of food insecurity in pastoral areas are discussed here: natural factors, resource appropriations, and poor infrastructure and capacity. Figure 3 displays how these factors affect household food insecurity in pastoral areas.

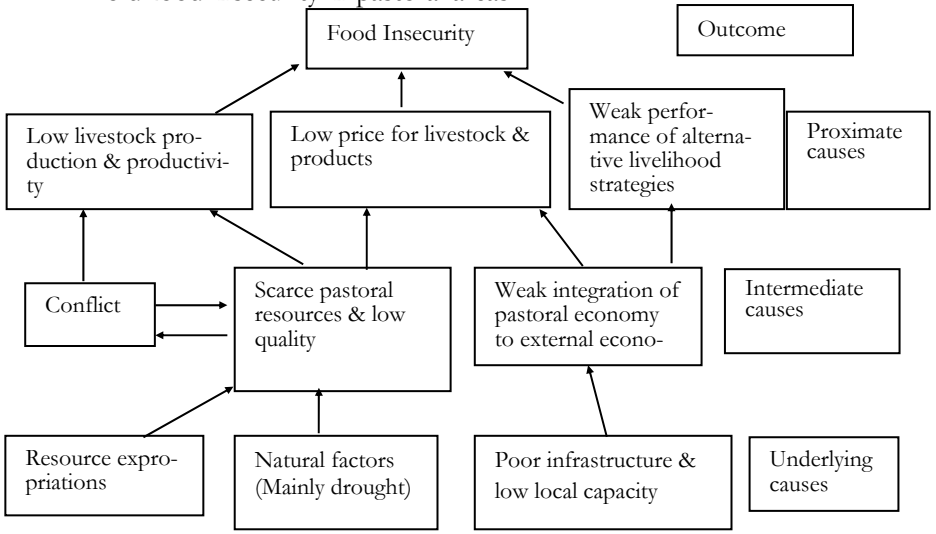

Figure 3: Causes of Food Insecurity in Pastoral Areas of Ethiopia

5.3.1 Internal Responses

People facing livelihood challenges are obliged to devise coping or adaptive strategies to survive. A coping strategy refers to responses of people to declining food availability and entitlements in abnormal seasons or years. It is a short term response to unusual food stress. Adaptive strategy is a coping strategy which has been permanently incorporated into a normal cycle of activities (Devereux, 1999). Though the two livelihood strategies are related they cannot be conflated since their objectives are different. While coping aims at minimizing the impacts of livelihood shocks, the purpose of adaptation is to spread risk through livelihood adjustments or income diversification.

Coping strategies followed by Ethiopian pastoralists are diverse but we can categorize them into two following Devereux (1999). The first one is protection of food consumption through different means (purchase food or receive free food) whereas the second strategy is modifying food consumption (reduce food consumption, diversify food consumption, and reduce consumers). Households may follow a combination of the two strategies or may follow one of them (Kebebew, et al 2001, Lemlem and Yemane 2007, Devereux 2006). This depends on situations such as the degree of drought. During mild drought, some animals (usually small ruminants and male cattle) are sold to purchase food grains and some are slaughtered to preserve dried meat. Households (particularly poor ones) start to ration food among members and reduce the number of meals in a day (children usually get priority, and adults even go hungry); the quality of food also deteriorates from dairy products to grains and wild fruits. This occurs, for instance, in Afar and Borana (Kebebew, et al 2001). During acute droughts, households sell large animals (i.e. cattle and camel including some breeding herds) to purchase grains. Poor households seek for food aid, split and send members (usually men) to urban areas for casual employment, and collect wild edibles (e.g. *buurii, gumbo, efftiira* in Borana (Lemlem and Yemane 2007), *Gersa* and *Amberaarcu* in Afar (Kebebew et al 2001)). Another important coping strategy is to use informal

hand, it has reduced the level of income generated from livestock and livestock products since prices are low. On the other hand, it has hindered the development of potential livelihood alternatives as sources of income. The low level of income due to low prices for livestock products and undiversified income sources in turn resulted in low exchange-based entitlements of pastoral households over food (i.e. food insecurity).

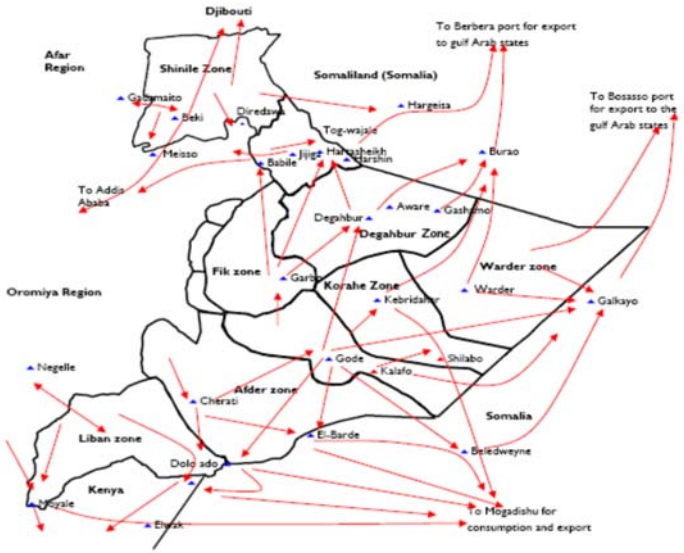

Figure 4: Main Livestock markets and marketing routes in Somali Region
Source: Somali Regional State, summary report on livelihoods (unpublished document)

5.3 Responses to Challenges to Food Security

5.2 Causes of food insecurity

5.2.1 Natural Factors

Livelihoods of Ethiopian pastoralists have been threatened by natural factors for a long time (Berkele 2003; Tafesse 2003; Sen 1981). It is not hurricane or flooding or earthquake that springs into one's mind when natural challenge is mentioned among Ethiopian pastoralists. Drought is the major factor affecting pastoral livelihoods since time immemorial. In about a century (since 1890s), 18 major droughts have been recorded in the country (excluding Eritrea) (Berkele 2003; Yayneshet and Kelemework 2004) most of which occurred in pastoral areas. The effects have been more pronounced since the drought of 1971/1972, which led to a serious famine in northern and northeastern part of the country particularly in Afar. For example, Amartya Sen (who used this phenomena as one case in his book) provides the following note regarding the effects of the drought on Afar pastoralists:

> It is quite clear that one group that was severely affected was the Afar community of nomadic pastoralists. They were among the group of refugees seeking help in Addis Ababa in December 1972, and they figured most prominently in the crowds lining in the north-south highway through Wollo in early 1973, stopping cars and busses asking for food. There is, in fact, overwhelming evidence that Afar pastoralists were amongst the first to face the acute problems after the rain failure of 1972 (Sen, 1981: 96).

Recent evidence also asserts the vulnerability of Ethiopian pastoralists to recurrent droughts (Berkele 2003; Beruk 2004; Tafesse 2003). Given that pastoralists extensively graze their animals and that forage availability depends almost entirely on rainfall conditions, the most direct impact of drought in consecutive years is livestock mortality and decline in livestock productivity. Sandford and Habtu (2000) have estimated 5 to 40 percent reduction in livestock population among Afar, Somali and Borana pastoralists due to the drought that occurred in 1999/2000. In fact, these figures were considered

to be optimistic figures. Under the worst scenario the livestock lost was estimated to range from 15% (for sheep and goats) to 80 % (for cattle). Emergency reports show that pastoralists in Somali, Afar, Borana, South Omo, and Gambella encountered shortage rain in recent years (2008-2010) which resulted in emaciation of livestock and distressed sales. The recurrence of the drought weakened the resilience of the pastoralists and in some places threatened their sustenance as pastoralists.

In addition to its impacts on livestock production, drought has calibrated the terms of trade against the pastoralists. This is because of oversupply of emaciated animals by pastoralists to save animals from death due to scarce pastoral resources during drought seasons. Although no systematic records have been found yet, assessment reports of aid agencies indicate a sharp decline of livestock prices during the droughts. For instance, a UN assessment mission in Afar indicated that pastoralists faced more than fifty percent reduction in livestock prices following the drought of 1999/2000(UN-EUE 2000). Another estimation shows that livestock prices fell by fifty to sixty percent due to the drought of 2002/2003 while maize prices rose in parallel by about 235 percent (Davies and Bennett 2007). Similar situations were observed in Somali region recently. For example, in Gode, while on average (2003-2007), pastoralists could buy on average 50 Kg of maize per 0.67 goat between the years 2003 and 2007 They needed 3.39 goats to buy that same amount of maize in 2008—an increase of over 500 percent (Ethiopia: food security update 2008). The adverse effects of the droughts on the terms of trade were compounded by other factors such as the export restrictions imposed by Saudi Arabia in September 2000 (following the Rift Valley fever outbreak) and poor market infrastructure in pastoral areas (Devereux 2006).

The impact of drought on household food insecurity in pastoral areas is compounded by the expansion of unpalatable plant species in the rangelands aggravating scarcity of pasture. In Afar, a weed plant known as *Prosopis juliflora* has invaded significant part of the rangeland found in almost all the districts of the region. Over

Road networks are poorly developed; neither markets nor marketing facilities exist in most of pastoral districts and hence pastoralists are obliged to travel long distances to sell their products. This has created difficulty to destock animals during drought seasons. Even during normal years, the difficulty of returning unsold animals enforces pastoralists to accept low price offers. Moreover, market information transmission mechanisms are quite weak because of poor infrastructure (both hard and soft); telecommunications are poorly developed; and cooperatives are non-existent (or at infant stages in areas such as Borana) to play a positive role in the marketing system (Coppock et al 2007a,b). Legal institutions are weak and rules are mainly enforced by traditional authorities that have limited capacity to address problems beyond their traditional domain. This has reduced the entry of potential traders from the highlands due to insecurity and high transaction costs to resolve market related conflicts (in case they arise).

In addition to these constraints, pastoral areas are deprived of formal financial institutions. Banks are limited to big towns. Even in those towns where banks exist, pastoralists do not have access to financial services due to strict lending rules. Most pastoralists are not beneficiaries of micro-finance institutions. The low level of financial services coupled with low level of education hindered pastoralists to pursue alternative commercial livelihood opportunities.

Poor infrastructural development has resulted in weak integration of the pastoral economy to the outside economy (both domestic and abroad). Pastoral areas are weakly integrated to the highland areas in Ethiopia. As an example, Figure 4 shows main livestock markets and marketing routes in Somali region. The integration is comparatively better with the regions and towns across the Ethiopian border though this has been currently affected by the strict rules imposed by the Ethiopian government on cross-border illegal trades which are the basis of the integration (Little and Mahmoud 2005).
The low level of integration of the pastoral economy to the "outside world", has led to food insecurity in two major ways. On the one

700,000 hectares of prime grazing land in both sides of the Awash River is currently either invaded or at risk of invasion by *Prosopis* in the Afar Region (Dubale 2008). This accounts for 15% of the region's productive land (4,670,316 hectares). Districts such as Amibara, Gewane, Mile, Dubti, Buremudaytu are severely invaded whereas Logiya, Hadar, Awash-Fentale, Yallo, Dalifage, and Dulecha districts are either partly invaded or the plant is recently observed to exist. A report has indicated that camel holding has declined by about one-third and the number of calf and heifer together has declined by fivefold (Zelalem 2007 cited in Dubale 2008).

In Borana, high quality perennial grasses have been replaced by unpalatable forbs and bush cover (Oba 1998, Oba and Kotile 2001). For instance, Oba and Kotile (2001) reported that about 59.6%, 33.3%, and 66.7% of the rangelands in Dirre, Golbo, and Liban production systems respectively are deteriorating in pasture quality due to invasion of unwanted plants resulting in low productivity of livestock. A study conducted in Yabelo district also shows that productive grasslands have been dramatically invaded by unwanted woody plants (Sentayehu, et al 2006). A similar problem has been reported by Abule et al (2005) for Karrayu rangelands.

5.2.2 Resource expropriation

Ethiopian pastoralists have faced extensive land expropriation by the state particularly since the 1960s. This is because pastoral areas were considered as vacant lands which should be used for national development. Expropriation of rangelands from pastoralists took place for two main purposes. The first one is expansion of mechanized farms and plantations. According to Beruk (2003), Afar pastoralists lost more than 50,000 hectares of dry-season grazing area in Awash River basin because of mechanized state farms and plantations. Similarly, Karrayyu, Somali, and pastoralists in South Omo lost large tracts of their best rangeland for different irrigation projects and other development schemes initiated by the state (Ayalew 2001; Beruk 2003; Assefa 2000).

Concern for tourist attractions through conservation of the natural flora and fauna is another reason for Ethiopian governments to intrude into pastoral areas. While Ethiopia has nine parks and a number of wildlife reserves and sanctuaries (Markakis 2004), most of these natural amenities are found in lowland areas where traditional pastoralism is dominant. Awash National Park (Karrayu/Afar), Yangudirassa National Park (Afar), Omo National Park (SNNP—South Omo), Mago National Park (SNNP—South Omo), Gambella National Park (Gambella), Yabello Wildlife Sanctuary (Oromiya—Borana), Babile Elephant Sanctuary (Somali) among many others are found in pastoral domain.

The expropriation of the large tract of land has affected pastoralists in two main ways. First, pastoralists are now denied access to their prime rangelands and their luxurious pastoral resources. Second, being deprived of the prime rangelands, the pastoralists have been confined in marginal areas. This has exacerbated rangeland degradation due to high concentration of livestock in one area and extended grazing (Getachew 2001, Gebre 2001). Such situations have contributed to the reduction of livestock productivity and have exacerbated livestock mortality during drought years thereby increasing food insecurity.

5.2.3 Poor Infrastructure

Infrastructure here consists of two categories: hard infrastructure and soft infrastructure. Hard infrastructure includes visible basic facilities such as roads, animal and human health centers, schools, marketplaces and associated facilities, and communication facilities. Soft infrastructure on the other hand refers to the overall institutional set up.

Pastoral areas in Ethiopia are poor in hard infrastructure mainly because they were given less attention by successive governments.