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INDIGENOUS LAND HUSBANDRY AND FOOD SECURITY IN DRY AREAS: SOUTHERN ETHIOPIA

Yohannes GebreMichael

Addis Ababa University, Department of Geography and Environmental Studies

ABSTRACT

The Konso community in Southern Ethiopia are known for their best land husbandry in Africa and already registered as UNESCO World Heritage mainly due the continuous survival of the wider range of complementary water harvesting practices. Therefore, this case study is made in semiarid areas with small farming households under hoe practice. Accordingly, systematic and random survey was made with 120 household of different wealth ranks. The findings indicated that irrespective of the wealth rank, the farmers practice wide range of indigenous water harvesting technologies with the function of nutrition and food security and sustainable resource management. Moreover, the vulnerability of the community is by and large attributed by the defective agrarian polices that have marginalized the values and identities of the community, introduction of inappropriate modern technologies and investment policy. Finally the study has recommended enabling policy environment to empower the community and their deep rooted indigenous practices as point f departure in assuring food security and sustainable resource management.

Keywords: Small Scale Farming, Vulnerability, Indigenous SWC Practices, Food Security and Sustainability

BACKGROUND

Introduction

Today, the global and national development strategies and plans are preoccupied with addressing poverty, fostering economic growth, developing appropriate technologies, assuring equity and good governance and mainstreaming sustainability. Accordingly indigenous knowledge (IK) can contribute to achieving the strategy. The recognition of IK is not only based on the deep-rooted experience of rural communities but also support and stimulates marginalised and poor people to solve their own problems (Agrawal 2010, Briggs 2005). IK comprised the knowledge and experience accumulated by local people over generations. It is dynamic, flexible and adaptable to environmental and policy changes and is embedded in the social culture of the community (Berkes 2012, Nakashima *etal* 2012).

Currently there is a growing awareness that scientific knowledge alone is not solving global problems and that IK has a fundamental role to play in filling the gap (Briggs 2005, Finucane 2009). International organisations such as Intergovernmental Panel on Climate Change (IPCC) have also acknowledged the role of indigenous knowledge and practices mainly in agro-forestry, traditional medicine, biodiversity conservation and customary natural resource management (NRM) in adapting to climatic and other changes (IPCC 2007, Fox et-al 2009, Ford et al 2010; UNFCCC 2010, Pourchez 2011, Berkes 2012, Nakashima et-al 2012). The cultivation of a diversity of traditional crop varieties and seed banking is also a rule than an exception in the indigenous farming practices as a component of biodiversity, access to different tests, spreading risks and maximizing productivity and assuring availability and continuity (Hanazaki et al. 2000; Emperaire and Peroni, 2007, Trakansuphakon 2010). Similarly, the deep rooted experience of community on metrological observation and interpretation with reference to the spatial and temporal phenomenon using range of indicators (astronomic, plant growth and animal behavior) is more complex and reliable when to plant and harvest or move with livestock than the modern metrological stations with limited indicators (Nakashima et-al 2012).

Objectives and methods

The overall aim of this study is to document and investigate the role of hoe practices in addressing food security and sustainable resource management. Accordingly as methodology Konso District (*woreda)* has 50 *kebeles*[1] (including two urban *kebeles*) and some of the kebeles are dominantly oxen-plough culture while the others are dominated by hoe culture. Therefore from the hoe practices Doketu keble is selected purposely due to combination of factors; first with the hoe practice indigenous land husbandry and innovation is embedded. Secondly the pilot area was an entry point for the Konso cultural landscape heritage by UNESCO.

As shown in Table 1, a total of 120 household heads were randomly selected from the list of proportional wealth categories in the *kebele* for an in-depth interview survey. The main issues covered in the interview survey were demography, agricultural production, sources of livelihood, and land husbandry. In addition, a series of FGDs were held with elders, local leaders, women and youth, and individual stakeholders. This study was complemented with observations of 110 fragmented plots

[1] The lowest administration unit of the government in rural areas; a sub-district

owned by the different wealth rank farmers. From the better-off two to three households and their total fragmented plots were observed, while from the medium and poor three to five households and their total fragmented plots were observed with check list.

Table 1 Household samples from Doketu kebele

Wealth rank	No	%
Better-off	15	12
Medium	30	25
Poor	55	46
Woman-headed	20	17
Total No.	120	100

The study area

Konso Special *Woreda* is located in the Rift Valley of south western Ethiopia in the Southern Nations, Nationalities and Peoples Region (SNNPR).[2] It covers a total area of 200,000 ha and has 50 *kebeles*. It lies about 600 km south of Addis Ababa. In terms of the Ethiopian agro-ecological zones, Konso has a dry *kolla* agro-ecology in about 70% of the total land area and dry *weyna dega* in the remaining 30%. Konso has bimodal rainfall: the main rains are locally known as *Hagaya* (March–May) and the small rains as *Katana* (September–November). The average annual rainfall is about 800 mm, ranging from 500 to 1100 mm. The average daily temperature varies between 15 and 31°C.

RESULTS AND DISCUSSIONS

RESOURCE POTENTIAL AT SMALL FARMING HOUSEHOLD

2.1 Population growth and trends

As shown in table 2 the population in the study area is growing by 2.5 % annually and the total population is expected to be doubled in forty years. Similarly the population joining the household heads is growing by 4.5 annually which imply the high potential for the population growth.

Similarly the number of persons per household varies with wealth rank. In the study areas, the average size of the better-off families was nine people, while for the poor it was six people and for woman-headed household's four people (see table 3). The average for the study area was six people per household. The traditional practice of late marriage was replaced by earlier marriage after the introduction of Christianity in the 1950$^{th..}$ The rapid population growth can also be attributed to better healthcare and low use of contraceptives in the community.

Table 2 : Family size classification in the study areas

Category of household	Doketu	
	Average	SD
Better-off	8.7	3.0
Medium	6.2	2.5
Poor	5.9	2.3
Woman-headed	3.9	1.7

[2] The current administrative hierarchy in Ethiopia from highest to lowest level is federal, regional, zonal, district (*woreda*) and sub-district (*kebele*). Some districts that are not part of a zone and function autonomously directly under the regional level are called "Special *Woredas*".

Table 3: Trend in population growth in the study areas

Population group	Doketu	
	1994	**2007**
Total	3977	5292
Male	1858	2554
Female	2119	2738
NHH*	885	1407

*NHH = number of household heads

2.2 Land use and cover

Based on the DAs' documentation in the study *kebele*, the dominant form of land use is crop farming, which covers more than 60% of the total area (see Table 4). The badlands are usually scattered rocky outcrop. The other land uses are grazing land (5%) and forest (20%); however, under agro-forestry farming system such classification might not reflect the reality in the study area. Nevertheless the classification might help to indicate private and communal lands, where the communal land size is declining. This has at least two fundamental implications: i) low potential for further land distribution with population increase; and ii) the poor who complement their livelihood from communal land (firewood, pasture, wild foods and medicinal plants) will have limited access to land and will be more vulnerable to food security and climate change with diminishing of options.

Table 4: Land use and cover in Doketu keble

Land use/cover	**%**
Cultivated land	60
Grazing land	5
Forest area	20
Badlands (rook outcropped)	5
Settlements	5
Others	5

2.3 Landholdings and fragmentation

The average landholding per household in the study areas is about 0.5 ha, but this varies with wealth rank. As shown in table 5, the medium-wealth and poor households have less than one ha, while some of the better-off under the hoe with more than 2 ha is usually the community leader (*poqalla).*

Table 5: Household landholdings in Doketu kebele

Category of household	**Ha**			
	0.25–0.75	**1.00–1.50**	**1.75–2.25**	**2.50+**
Better-off	38	38	19	6
Medium	76	24	-	-
Poor	9	8	-	-
Woman-headed	75	5	-	-

Fragmentation of plots is a rational adaptation strategy to access different farm features (soil fertility, microclimate), allowing crop diversity and increasing resilience to risks and uncertainties (drought and crop diseases). Moreover, remote plots can be assigned for inheritance by children or for sharecropping or for sale. However, the number of fragmented plots owned by a

single household has been diminishing mainly because of inheritance by children and expansion of settlements. As shown in table 6, the average number of plots per household in the study areas is three, but the better-off farmers have up to eleven fragmented plots. This implies that there will be differences in access to different micro-climate resource potential and vulnerability and resilience differences.

Table 6: Ownership of fragmented plots at Doketu keble

Category of household	**No. of plots**			
	1–2	**3–4**	**5–6**	**7+**
Better-off	25	63	6	6
Medium	48	38	14	-
Poor	84	12	2	2
Woman-headed	75	5	-	-

Soils

According to the resource farmers in Doketu kebele the soil types are classified into four major categories based on their fertility, soil colour and slope (Table 7). Usually, fertile soils (*borober*) have a potential for better yield and are less vulnerable to drought and erosion accounts for up to 20% while the medium-fertile account for up to 60%. This suggests that the medium soil fertility is maintained due to the widespread indigenous land husbandry. Similarly the hoe-farming system in Doketu, crop diversity is not strongly correlated with soil fertility because the physical conservation, mixed-cropping and agro-forestry practices create a synergy for soil and water improvement. However, the yield and diversity of plants per plot usually varies with distance from homestead and farm size. Usually the poor soils (*Achaita)* account for up to 20% of the farmland and have serious problems of crop failure and soil erosion. The farmland with poor soil is usually on plots far from homestead and owned by the poor, who have no sufficient human labour and livestock to provide SWC works and manure for improving the soil fertility and usually assigned for share cropping with the medium or better-off farmers.

Table 7: Major local soil types of farmlands in Doketu

Soil type	**Area** (%)	**Colour**	**Slope**	**Fertility**	**Major crops**
Borober	20	Black	Flat	Fertile	All
Klkayta	50	Red	Sloping	Medium	All
Dogolata	10	Red	Flat	Medium	All
Achaita	20	White	Sloping	Poor	All

IMPROVING LAND PRODUCTIVITY

Indigenous land husbandry practices

To deal with the diversity and complexity of the agro-ecological conditions in the Konso area, the farmers use a wide range of conservation based agricultural practices that can be categorised into agronomic, biological and physical measures.

As shown in table 8, under hoe farming the different land husbandry practices (agronomic, physical and biological) are widespread among the farming households irrespective of wealth ranks. The widespread conservation measures have multiple functions in land protection, improving land productivity and production, diversification and nutritional values, complementarities and synergy and resilience to different risks and optimal use of labour.

For example thinning of finger millet and sorghum land races are also widely practised as a way to deal with poor germination or to prevent disease in the crops, but also as a source of livestock feed and to adapt to climate variability. After harvesting crops such as finger millet and sorghum, the roots are left on the ground and resprout up to three times as a component of ratooning.

Similarly the biological measures applied in Konso include live fences, agro-forestry, enclosures and afforestion, cut-and-carry feeding, grass strips, stall-feeding and controlled grazing mainly under the hoe practice. Agro-forestry with multipurpose woody species includes fruit trees (papaya, banana, avocado), stimulants (coffee and chat), *Moringa stenopetala, Ficus vasta, Cordial africana* and *Terminalia brownill*.

The physical measures applied in Konso include stone terraces, micro-basins, trash lines and check-dams. Some of the physical structures, including terraces and check dams, are permanently established, while micro basins and trash lines are semi-permanent (Kruger *et al* 1997). The stone terraces (*kaweta*) are usually constructed by the skilled and elderly, while the other people transport the stones. The multiple functions of the terraces include slope modification as bench terrace, water harvesting, removal of stones from the field, space for producing fodder and wild foods during drought, and serving as a fence for the farm plot and boundary between fields. The Micro basins (*mona or korayita*) are made by any member of the household during hoeing. These are semi-permanent structures and the size of a micro-basin varies depending on the soil type and objective of harvesting more water or gaining more land by increasing the number, size and height of the ridges. Similarly the trashlines (*tura*) are made with the straw of sorghum or maize as semi-permanent structures. Their functions include reducing the splash effect of rainfall, maintaining soil moisture, diminishing runoff and thus increasing moisture infiltration, and improving soil fertility with decomposition. However, some of the conservation measures such as the use of trash lines are declining because the materials are increasingly in demand for fodder and fuel-wood. Other conservation practices are localizing due to some geographical locations in relation to different land use and cover.

Generally the findings have multiple implications first under the agro-forestry and hoe practice there is high level of crop diversity and intensification. Secondly the community have wider range of options to food and nutrition and strong resilience to risks of the impact of climate change. Thirdly prior to the introduction of modern and new technologies to strengthen and diffuse the existing ranges of indigenous practices is cost effective and sustainable.

Table 8 Trends of land husbandry under the hoe practices

Indicators /Trends	Remarks
Wide spreading	
Mixed cropping	Irrespective of wealth rank but the combination of cereal, pulse, oilseed, root and vegetables varies at plot and household level.
Crop rotation	Complementary species of cereals and legumes are sown together
Thinning	Where maize and sorghum is cultivated. Use for livestock feed, for sale, resilience to reduce feed for livestock, for fodder sale and to reduce moisture stress.
Agro-forestry	Agro-forestry is widespread in hoe farming and is expanding quickly from homestead to field stead. As diversification, intensification and conservation strategy.
Stone terraces	In the hoe-farming system, terraces are integral components on both steep and gentle slopes; in the ox-ploughing system, terraces are found only on the field boundaries on steeper slopes.
Ratooning	Ratooning is still widespread in hoe farming, mainly in crops like sorghum and millet, although slightly declining with greater frequency of drought.
Stall-feeding and tethering	Component of hoe-farming; free grazing might damage the stone terraces and trees. Many farmers fatten animals to generate income.
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Stone terraces	In the hoe-farming system, terraces are integral components on both steep and gentle slopes; in the ox-ploughing system, terraces are found only on the field boundaries on steeper slopes.
Micro-basins	Micro-basins are integral components of the hoe-farming system, mainly to harvest water and conserve soil. Hoe farming is not possible without making micro-basins, and the ridges provide a larger soil surface for planting crops.
Declining	
Double cropping	In normal years, Konso has bimodal rainfall, which permits double cropping, but greater frequency of drought has led to a decline in this practice
Trashlines	Trashlines are common practice in hoe farming, but this practice is declining because the sorghum and Maize straw is used for fodder and fuel-wood.
Fallow	Fallowing in Konso is very targeted: within a plot, a specific spot with low soil fertility is left under grass cover, which also serves as a conservation measure and source of cash, when the grass is sold as fodder and cottage construction.
Localized	
Diversion ditches	On land near grazing areas, woodland, roads and settlements, drainage ditches are often dug to harvest water and lead it to the plots.

Indigenous early-warning practices

Risk and uncertainty are inherent features of arid and semi-arid environments. Out of necessity, the Konso people developed an early-warning system for their farming, using ecological, astronomical and social indicators. Some components of the early-warning knowledge are widespread among the Konso, whereas other components are known only by individuals or groups of the same family. The major indicators of early warning used by the Konso are: direction of wind, direction of sunset, movement of the moon, vegetation growth cycle, livestock and wild animal behaviour. Moreover, in Konso, there is a culture of drum-holding or power transfer from generation to generation, which are called *Kalkusa* and *Hirba.* Each generation remains in power for 18 years, but the administration within the system is transferred every 7 and 11 years, since the *Hirba* hold power. The time of the rule of this generation is traditionally known to be a period of famine, drought, conflict and lack of justice, while the *Kalkusa* is the opposite: it is a time of good harvest, peace and security. This characterisation has developed over decades of oral history of events under the rule of the different generations. Most people among the

Konso still follow the traditional system of power, despite the modern structural interventions of the Government administration.

The use of traditional early-warning indicators is diminishing among the young generation with the expansion of modern education. However, most of the rural Konso still use the information of these local resource persons before starting any farming activities, and they believe it is reliable. Dry sowing is commonly based on the information of these resource persons. In contrast, the DAs advise the farmers to seed immediately after the start of the first rains; most farmers' regard this advice as unreliable and risky because sowing is then too late and leads to crop failure if the crop cannot mature in time.

The wide range of grassroots indicators based on long-term observation and oral history of environmental events are complex and diverse and seems more realistic in forecasting the variability of weather than the modern meteorological information revolving around measured rainfall and temperature regimes. Moreover, delays in availability of modern meteorological information and its gaps in spatial coverage of metrological stations have inclined the Konso to continue to depend on their traditional system. A synergy of the modern and traditional systems would doubtless improve weather forecasting and the development of early-warning strategies.

Grassroots organisations

The Konso people have a wide range of grassroots organisations with ecological, economic, social and political functions. The traditional leaders (*poqalla*) played fundamental roles as spiritual leaders, clan leaders and managing the communal forests, supporting the poor with access to land and other forms of safety-net support, and mobilising labour for communal farming and land-conservation works. However, some of them developed some flexible mechanisms for adaptation to the external government and religious influences as they continue with the informal traditional labour sharing arrangements (Hallpike 1972, Watson 1998, Otto 2004, Watson 2009, Meron 2012).

As shown in Table 9, the main community-based organisations or task forces concerned with farming activities – *oldawa*, *perga*, *fedeta* and *keffa* – operate by offering food and drink or according to reciprocity arrangements or payments. By and large these activites are currently in a declining trend due to combination of factors such as diminishing of communal land to be cleared for agriculture, youth labour migration to towns and other areas, decline of farm size per household due to inheritance, government incentives to construct SWC measures.

Other local organisations such as *kenta* and *edir* serve as social safety nets, and *equip* is a credit-and-savings club are wider spreading. To overcome the seasonal labour shortages some can manage with only household labour because the farms have become smaller, while others allocate their more remote plots for sharecropping or planting them with trees which is less labour-demanding than cropping. Moreover, the diversification of crops and trees within a farm lowers the peak labour demand, as the different plants have different planting and harvesting dates. Because social cohesion among the Konso is strong, some safety-net activities (providing food, seed, wood and cash to the needy) seem to remain strong despite the frequent prevailing of risks and uncertainties. The credit-and-savings clubs dominate in towns but are slowly expanding to the rural areas. Women household heads are benefiting from such clubs in terms of savings, access to credit and engaging in income-generating activities. Accordingly any external development intervention by the government and NGOs need to

understand how indigenous grassroots organisations are functioning and designed for synergy with local initiatives than preoccupied with establishment of new arrangements that might be counterproductive.

Table 9: Roles and trends of grassroots institutions

Grassroots organisations	Members	Functions	Modalities	Trends
Oldawa	12–14, dominantly male	-Clearing forest for cultivation -Spreading manure on plots -Hoeing and seeding	Turn-by-turn assistance offering food (*erota)* and drink (*cheka*), or payment to non-members	It is declining due to limitation of forest land for farming, decline of household farmland and less need for non-family labour. Moreover, with recurrent drought, limited means to pay labour
Perga	10 male and 2 female	Involved in all types of farming activities	Cash payments	Decreasing because of: labour migration to towns, because farmers cannot afford to pay higher rate offered in town, decrease in landholding per household
Fedeta	20–50, depending on size of farm and wealth rank	Includes various farming activities hoeing, weeding and terrace construction and maintenance	Usually by offering food and drink (*erota* and *cheka*)	Assumed to be declining with diminishing of land size per household and food for work extension services
Keffa	Clan-based assistance (there are 9 clans in Konso)	Assists during farming activities and death of relatives	Household offers some drinks for farming and members contribute cash in time of death	Still widely practised due to the strong bondage and values of clans
Kenta	Sub-groups in village;each *kebele* has at least 8 *kentas*	Irrespective of clan, neighbours assist each other when others are sick, die or have economic or social problems	Usually, elders play a role in managing the sub-groups to ensure their rights and duties	Very strong because *kentas* alleviate social and economic crises in neighbourhood; wise use of external support from government and NGOs to the community
Edir	150–200 household heads, combining traditional and modern approaches	In addition to social support, members have access to credit	Monthly contribution of members (one Birr or more) and access to credit with very low interest rate	Widespread in rural areas; many poor farmers and women benefit and can engage in some income-generation activities
Equip	7–30 members	Receiving collected money in turn helps to invest in livestock, small business, health school expenses	Savings and credit institution: receiving collected money turn by turn in a lottery system	Widespread in urban areas; expanding in rural areas as many self-help groups are formed

PRODUCTION AND DIVERSITY

Livelihood bases

The fundamental sources of livelihood in the study area are crops and livestock. In the hoe-farming areas, cereals, pulses, oilseeds, tubers, coffee and cotton are produced as components of agro-forestry systems with multipurpose trees for food, fodder, medicine, timber and cash. Fattening of livestock is a complementary activity in all wealth-rank groups; some are also engaged on traditional beekeeping. Many of the poor farmers, particularly women household heads, are engaged on petty trade: selling local drinks and attending periodical market days to sell different crops and fruits. Some youth groups (female and male) also generate income by working as a group in different farming activities, while other youth groups migrate seasonally to neighbouring areas to work as farm labourers. Many of the poor farmers are highly dependent on the PSNP, as part of the agricultural extension system under the Food Security Programme. However, other wealth rank groups are also benefited due to the prevailing strong customary social safety nets (see also Table 10). There are also community members who complement their livelihoods with weaving and other craftworks, which stimulates a transition from subsistence to a commodity economy and a gradual decline in the distinction between the artisans and farmers, as both types of activity are combined in one household (Watson & Lakew 2001). Firewood selling is also a source of income among all wealth-rank groups, using wood from both private and communal land. During drought periods, fuel wood is the dominant commodity in the periodic markets. Wood is the only source of energy for cooking and heating in the rural areas.

Table 10: Sources of livelihood

Category of household	Doketu (%)			
	CL	T	L	PSNP
Better-off	100	20	10	4
Medium	62	9	11	18
Poor	47	22	14	37
Woman-head	60	45	10	72

Key: CL = crop +livestock T = trade, L = labour, PSNP = Productive Safety Net Program

As shown in Table 11, , over 90% of the poor households can sustain their family from crop farming for only up to six months of the year. They fill the gaps with different sources of income, including safety-net support. About 40% of the medium category of households cannot sustain their family all the year from crop farming in good seasons, while about 90% of the better-off households are self-sufficient in food year-round. This implies that crop production alone is not a sufficient means of survival in the study area. This is why the people have complemented crop farming and diversified their livelihoods by practising livestock fattening, crafts, petty trade and daily wage labour.

Table 11: Level of food self-sufficiency in good years from crop production

Category of household	Months			
	1–3	4–6	7–9	10+
Better-off	-	-	-	100
Medium	-	3	14	83
Poor	32	51	18	-
Woman-head	40	55	5	-

4.2 Trends of production and diversity

Some of the farmers reported a trend of declining crop production, but their perceptions depended on wealth rank and farming system (Table 12). The factors include climate change, decline of farm size, leasing land for share-cropping, change in cropping pattern and land use. There are also some farmers perceived an increase in crop production and they underline the use of agro-forestry, manure and access to share cropping. The focus groups also perceived a trend of declining crop diversity; this likewise varied according to wealth rank (Table 13).

Table 12: Farmers' perceptions on trend of crop production at household level

Classification	Doketu (%)			
	Increase	Increase	Decrease	No change
Better-off	30	10	65	25
Medium	15	7	81	12
Poor	0	7	86	7
Woman-headed	3	5	90	5

Table 13: Farmers' perceptions on trend of crop diversity at households' level

Classification	Doketu (%)		
	Increase	Decrease	No change
Better-off	38	56	6
Medium	45	55	-
Poor	12	76	12
Woman-headed	-	40	40

Causes of vulnerability to food insecurity

A series of FGDs with elders, local leaders, women and youth were conducted on their perceptions of vulnerability to food insecurity. These revealed that, at household level, access to resources, family size, and the sex and age composition of the household had impacts on the household economy and the vulnerability to risk of climate change. Most of the farmers felt that medium-sized families are less vulnerable than extremely large or small families. Large families tended more toward consumption than saving, and small families had insufficient labour to carry out different agricultural activities. A family with many children was regarded as highly vulnerable. Households with a larger proportion of females were seen as less vulnerable than male-dominated households, because the women and girls had multiple functions in agriculture, income generation and household activities. A large number of males in the household meant there was more risk of having to share land resources.

Various documents have highlighted the causes for chronic food insecurity in Konso, including drought, population pressure, soil erosion, deforestation, traditional farming practices and marginalisation of the community in decision-making (Foerch 2003, Beshah 2003, Tadesse *etal* 2008, Tadesse 2010, Meron 2012). Based on the household survey and group discussions, the root causes of vulnerability among the Konso to climatic and other external changes appear to be very diverse and complex, as indicated below.

Climate change: Rainfall distribution in the big and small rainy seasons is erratic. Sometimes, the rain comes too early or too late and it often stops in the middle of the growing period as a phenomenon for decades. This situation provides favourable conditions for infestation by pests and diseases in both crops and livestock. Consequently, crop failure, livestock losses, outmigration of people and dependency on food aid has become more common.

Marginalisation of socio-cultural practices: The Konso people are known for their deep-rooted ritual practices, indigenous land-husbandry skills and grassroots customary institutions that tried to assured the livelihood of the community during bad and good years. These cultural practices and associate landscape have been recognised by UNESCO as a global heritage. The forest-based rituals and annual festivals had reinforced the values and multi-functionality of the forest and strengthened social safety nets and community solidarity. However, during the Derg regime (1974-1990), the ritual houses were set on fire, the ritual drums were destroyed and the Konso people were told not to practise such "backward culture". Many the elderly and middle age farmers irrespective of sex have believed that this destruction of their cultural practices and weakening of their values were root causes of their vulnerability to climate change today.

Introduction of new religion: The elders of Dekotu underlined that the intervention of Christian missionaries in the Konso area in the 1950s was a fundamental turning point for the decline in their cultural practices and sense of identity, as this started off the erosion of community solidarity, the ensuing crisis in the Konso indigenous economy and the growing dependency on foreign support, triggering off the vicious circle of poverty. The Derg regime had merely destroying the remnants of the culture eroded by the missionaries. Similarly, Otto (2004) indicated that the missionaries had no interest in understanding the rationality of the cultural practices and considered the Konso to be pagans, even though the people believe in God (*Wa'qha*). Accordingly, the missionaries regarded the ritual practices and leaders (*poqalla*) as evil. However, the missionaries also had positive impacts in the area by creating awareness of the equality of human beings among the farmers and artisans and by establishing schools for modern education (Watson 2006).

Government agricultural extension services: In line with the Growth and Transformation Plan (GTP) of the Ethiopian Government introduce around 2010 the Green Revolution has been given a top priority although it was introduced before decades. This included the introduction of "improved seed" and chemical fertiliser and the modernisation of small-scale irrigation schemes. No doubt this has attributed to the increase of production and contributes to alleviate food insecurity. However, the introduced improved varieties are less resistant to drought and disease, demand more labour and encourage sole cropping, thus replacing the indigenous farming practices. Similarly, the indigenous terraces are being replaced by the standard modern terraces with the support of incentives from the government safety net programe. Generally the extension services have many undesired outcomes attributing to the vulnerability of the poor farmers.

Investment policy: For the Konso people, the big rivers are emergency-reserve areas for traditional irrigation during prolonged drought and for collecting wild fruits from the riverbanks. However, many of these areas have been allocated to private investors. This contradicts the sound government policy of assuring food security and equality among the small farming households.

Marginalisation of elderly people from decision-making: Many elderly people believe that, traditionally, elderly people had an influential power and played an important role on the livelihood of the rural community during peace and war and in good and bad years. On account of their deep-rooted experience and knowledge, the elderly can provide appropriate advice about managing natural resources and coping strategies during drought periods. However, after the 1974 revolution and the establishment of Peasant Associations (the *Kebele* Administrations of today), the illiterate and elderly people were consider as backward and marginalised in the decision making process.

CONCLUSIONS

Under the indigenous farming practice the wide spreading conservation practices have multiple functions in land protection, improving land productivity and production, diversification and nutritional values, complementarities and synergy and resilience to different risks and optimal use of labour. Hence prior to the introduction of new and modern technologies to strengthen and diffuse the existing ranges of indigenous practices is cost effective and sustainable.

The indigenous early warning systems the wide range of grassroots indicators based on long-term observation of environmental events are complex and diverse and seem more realistic in forecasting the variability of weather than the modern meteorological information revolving around measured rainfall and temperature regimes. Hence a synergy of the modern and traditional systems would be doubtless in improving weather forecasting and the development of early-warning strategies.

The community have a wide range of grassroots organisations with ecological, economic, social and political functions. Hence any external development intervention need to understand how indigenous grassroots organisations are functioning and designed for synergy with local initiatives which is cost effective and more sustainable.

Livelihood practices of the community indicates crop production alone is not a sufficient means of survival in the study area and have complemented with livestock fattening, crafts, petty trade and daily wage labour. Hence in the strategy of the policy of agrarian transformation supporting and complementing the local initiatives are good entry point for the sustainability of rural livelihoods.

The fundamental causes of food insecurity in the study community are by and large attributed due to government policy defects which have marginalized the socio-cultural practices of the community which has embedded their values and identities in the name of transformation and modernisation. This problem has been compounded with the introduction of inappropriate modern agricultural technologies with some risks and undesired outcomes. Similarly the investment policy focus on communal lands and private investors individual contradicts with the sound government policy of assuring food security and equality among the small farming households. Hence the reorientation of the different agrarian policies in empowering the community in decision making and local experimentation and innovation in solving their own problems is fundamental.

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ABOUT THE AUTHOR:

Yohannes GebreMichael GebreMedhin (PhD) is an Assistant professor, Department of Geography and Environmental

Studies, Addis Ababa University, Ethiopia.