

Full Length Research Paper

The role of indigenous people in the biodiversity conservation in Gamo area of Gamo Gofa zone, Southern Ethiopia

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Received 23 August, 2015; Accepted 10 February, 2016

The Gamo indigenous people and their knowledge on the biodiversity conservation represent one of the oldest traditionally intensified systems in Ethiopia. Indigenous peoples and their socio cultural relationship with biological systems have largely been contributing to sustainable conservation of biodiversity. The main objective of this study is to analyze the role of indigenous peoples and their knowledge on biodiversity conservation. For this research key informant interview were carried out to generate primary data. The collected data was analyzed using descriptive statistics such as percentage. Accordingly, the indigenous biodiversity conservation method dominantly owned by Gamo peoples was home garden/traditional agro forestry practice. These age-old systems are receiving increasing attention owing to their perceived potential to mitigate environmental problems such as loss of biodiversity and high concentration of atmospheric carbon dioxide. Lack of prioritization for indigenous people due to neglect, decay, as well as destruction of socio-cultural values and their knowledge on the biodiversity conservation were the reasons for the degradation of biodiversity. Therefore, this article came up with the evidence of culture, spiritual, social and ethical norms possessed by indigenous peoples have often been determining factors for sustainable use and conservation of biodiversity.

Key words: Indigenous people, indigenous knowledge, Biodiversity conservation, Gamo area.

INTRODUCTION

Ethiopia has known indigenous people and developed indigenous knowledge in a wide range of fields like soil and water conservation, seed selection and preservation, advancement of traditional farm implements, development of appropriate farming systems, and adaptation of effective coping mechanisms withstanding food insecurities through time. It has well appreciated

indigenous technologies that have been devised by the community, using their own indigenous knowledge to cope up harsh time and be able to sustain the livelihoods. For instance, farmers around North Omo commonly use *Moringa stenopetala* for food; to purify water, as a detergent, and for medicinal purposes (Norbert et al., 2002). In Eastern Hararghe, remnants of the Harla

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Civilization could be observed (near Dire Dawa) where improved soil and water conservation practices are still traceable. Advanced soil and water conservation in Konso is a well-known living example of strategy to cope up with moisture-deficient soils and is still sustaining the livelihoods of the ever-increasing population (Besha, 2003). Farmers in Kindo Koisha woreda (southern Ethiopia) mitigate the problem of declining soil fertility through organic manuring, a succession of specific crops and short fallow at the lowland (Elias, 2002). Farmers in Tikurso catchments (northern Ethiopia) rank the qualities of their land by using slope, soil depth, soil fertility (quality), agro climatic zones and water logging as criteria (Bekele, 1997). Likewise, multilayer indigenous agro forestry land-use system in Gedeo (Southern Ethiopia) has helped farmers to survive difficult times in their history (Kanshie, 2002). The Borana pastoral community practiced regulated water use through local leaders to conserve water for livestock and human use during the dry period (Chemedo et al., 2005). In addition, soil conservation practices of farmers in Maybar, south Wello (Beshah, 2003) and indigenous irrigation system in Amaro Special Woreda, southern Ethiopia; where farmers constructed waterways over gullies using grooved big logs and the diversion structure is constructed of thrash and tree branches (personal communication) are some of the indigenous technologies that can be cited.

The Gamo people are one of the Omotic speaking groups of South-western Ethiopia. They speak a language that closely relates to Gofa, Wolayta and Dauro. The forty societies (Deres) of the Gamo highland live in areas ranging in size from five to fifty square miles (Olmstead, 1975). During the nineteenth century this area was politically autonomous and divided into small territorially discrete political units called Deres, each with its own hereditary king locally called as (Ka.o).

The Gamo indigenous peoples possess their cultural practice which plays a significant role in the conservation and maintenance of biodiversity. According to Desalegn Desissa, a plant ecologist (2007) who has studied the area, the Gamo's "traditional activities depend on a harmonious relationship with the local environment, which frequently contributes to minimizing environmental disruption and thereby maintaining an overall ecological equilibrium." In the highlands, the Gamo have protected at least 272 sacred groves along waterways and on the tops of hills, these being the remnant forests of formerly vast Afromontane woodlands. Within the groves, the people keep their ritual relics and perform sacrifices, healings, harvest rituals and fire ceremonies that symbolize the connection between the past and the future. There are rainmaking and rain stopping ceremonies and thanksgiving rituals, all of which recognize the peoples' dependence upon the earth to provide for their sustenance and livelihoods. Many groves are also bossa (burial grounds). Surrounding these burial forests are balee (grasslands) where people mourn but which also function as buffer areas that are off limits to

grazing and cultivation. Besides protecting sacred groves, the Gamo continue to practice organic and terraced cultivation and composting, which has greatly controlled soil erosion and water pollution and allowed them to cultivate 91 percent of their total land area. Careful use of manure as fertilizer is a key to soil fertility throughout the region.

According to Desissa (2007), the sacred groves are "believed to be the gray hairs of Gamo elders; they are a paternal symbol, a protector of communities against misfortunes." A study by the Ethiopian Wildlife and Natural History Society found that biodiversity in sacred groves is higher than in non-sacred forests and that the sacred groves are often a refuge for plant species that have been eradicated in other areas. The groves also contain great numbers of endemic species, making the highlands exceptional for East Africa. In each of the sacred groves scattered across the region, an eqaa (ritual leader) is responsible for leading community ceremonies and is also considered the "father" or traditional custodian for the grove. In this system, knowledge is transmitted to younger generations from stewards of the spiritual life, who hold the community responsible for the protection and well-being of the lands and waters. However, the issues of indigenous peoples, their socio-cultural values and knowledge on the biodiversity conservation are not prioritized in the Gamo area. Therefore, the main objective of this study is to analyze the role of indigenous peoples and their knowledge in biodiversity conservation.

MATERIALS AND METHODS

Location

The study was conducted at Gamo areas in three woredas (Chencha, Mirab-Abaya and Arbamich Zuriaworeda) around Arbaminch town, in the Southern Nations, Nationalities and Peoples Regional state. Arbaminch town (6° 02' N, 37° 36' E) is located at 505 km south of Addis Ababa at an altitude of 1350 m a.s.l. The relief setting is mountainous, rugged, hilly and undulating. The region includes some basaltic highlands in the north and to the west of Lakes Abaya and Chamo and some crystalline highlands to southern extremes (Murphy, 1968).

Climate

The long-term weather information at Arba Minch Meteorological station revealed that the rainfall pattern of the study area is a bimodal type with a total rainfall of 830.7 mm per annum. The major peak in April and another small peak in October, extends from April to October with maximum rain in the months of June, July and August. The mean minimum, mean maximum and average temperatures are 14.1, 27.9 and 20.6°C, respectively. Chencha woreda is in cool-semi-humid zone (highland) while Mirab-Abaya and Arbamich zuria woreda areas are in warm semi-humid zones (lowland). The temperature in the areas varies and ranges from 16.2 to 32°C. The vegetation of the study area is quite diverse and can be divided into *Acacia-Commiphora* woodland (lower portion) and *Combretum-Terminalia* woodland (upper portion). Though natural

forests have disappeared in many places due to shifting agriculture, a rich floristic diversity can still be marked in these forests.

People

The Gamo people are one of the Omotic speaking groups of South-western Ethiopia. They speak a language that closely relates to Gofa, Wolayta and Dauro. The forty societies (Deres) of the Gamo highland live in areas ranging in size from five to fifty square miles (Olmstead, 1975). During the nineteenth century this area was politically autonomous and divided into small territorially discrete political units called Deres, each with its own hereditary king locally called as (Ka.o).

Gamo indigenous knowledge

Gamo indigenous knowledge is knowledge of an indigenous community accumulated over generations of living in harmony with their environment. It is a broad concept that covers forms of knowledge, technologies, know-how, skills, practices and beliefs that enable the indigenous community of Gamo to achieve stable livelihoods in their environment. It is traditional cultural knowledge that includes intellectual, ecological, technological, and medical knowledge.

The Gamo indigenous communities had a vast stock of knowledge on prediction and early warning of rainfall, weather forecasting, time-testing coping mechanisms, food production and storage techniques, and an impressive plant-based pharmacopoeia for both human and animal health. For instance, in the field of prediction and early warning of rainfall, the Gamo indigenous community have a large number of climate monitoring indicators that enabled them to tell such things as the right time to start soil and water conservation practice, to start planting in anticipation of the rains or to preserve and store food in anticipation of a dry season as well as help to determine the rainy season (*Baliggo*) and dray season (*Bonne*) in order to plan and design the cultivation and tillage type. These indicators included observation of the movement of sun, moon and star, behavior of animals, birds, reptiles, amphibians, insects, vegetation and trees, celestial bodies, winds and level of temperatures.

Many of the Gamo indigenous knowledge approaches to environmental conservation included such technologies and practices as shifting cultivation, mixed cropping or intercropping, minimum tillage and agro-forestry, home garden as well as transhumance. These technologies and practices were common place and were used with various other methods of land use and management to promote higher yields and at the same time conserving the environment.

The Gamo indigenous people's mind also possesses detailed information about species of plants, animals, and some microorganisms; they also recognize types of minerals, soils, landforms, vegetation and landscapes. In case of soil, black soil (*Karetta Bitta*) which is suitable for growing crops such as sweet potatoes and potatoes. In case of microorganism: they also decide the type of microorganism those are living in soil to decompose organic matter of a soil through using smell of soil and observing the soil color. If the soil have deep dark color and pungent smell, they decide that the soil contain soil microorganism called as Bacteria (*Bitta Modhdhisiza Guutunne*).

Gamo community based organization

Gamo community based organization is traditional mutual assistance organizations developed within community by community on Kebeles level provide a model for closer community services/

community interaction. This organizations named as (*Iddir, Iqube, Dego (Yusho)*). *Iddiris* a voluntary and most widespread association in the Gamo area but its composition, system, approach and size may differ from village to village. But all over *Iddirs* are communities oriented and mostly religiously and ethnically heterogeneous unless the vicinity is homogenous. They are characterized by high commitment, participation, constructive dialogue and cooperation of members and had been engaged in security, development issues and social issues long and developed at village. Mostly the primary aim of *iddirs* is at least in their initial stages and now in some cases the provision of mutual support in time of death. Among the functions of *iddirs* decent burial comes first and foremost to bind all together. Both rich and poor, young and old, healthy and sick die.

The suitability of another common mutual assistance organization, the *Eqqub*, is a rotating saving and credit scheme, where members contribute constant amount of money each period and collect a sum of pooled money when it is their turn. It is an efficient and flexible savings institution benefiting particularly women and lower income households in the community. Furthermore, *Debois* mutual help associations of labor share arrangement of agricultural work groups in Gamo area which is formed by Gamo people living in the same neighbourhood has leased by the representatives who voted through the agreement of peoples from the member of it. The number of member based on the interest off the participants sometimes the topography of a farm land as limiting factors of the number of the *Debo*.

Source of data and analysis

The study approach includes both secondary and primary data collection method to generate appropriate information for the study. The primary data were obtained through key informant interview. The interviews were focused to collect data on the relationship between indigenous peoples, their knowledge and culture on the biodiversity conservation to answer the research questions: Why the indigenous peoples and their knowledge are critical in biodiversity conservation? How are indigenous peoples, their knowledge, biodiversity and culture related between each other? And also focused to collect data on the their strategies for the conservation and improvement of the resources necessary for survival and dominant biodiversity practice implemented on the community to mitigate climate change and adaptation to answer the research questions: Which biodiversity conservation method that is practiced by Gamo Indigenous peoples could contribute to climate change mitigating and adaptation in the Gamo area? And their coping approach adapted to overcome problems associated with the degradation of biodiversity could be associate with what are the main causes and consequences of biodiversity degradation in the Gamo area? Whereas, secondary data were collected through an examination of the peer-reviewed literature, as published in journal and books for the data of dominant biodiversity practices in the Gamo area.

Sampling and sampling procedure

Three woredas (Chencha, Mirab-Abaya and Arbamich Zuria woreda) were purposively selected from the Gamo Gofa zone based on their accessibility and relevance to the proposed study. After the study woradas where identified, 27 key informants were selected purposively from the three woredas.

Key informants interview

Key informant interviews were carried out with elder people and

Table 1. Summary of key informants during interview.

Name of representative Woredas	Gamo elders from each woredas		Community based organization (Debo(yusho), Idirlquib		Top governmental office of woreda agriculture and rural development bureau		Total
	Male	Female	Male	Female	Male	Female	
ArbaminchZuriaWoreda	3	2	2	1	1	----	9
Mirababayaworeda	3	2	3	----	1	----	9
Chenchawored	3	2	2	1	1	----	9
Total	9	6	7	2	3	---	27

Source: Survey data, 2012.

community based organization representatives, top governmental office of woreda agriculture and rural development bureaus, who know the history of the areas very well. The elders from each woredas have been above 50 years old, acceptable by community for different social and cultural affairs. By the above selection criteria the sample size were 5 per woreda from elders, three per woreda for community based organization and one per woreda from top governmental office. Therefore, the total sample sizes were twenty-seven (Table 1).

Data analysis

The quantitative data was analyzed using both descriptive and inferential statistical tools like percentages whereas qualitative data were analyzed by cross checking with different data sources in the study area.

RESULTS AND DISCUSSION

Values of Gamo indigenous knowledge in the biodiversity conservation

Gamo indigenous knowledge is essence of the social capital of Gamo peoples and plays a significant role in conservation of biodiversity. Local culture, spiritual, social and ethical norms possessed by these peoples has often been determining factors for sustainable use and conservation of biodiversity. According to the 45% of key informant interview responds, indigenous knowledge owned by the Gamo people to conserve biodiversity are shifting cultivation, sacred groves, local method of soil and water conservation practice (physical and biological structure) were as according to 55% of key informant interview responds, home garden/traditional agro forestry practice, locally known as *Daniogade* in the Gamo language are dominantly used to biodiversity conservations.

Some researchers are carried out on home-gardens in detail in certain localities of the Gamo area by Belachew et al. (2003), Southern Ethiopia (Tsfaye, 2005) in Ochollo, Channo and Lantee kebeles in low land part of Gamo area are stated as traditional home-gardening is a sustainable agricultural practice; it is environmentally friend and also allows the harvesting of diverse products

to the satisfaction of farming families as well as urban dwellers. This farming system that is composed of diverse and complex vegetation arrangements deserves unique nomenclature as it shares more with natural forests than it does with man-induced agro-ecosystems. According to the Gamo community based organization representative responds, the cultivated garden plants are composed of both food and non-food species.

According to woreda agriculture and rural development bureau representative responds the most Gamo women encouraged the neighbors, husbands and youths to conserve home gardens by planting diverse plant species and by taking proper care of the gardens. As they said, women's play a silent but active role in home garden conservation and management of plant genetic resources and seed selection. Talemso (2007) reported the same results. During key informant interview with the elder women's, it was notice that women were interested because they thought that home gardens could help them to earn and save money. However, many were also interested in preserving the environment and reducing biotic pressure on forests.

Role of home garden in the climate change mitigation and adaptation

Based on the 65% of key informant interview responds, pollution (water, soil, air and noise), stream cuts, erosion, flood, rugged topography and quarry were identified as the potential hazards/constraints of biotic resources in the Gamo area but 35% of KI respondents, erosion, flood and rugged topography and quarry were identified as the potential hazards/constraints of biotic resources in the Gamo area. As they explained, water and soil pollutions emanated from improper disposal of urban and poorly regulated wastes from industries, unwise uses of chemical fertilizers and locally produced beer (locally Areke, and Tella). In Gamo society, almost all of the generated solid wastes are indiscriminately dumped into drainage channels, streams, open surfaces, culverts, and residential compounds and even on the road including highway passing through the town. Open air combustion of wastes and emission of gases from factories in the

area without effective treatment design can be the cause for air pollution. However, as they said that the contribution of home-gardens of the study area in sustaining the environment is promising. These Home garden, developed and nurtured by Gamo local farmers through generations of innovation and experiment, are often cited as the epitome of sustainability, yet have been long neglected by the developmental activities. Today, however, these age-old systems are receiving increasing attention owing to their perceived potential to mitigate environmental problems such as loss of biodiversity and high concentration of atmospheric carbon dioxide. According to Ajibade and Shokemi (2003) it is widely recognized that agro-forests play an important role in the global carbon cycle by sequestering and storing carbon(C).

During the interview, woreda agriculture and rural development bureaus pointed out that this home garden plants help remove pollutants from the air in three ways: absorption by the leaves or the soil surface; deposition of particulates and aerosols on leaf surfaces; and fallout of particulates on the leeward (downwind) side of the vegetation because of the slowing of air movement. In line with this, home-gardens of the study area offer relevant service in mitigating the currently aggravating trend of climate change and in rehabilitating soil degradation. Soil erosion is minimized because of high vegetation cover that prevented the exposure of bare ground to heavy rainfall, improve the soil structure and increase the level of organic nutrient through the litter fall and releasing nutrient contain fluid through their roots. This help to increase the infiltration rate of the soil and also help to keep healthy soil. The healthy soils are a medium for sustainable growth of diversity plant and clean the environment through the process of organic matter decomposition. In addition, shades of trees, shrubs and other vegetation help to control temperature extremes by modifying solar radiation. Moreover, trees in the homesteads are also used to intercept dust. Since there is almost no use of pesticides in gardening, their produce is 'clean' contributing to environmental protection as well as public health. Therefore, this home garden practice of the study area have dual service of reducing the emission of GHG (Green House Gas) from anthropogenic sources, and enhancing carbon "sink". As they reported that "home garden also play a significant role in adaptation to the local climate change through practices of the planting early maturing crops, adoption of hardy varieties of crops and selective keeping of livestock in home garden".

Causes and consequences of biodiversity loss in the Gamo area

According to (100%) of Gamo indigenous elders respondents, the main causes for the loss of Gamo

biodiversity are: neglecting of local-biodiversity relationship through belittling of local knowledge, beliefs and practices has led to a disconnection of local peoples from their local nature (biodiversity). As they explained that when the links of local people with nature have been severed, it becomes difficult for local people to wake up to the call to take up their responsibilities to care for and work with nature for their own good (let alone for the good of nature and others). This eventually results in the loss of culture and biodiversity. This lead the development programs implemented in such an area of Gamo are hardly appropriate and will very likely be unsuccessful. Therefore, Gamo local communities have often been led to believe that their own way of life, depending on local biodiversity must be shunned in favor of alternative lifestyles. These alternatives, however, usually alter traditional patterns of interaction with the environment beginning with mismanagement and eventual destruction of local biodiversity and cultural practices.

According to (100%) of Gamo community based organization representatives respondents, the main causes for the biodiversity loss are policy failure: The policy and legislative frameworks do not articulate strategies specific to the conservation and sustainable use of biodiversity for Gamo indigenous people. As they said, migration from rural areas to towns and resettlement of people from drought-stricken regions to fertile areas has also resulted in the deterioration of traditional practices. As they reported, lack of prioritization for indigenous people due to neglect, decay, as well as destruction of socio-cultural values and their knowledge on the biodiversity conservation were the other reasons for the loss of biodiversity.

Furthermore, woreda's agriculture and rural development bureau respondent pointed out that the misunderstanding of the principle of conservation by those conservationists and developers who have considered conservation strictly as the act of keeping biodiversity from change or loss, by protecting and preserving it or preventing, disallowing and denying the use of biodiversity by people in order to "save biodiversity". As they said, these forget that the natural biological systems as well as cultures are dynamic and not fixed. If these systems are dynamic then we cannot keep them from changing. They must rather work within these systems and help them attain their balances through change. On other hand, if the principle of conservation has been understood, then actions on the ground have indicated that the principle has been misapplied. This misapplication whatever in Gamo area on the ground results as regards development and biodiversity conservation programs have not been satisfactory.

Almost all interviewees quite agreed the impact of biodiversity loss lead to the Gamo indigenous peoples particularly youth to long-term-long distance internal migration on the women left behind in local areas. This indicates that the livelihood of women who are left behind

as the male household head migrates out is highly affected by the labor gap and the social, cultural and institutional barriers, which constrain women's effort to improve and diversify their livelihood and come out of poverty and food insecurity. Women heads reported, labor gap at household level has forced most women to reduce the acreage of land they cultivate or leave some of their plots fallow. As a result women heads reported a decline in their agricultural production and high reliance on purchased food for survival. Were women effectively take over home garden conservation when household heads migrate out, in the study area the labor demanding tasks like land preparation and Enset transplanting are practically impossible for women to stay in the home garden conservation. It is also learned that reliance on hired labor has a lot of negative effect on the conservation of home garden lead to decline in the productivity of diversity.

Especially the Gamo elders in Gamo highland part (Chencha worda from Bilala and Shaye kebele) reported that they are facing much greater problems in recent years in drought due to erratic rain fall distribution lead to the scarcity of water. Dry-season grazing and watering areas have dried up, the water table in the shallow wells has fallen, and there is little or no water for the livestock as well as humans' nascent efforts to practice small-scale irrigation. As they said that, this problem is not common before ten years ago and happen suddenly due to the loss of our guard crop Enset is key position in the country's home-gardens as a dominant species is mentioned by Zemedu (2002) which play a significant role as source of water and food for livestock and human. As a result, they said that they have to move their livestock further away to non-traditional grazing areas, that is, into the territory of their enemies, although they were fully aware that this could lead to more conflict.

Conclusions

Indigenous peoples and their socio-cultural relationship with biological systems have largely been contributing to sustainable conservation of biodiversity. Field-based studies or interview were identified that the indigenous knowledge dominantly practiced to conserve biodiversity were the practice of home-garden in small scope traditional agro ecosystem having diverse plant species was carried out in Gamo area of South Ethiopia. Gamo indigenous farmers have well founded ingenious knowledge to conserve home garden and manage each components of the system. One major endeavor is the maintenance of diverse taxa of plant species in the home-gardens that are grown for food and others. This practice has a significant role on the biodiversity conservation and climate change mitigation and adaptation of Gamo peoples. The major causes for biodiversity degradation are neglecting of local-biodiversity relationship through belittling of local

knowledge, beliefs and practices and policy failure. Based on this, it is possible to conclude that indigenous people and their knowledge are playing a significant role in the protection of environments well as biodiversity.

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

First and for most I would like to glorify and bring the greatest of all thanks to God for helping me start and finish this work. I would like to express my heartfelt gratitude to Professor Antonino Colajanni, Department of History, Cultures and Religions, La Sapienza Università of Rome for his consistent follow up right from the start and completion of my work. I express my sincere gratitude to the International Fund for Agricultural Development (IFAD) particularly to the Policy and Technical Advisory (PTA) division at Rome, for their substantial co-operation and material support. I appreciate and thank Ms Antonella Cordone has encouraged me to broaden my view and rethink numerous theoretical issues and problems of practical importance. I would also like to express my gratitude to my lovely friend Zerihun Kassa for his moral and financial support from starting to end of my study.

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