

Full Length Research Paper

The role of rural women in natural resources management and utilization: A case of Delanta District, South Wollo Zone, Ethiopia

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Natural resources provide any material from the natural environment that can be used by people for support and sustenance of life on earth with its ecological value and manifold resources. The purpose of this study was to explore the role of rural women in natural resources management and utilization in Ethiopia by taking Delanta as the case. The research design was descriptive survey using stratified random sampling technique along the agro-ecology. Both quantitative and qualitative data collected. The target population was 300 sample households from the total of 2992 households in six Kebeles. The data were analyzed using both descriptive (percentage, mean score, cumulative frequency) and inferential (Chi-Square tests) statistical techniques. The results have shown that women are good natural resources managers and the primary gatherers of fuel-wood (76%), fetching water (71%), agriculture participation (83%) and fodder to meet immediate household needs. However, women are culturally denied the right to register and control land resources. Women have also limited access of technology, skill training, education, extension services and information. The depletion of natural resources directly impact on women with increasing workload and drudgery, and the overall livelihood of people who depend on natural resources. Henceforth, women's role in natural resources exploitation and management cannot be undermined. To reinforce and build up women's participation in resources management and sustainable uses, all concerned bodies should take appropriate measures to empower women in decision making, skill training, education, extension services and information.

Key words: Agriculture, environment, natural resources, resources management, resources utilization.

INTRODUCTION

Natural Resource Management (NRM) means the management of resources such as land, water, forest, plants and animals, with a particular focus on how

management affects the quality of life for both present and future generations. Without access to resources, there cannot be enough incentive for sustainable NRM

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and consequently rural development is curtailed (Babu and Nautiyal, 2015). The concept of NRM is basically attached with rural development, because the allotment of resources is essential in generating sustainable livelihoods. There needs to be equality in the allocation of resources and support mechanisms, which encourage people to use their resources sustainably (Nyamekye and Oppong-Mensah, 2016).

Natural resources have been crucial for the existence of life on earth which is vital both for lives and livelihoods in the community. They depend directly on natural resources for their livelihoods and ecological benefits. Thus, women are at center of the environment and development nexus. They perform many of the agricultural tasks worldwide, representing 43% of the agricultural labor force in developing countries and over half of all agricultural laborers in sub-Saharan Africa (SOFA Team and Doss, 2011). Women also responsible for small livestock production comprise around two-thirds of livestock keepers' worldwide (Genzebe et al., 2016). They are the primary caretakers of poultry and dairy animals, engaging in the sale of eggs and the production of cheese or other dairy products (SOFA Team and Doss, 2011).

Women are frequently responsible for firewood collection and fetching water, generate substantial income for the family budget from sale of handicrafts, a variety of grown and wild foods, firewood and other products, and care for their children and homesteads. To accomplish their tasks, women are, formally or informally, resource managers (Chen and Ravillion, 2008). Moreover, women play a key role in food production, some 80% of all food produced in Africa is grown at least in part by women (IKNWP, 2013). As an example, women in sub-Saharan Africa are major contributors to the agricultural economy, but face various constraints that limit them from achieving optimal production and agricultural development (Kaaria and Osorio, 2014). Most rural women derive basic resources such as fuelwood, forage, fodder, leaves litter, and non-timber forest products with economic, social, cultural or religious significance from forest ecosystems for their households' livelihoods. Their indigenous knowledge, strategies and roles in conserving and using various plant and animal species found in different ecosystems are very crucial to sustain the environment, their households' livelihoods, and those of their communities (Khadka and Verma, 2012).

However, research has shown that in many contexts, women often have less ownership and access to resources than men, making them more vulnerable to negative changes in the environment to productive resources and opportunities such as land, labour, education, extension, financial services and technology (Mehra and Rojas, 2008). The reduced access to land due to insecurity or damages to local resources, destruction or looting of agricultural infrastructure and

equipment, lack of availability of extension services and inputs, and reduced access or loss of markets can all render food production insufficient to meet the daily needs of families and children, which remain the responsibility of women in many cases, and lead to loss of critical income (FAO, 2014). As per Chayal et al. (2013), women are less educated than men, less access to information; extension systems tend to be male-biased. In addition, women have low decision making power than men when it comes to issues of household income allocation, livestock and cash crop production and marketing, and water management, and this is often rooted in cultural and social norms (Akeredolu et al., 2007).

A sustainable practice for management of natural resources to meet the need of life for both the present and future generations is of crucial concern to all societies (Belay, 2016; Agarwal, 2010). The impacts of degraded ecosystem services are being disproportionately borne by the poor, are a principal factor contributing to poverty, and are a barrier to achieving the Millennium Development Goals set by the United Nations (FAO, 2010). The natural resources coverage especially forest, portable water and protection of soil degradations are still very low in Ethiopia. As a result, the distance traveled and time taken to gather fuelwood and to fetch water has negative consequence for health and for economic productivity of women (Belay, 2016). The main burden to feed families and negative impact tends to fall on women, who are traditionally responsible for maintaining the household water supply and on their children. However, the program has problems in its implementation and it is not achieving what it had intended in terms of 'improving women's social status and traditional role structure in water management.

Women in Ethiopia have not shared the fruits of development equally with their male counterpart. Rights such as, access to land, credit and other productive resources are difficult for women to attain (Ogato, 2011; Bremner et al., 2010). They also experience multiple forms of other deprivations such as longer working days, women specific ill health, low levels of education relative to men, and lack of adequate representation in leadership and decision making positions (Agarwal, 2010; Ogato, 2013). Women's role in NRM issue remains collecting, storing and using for various purposes rather than to participate in decision making. This study tries to find out the role of women in NRM practices and performances in Ethiopia Delanta district taking as a case study. Moreover, it presents good practices and lessons for future participatory gender equality and women's empowerment policy formulation, implementation and evaluation in Ethiopia generally in the study area in particular. As it result may help to create a general over view about the status of women society, especially in relation to NRM and women in Delanta district.

Statement of the problem

Over half of the world's poor live in rural areas and depend heavily on natural resources for survival. Assets critical to rural women and men not only for securing food and a livelihood for their household but also for the conservation and sustainable use and management of natural resources (Agarwal, 2010). The key to sustainable environment and NRM is to integrate marginalized rural people into the formal economy. The current trends in population growth and ecosystem health suggest a challenging future for the world's poorest. More than 1.4 billion people live in extreme poverty, their daily income is less than one dollar (Chen and Ravillion, 2008), and many of them depend on degraded ecosystems. The majority of such people are rural women, who have virtually no access to farm-based resources. This lack of resources access also increases women's vulnerability and their livelihood strategies to be dependent on the natural resource base. As natural resources decline, women must dedicate increasing amounts of time to obtaining resources for both sustenance and livelihood needs (New Course, 2010; UN-Women, 2014).

Women and men play different roles in the utilization and management of natural resources including agricultural production. These differences can be specific to cultures, but women tend to have more responsibility for subsistence crops, they collect fuel wood, and contribute more of the labor. Coupled with their domestic responsibilities they have greater demands on their time, and factors that affect labor are likely to have a greater impact on women (New Course, 2010). This gender differences can create 70% of the world's poor women (Solar, 2010) who have less access to financial resources, land resources, education, health and other basic rights like decision making processes than men which also affect NRM in a number of ways. Access to extension advice is also harder for women than men. In many developing countries most extensionists are men, so tend to focus on the tasks and interests of men, and women may be socially inhibited from interacting with male extensionists. Although the situation may have improved in the last two decades, in Africa less than 3% of agricultural advisers and extension workers were female (APF, 2007), and less than 2% of all extension contacts are with women farmers (Blackden, 2006).

The major difference between men and women in NRM including agriculture is their ownership and access to resources. Despite a strong reliance on land and natural resources for survival and livelihood, women own less than 2% of the world's titled land (Coleman, 2008). The lack of land ownership can affect access to other resources, such as credit, water and grazing rights, limiting livelihood options for women and increases vulnerability (Nyamekye and Oppong-Mensah, 2016). More than one fifth of humanity lives in poverty while

nearly two-thirds of humanity subsists on less than three dollars per day. All together, the world is hurtling away from environmental sustainability (UN-Women Watch, 2009).

The last two to three decades, the role of women in natural resource management was often overlooked, perhaps because the onlookers were viewing communities through the lense of their own developed country experience and perspective (Fish et al., 2010). With few exceptions, women are at the forefront of the environment and development nexus. In most communities, women have a pivotal role in economic development and in challenging poverty. They are farmers, workers and entrepreneurs, but almost everywhere they face more severe constraints than men in accessing productive resources, markets and services (SOFA Team and Doss, 2011). Their role was seen as that of 'housewife', and in that context the concern of environmentalists was with limiting environmental degradation through population control.

Ethiopia for the last couple of decades has faced serious ecological imbalances due to large scale deforestation and soil erosion caused by improper farming practices, destructive forest exploitation, wildfire and uncontrolled grazing practices (Belay, 2016). This has resulted in a declining agricultural production, water depletion, disturbed hydrological conditions, poverty and food insecurity. One of the keys to successful poverty alleviation is enabling rural poor people to have access to natural resources and to enjoy the new technologies to use resources sustainably (IFAD, 2011). So as to facilitate women's participation in sustainable development process of Ethiopia and the other developing countries, there is a great need to promote changes in policies, laws, structures and attitudes in development programs.

The existing low level of consciousness about the roles of women play in the development of Ethiopia; the deep-rooted cultural beliefs and traditional practices that prevent women from playing their full roles in the development process of the country; lack of appropriate technology to reduce the workload of women; shortage of properly qualified female development agents to understand, motivate and empower rural women by eliminating the major constraints hindering their progress (UN-Women, 2014) motivating to conduct this research on rural women involvements in resources utilization management and their major constraints access to productive resources: the case of six rural communities in Delanta district.

Women have additional roles as mothers along with other productive community work. This takes up much of their time. They can devote that much less time for investment in their human capital and capacity building. Hence, involvement of women in additional conservation work without labor availability and means of production will only increase work load, burden and drudgery for

women. In the Delanta context, sustainable development would depend primarily on a wise use of the existing resources (land, water and forests); reduced exploitation of novel resources and adapting better agricultural practices over time. Proper natural resource management can release more time for women to use on income generation activities, child care and personal development. Hence, this study tries to assess the role of women in NRM in Delanta, a rural community in south Wollo zone Amhara Region, Ethiopia.

Objectives of the study

The general objective of this study was to assess the overall roles and contributions of women in natural resources management and comprehend their constraints to empower women. In line with the general objective, the study explored the following specific objectives:

- (1) to assess the overall contribution of rural women in managing natural resources;
- (2) to investigate people's awareness and appreciation of natural resources, environmental issues and their effects on resources degradation; and
- (3) to establish factors that affect women's involvement in NRM and utilization in the study area.

Research questions

To achieve these objectives, the paper outlined the following research questions:

- (1) What are the major roles of rural women in natural resource management and utilization?
- (2) How much attention does the community give to environmental issues such as natural resources deprivation and its effect on their livelihood?
- (3) What are the major drawbacks that faced women's involvement in resource utilization and management?

MATERIALS AND METHODS

Description of the study area

Delanta is located in South Wollo Zone the Amhara Regional State of Ethiopia which lies between 11° 29' 29.82" to 11° 41' 25.53" N and 39° 02' 19.19" to 39° 14' 05.04" E with an altitude ranging from 1500 to 3819 m above sea level at the bottom of the valleys (Gosh Meda) and the top of the mountain (Mekelet), respectively. Delanta is bordered on the south by the Beshilo River which separated it from the Debub Wollo Zone, on the west by the Dawunt, on the northwest by Wadla, on the northeast by Guba Lafto and on the east by Ambasel. The major town is Wegeltena. It is situated at about 499 km north of Addis Ababa and 98 km northwest of Dessie town in South Wollo Zone (Figure 1).

The major landforms of the District comprise extensive plateaus, chains of hills with mountainous ridge, river-valleys and very deep

gorges at the boundary. It is oval in shape with dendritic drainage pattern, steep ridges, and numerous convex hills at the plain area and gorges at the boundary. The area is characterized by the trap series of tertiary periods, similar to much of the central Ethiopian highlands. It is covered by Oligocene rhyolite and very thick ignimbrite units encompassing predominantly of alkaline basalt with numerous inter-bedded flow of trachyte. The granite, gneisses and basalt rock types exist in the area the forming part of the basement complex and most of the soils are basaltic parent material. According to Nahusenay et al. (2014) the soils are predominantly Vertisols, and other types are Cambisols and Leptosols which are greatly influenced by topography with high surface runoff during the main rainy season.

According to WAOR (2013) report, the total area of the district is 98002 ha stretching from lowland to highland, much of it being in the mid-altitude ranges dominated by plateaus. Average land holding size is 1 ha per household (0.75 ha for crop production and 0.25 ha for grazing). The land uses are both private and communal land holdings which can be identified through land use patterns. The largest proportion of the land is currently unutilized which accounts about 45%. Cultivated and grazing lands are the major land use types in the study area.

According to traditional agro-ecological classification of Ethiopia, the area falls in all the categories that basically correlate with elevation. These are *Kolla (lowland)*, *Woina Dega (midland)*, *Dega (highland)* and *Wurch (very highland)*. The climate of the area is characterized by dry seasons (from October to February cold-dry and from March to June hot-dry) and wet season (from mid-June to September). The fifteen years mean annual rainfall of the study area is about 812 mm of which 75 to 80% is received in summer (*Kiremt*) and 25 to 20% in the spring (*Belg*) seasons. The mean annual minimum and maximum temperatures of the same period are 6.8 and 19.6°C, respectively. Peoples living on upper elevation, their farming activities primarily depend on *Belg* rains, while those on middle and lower elevation rely on both the *Kiremt* and *Belg* rains. However, there is small, erratic and unreliable rainfall and the area is prone to sporadic droughts.

As per reported by the Central Statistical Agency (CSA, 2008), Delanta has a total population of 132,770 (26554 Households), of whom 66243 (49.89%) are men and the remaining 66528 (50.11%) being women; 8535 (6.43%) are urban and 124236 (93.57%) being rural inhabitants. The district is densely populated area with average family size of five persons per family. The majority of the inhabitants practiced Ethiopian Orthodox Christianity with 90.78% reporting that as their religion, while 9.21% of the population said they were Muslim. The district is divided into 35 Kebeles-the least administrative structure, that is, local districts which are stretched into different agro-ecological zones. The community of the district (Woreda) did not produce sufficient food for year-round consumption even in the normal climate conditions. This is due to severe land degradation, land scarcity, and erratic rainfall (WAOR, 2013).

Design of research, data sources and sampling techniques

The research design was descriptive and survey method using stratified random sampling technique along the agro-ecology. The data collection approaches were both quantitative and qualitative methods. The study was conducted in six Kebeles from the total of 35 Kebeles and 300 household (HH) from the total of 26554 HHs in the district through a structured questionnaires and focus group discussions.

Data types and sources

The research was considered both as the primary and secondary

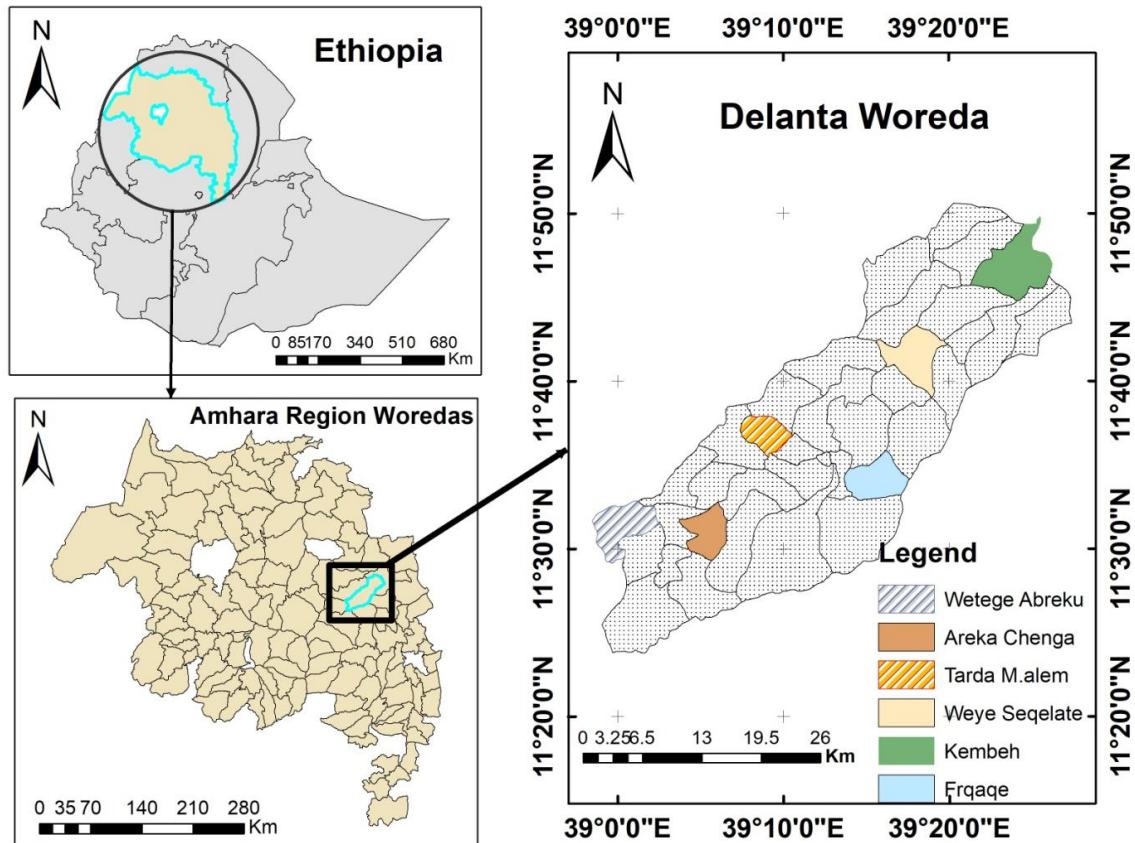


Figure 1. Location map of the study area.

data sources. The primary data were conducted in household surveys which were administered through field observations, questionnaires, formal interviews and focus group discussion with rural women, men, women affair office and other concerned authorities. For this purpose, questionnaires were developed and provided to all key respondents. Most of the items were closed-ended and some open-ended questions were also included due to accomplish qualitative information on the attitudes, beliefs and practices of the people. The secondary data were reviewed from published and unpublished documents of governmental and non-governmental organizations to supplement and strengthen the primary data. Historical, cultural, socio-economic backgrounds of the area were also obtained by using secondary data.

To check the appropriateness of the items in the instrument and to make necessary correction on the feedbacks obtained from the respondents, pilot test was administered by randomly taking five men and fifteen women from the non sampled Kebeles. Based on the pre-test results, some improvements were made in preparing the final questionnaires. Finally, 300 copies of the questionnaires were distributed to the key respondents and all of them were filled in and gathered

Sampling techniques

According to the Central Statistical Agency (2009) report, Delanta has a total population of 132770 people of whom 66528 (50.11%) are women and 124236 (93.57%) rural inhabitants. Therefore, the target populations were rural women and to know the attitudes of

men towards women's employment, 25% of men were considered from the total sampled population. The sample size was 300 rural households from the total of 2992 HHs in six Kebeles of which 75% of women and 25% men. One of the motives of the survey was to investigate variation in the patterns of agricultural works and coping mechanisms based on agro-ecological variations. To this end, six Kebeles were randomly selected in the earlier stated variations and to make the study manageable, on average 50 household was taken from each rural Kebeles using simple stratified random sampling techniques by altitude, sex and agro-ecological zones (Table 1).

Methods of data analysis

The primary data were analyzed and presented by using both descriptive and inferential statistical techniques. The descriptive techniques include percentage, cumulative frequency, while the inferential statistical techniques used Chi-Square tests. The Chi-Square test was employed to see the association or homogeneity between the agro-ecological zones with reference to responses regarding agricultural works and coping strategies used by peasants during famine (scarcity of food) and its impacts.

RESULTS AND DISCUSSION

The term resource is a broad concept to define and refer

Table 1. Site location of the study peasant associations.

Site name	NRP	Total HHS	Agro-ecological zone
Ferqaqe	48	483	Kolla (Lowland < 2100 m)
Kembeh dega	47	474	Dega (Highland > 2700 m)
Weyesequleho	49	489	Dega (Highland > 2700 m)
Tardate medihanialem	53	532	Woina Dega (Midland b/n 2100 and 2700 m)
Arka-Chinga	52	519	Woina Dega (Midland b/n 2100 and 2700 m)
Wetege-Aberkut	50	495	Kolla (Lowland < 2100 m)
Total	299	2992	-

Source: Based on Field Survey.

to various aspects, but the interest of this study concentrates on farmland, water, forest, agricultural output, household income, women's access to resources and their challenges. It is accepted that the decision-making process is the reflection of the resources control management. The issue of NRM has always been dominated by men, though women in the area generally depend heavily on natural resources for their survival (Mondal, 2013). The degree to which women are involved in the control of the earth's life is just beginning to dawn on most of us. The result showed the key role of women as conservationists and sustainers of the environment. They are highly involved in afforestation, water harvesting and soil conservation programs in the district. However, their roles remain informal and unrecognized. One thing should be clear at the outset: women who are closer to water, forest fuel, fodder and other natural resources than men. The role of women in natural resources management has been investigated under the following broad sub-heads, such as land resource, water resource, forest resource and women's accessible to the resources control.

Women and land resource

Land is one of the most vital natural resources for people and it partly determines the volume of output and the status of a farmer in the social setting of the society. It is a store house for minerals and forest resources of various kinds. This kind of natural capital is mostly controlled by men, while women have limited power to control the resource and have also limited or no access to external inputs such as extension, fertilizer and credits. In the study area, males have the right to register and control land resources, while women are culturally denied such a right except when they are divorce or become widows. In the survey, a further attempt was made to understand the feeling of women regarding the existing land registration practice. None of the respondents have expressed dismay towards the tradition of registering land in the name of their husbands. As the results showed that about 81% of the sampled respondents' said

that women and men do not have equal accessible for the land resources (Table 2).

This is due to the inheritance laws, customary laws and cultural norms which are more favorable to men than women in the study area. The Chi-Square test showed that there were significant differences among the three agro-ecological zones with regards to the subjects in question *Woina Dega* (86%) having a higher proportion than *Kolla* (78%) and *Dega* (68%). The question comes why are their differences? As information obtained from sampled respondents and WAOR (2013), these are traditional and cultural influences. This indicates the environment, institution, socioeconomic, cultural norms and demographic factors have prejudiced women's resources accessibility.

The other characteristic of farmland has something to do with the spatial extent fragmentation of plots. It is a common form of landholding arrangement in Ethiopia in general and the study area in particular. Dispersed plots involve distance between homesteads and farmsteads, which demand additional time and labor. In case of possession of distant plots, household members need to travel and transport implements and farm outputs, the time and labor demand of which progressively increases with distance. The round trip to distant plots is quite considerable. The impact is much more serious on women than men due to their double role both in homesteads and farmsteads.

As shown in Table 3, in terms of local measurement, that is, *timad* (approximately 0.25 ha) of the total population about 57% have less than 1 ha of land. The results indicated that 16.5% of the households have below one and one *timad*. The majority of peoples (40.5%) owned 2 to 3 *timads* and 32.5% of the respondents categorized in 4 to 5 *timads*. The others (10.5%) have above five *timads*. In terms of agro-ecology, peasants in Woina Dega have less farm plots than in Dega and Kolla areas. This has something to do with high population pressure.

Women and water resource

Women gather water and manage it for household use,

Table 2. Degree of accessibility for land resources.

Activity			Dega		Woina Dega		Kolla		Total		
			NRP	%	NRP	%	NRP	%	NRP	%	
Do men and women have equally access for land resources?	Yes	Atc.	32		14		16				
		Exp.	24	32	16	14	20	22	62	19	
	No	Atc.	68		86		84				
		Exp.	76	68	84	86	80	78	238	81	
	Total			100	100	100	100	100	100	300	100

$\chi^2 = 8.5$; C.V = 5.99; $p = 0.05$; $df = 2$.
Source: Based on Field Survey.

Table 3. Distribution of respondents by agro-ecology and category of plot size.

Size of plots	Dega		Woina Dega		Kolla		Total	
	NRP	%	NRP	%	NRP	%	NRP	%
Below 1 timad*	10	10	11	11	4	4	25	9
One timad	8	8	7	7	8	8	23	7.5
2-3 timads	30	30	45	45	42	42	117	40.5
4-5 timads	48	48	31	31	20	20	99	32.5
Above 5 timads	4	4	6	6	26	26	36	10.5
Total	100	100	100	100	100	100	300	100

1 timad* is approximately 0.25 ha; NRP: Number of respondents.
Source: Based on Field Survey.

ensuring adequate supply, storing and keeping it clean while stored in the house. They also play key community management roles in domestic water supply at the community level including maintenance of traditional sources. Over centuries, women have acquired extensive knowledge about water quality, health and sanitation. As shown in Table 4, respondents have stated that the main water sources in the district are springs, ponds, rivers and wells (ground water). The tasks of fetching water are exclusively left to women who engaged that about 70.5% of the sampled households. However, children are parts of the community who participate in fetching water [19.5%], especially girls are the ones that carry the greater burden. The participation of men in fetching and carrying water is very low with only 7.5% of them. This implies that any development effort to provide water should be made to alleviate the problems women face due to lack of potable water.

Women are good water managers in the study area. However, many people suffer from water stress on a seasonal and annual basis, due to lack of accessibility and availability of portable water. As the results showed, over half of the villagers in the study area do not attain potable water. Still they have used unsafe water from springs, rivers and ponds. The researcher observed during the field work women still carry water on their back

even when they are pregnant and lactating. The situation is particularly worse in *Kolla* agro-ecological zone of which 72% have no access to potable water (Table 5). As was also reported by UN-Women (2014), the proportion of rural women were affected by water scarcity, for example, is estimated at 55% in Africa, 32% in Asia, and 45% in Latin America, with the median time for collecting water in the dry season at 1.6 h per day. If water resources are scarce, it affects both men and women negatively with less productivity. At the same time, it affects women and children more with more workload and drudgery and poorer nutrition as compared to men and boys.

Women in biomass energy consumption and management

Over centuries, women have gathered and managed biomass energy for household consumption. Most domestic energy in rural Ethiopia comes directly from biomass sources which include fuel-wood, charcoal, agricultural residue, animal dung and bushes. The burden of fuel-wood crisis is borne by women's because they have the responsibility for meeting household energy needs through fuel collection, preparation and

Table 4. Gender specific tasks in fetching water

AEZ	Women		Men		Both		Children		Total	
	NRP	%	NRP	%	NRP	%	NRP	%	NRP	%
Dega	66	66	8	8	4	4	22	22	100	25
Woina Dega	71	71	8	8	3	3	18	18	100	50
Kolla	74	74	6	6	0	0	20	20	100	25
Total	211	70.3	22	7.3	7	2.3	60	20.0	300	100

AEZ: Agro-ecological zone; NRP: number of respondents.
Source: Based on Field Survey.

Table 5. Access to potable water in the study area.

AEZ	No. of HHs with access		No. of HHs without access		Total
	NRP	%	NRP	%	NRP
Dega	36	36	64	64	100
Woina Dega	67	67	33	33	100
Kolla	28	28	72	72	100
Total	131	49.5	169	50.5	300

AEZ: Agro-ecological zone; HHs: households.
Source: Based on Field Survey.

use. Fuel-wood preparation, cooking and care of the fire are almost exclusively tasks for women and young girls. Tables 6 and 7 show this fact.

As Table 6 depicts, the majority of the respondents (94%) are used for animal dung. The remaining sources of energy were wood (71%), gas/kerosene (82%) and crop residue (44%). Due to lack of resources and awareness of the people, less amount of charcoal was used in energy consumption. In terms of agro-ecological zones, wood and bushes were highly used in Kolla area than the others. Gas/Kerosene used as electricity during night and not for cooking activities.

Women work long hours in both domestic and economic activities (11 to 14 h per day) have been documented in nearly every country. Compared to men, women in rural areas of developing countries spend long hours working in survival activities such as firewood collection (75%), water hauling (90%), food processing (76%), cooking (100%) and 75% of small animal caring (Table 7) as was also reported by UN-Women (2014), of the total burden of work, women carry on average 53% in developing countries and 51% in industrial countries.

Women and livelihood agriculture

The rural women assist to prepare farm, and then plows, harvests, weeds and transplants, while they do milking and act as a shepherd. Also, they weave carpet, try to make tools and handicrafts, bake bread, cook, do

housekeeping duties, fetch water from water sources that are far away, collect firewood, care for children, spin wool and make curd, buttermilk, yogurt, butter and oil. In addition to all these, they are mothers and family supervisors too. The research was tested, women's participation in crop production activities, by using Chi-Square tests to see whether there was any significant difference among the three agro-ecological zones or not. As the results showed that there was a significant difference among the three agro-ecological zones. In case of *Kolla*, 94% of the sampled women respondents have participated regularly in crop production. The participation of women in *Woina Dega* and *Dega* were 82% and 74%, respectively (Table 8). However, their activities are not considered as economical and they are simply removed from agriculture and rural development programs. In consent with this study World Bank (2002) and Mihiret and Tadesse (2014), in spite of that, rural women in developing countries provide 70% of agricultural labor, 60–80% labor for household food production, 100% labor for processing the basic food stuffs, 80% for food storage and transport from farm to village, 90% for water and fuel wood collection for households and 30% for supervising rural families. This, therefore, suggests that their role in natural resource exploitation and management cannot be undermined.

The questions come why are there differences of women's activities in agro-ecological zones? The reasons for the involvements of women differ in agro-ecological zones, and the types of crops have sown in the area. Some type of crops, namely *teff*, maize, sorghum, some

Table 6. Source of energy consumption.

Energy sources	Dega		Woina Dega		Kolla		Total	
	NRP	%	NRP	%	NRP	%	NRP	%
Animal dung	100	100	100	100	76	76	276	92.0
Wood	56	56	68	68	90	90	214	71.3
Crop residue	24	24	42	42	68	8	134	44.7
Charcoal	10	10	10	10	14	14	34	11.3
Bush/Shrub	16	16	12	12	46	46	74	24.7
Gas/Kerosene	84	84	89	89	64	64	237	79.0

NRP: Number of respondents.
Source: Based on Field Survey.

Table 7. Time allocation to survival activities among women and men (hour per day).

Activity	Dega			Woina dega			Kolla			Total		
	NRP	%	HPD	NRP	%	HPD	NRP	%	HPD	NRP	%	HPD
Firewood collection												
Women	70	70	2.92	82	82	3.42	64	64	2.67	216	75	3.1
Men	30	30	1.25	18	18	0.75	36	36	1.5	84	26	1.06
Water hauling												
Women	92	92	3.83	92	92	3.83	82	84	3.5	266	90	3.75
Men	8	8	0.33	8	8	0.33	16	16	0.67	32	10	0.42
Food processing												
Women	74	74	3.08	82	82	3.42	66	66	2.75	222	76	3.17
Men	26	26	1.08	18	18	0.75	34	34	1.42	78	24	1
Cooking time												
Women	100	100	4.17	100	100	4.17	100	100	4.17	300	100	4.17
Men	0	0	0	0	0	0	0	0	0	0	0	0
Small animal care												
Women	70	70	2.92	82	83	3.46	64	64	2.67	216	75	3.1
Men	30	30	1.25	18	17	0.71	36	36	1.5	84	26	1.06
Mean total work time												
Women	82	82	3.38	88	88	3.66	76	76	3.15	246	83	3.46
Men	18	18	0.78	12	12	0.51	24	24	1.02	54	17	0.71

NRP: Number of respondents; HPD: hours per day.
Source: Based on Field Survey.

pulses have never be sown in *Dega* areas but are commonly found in *Kolla* and *Woina Dega* areas. These types of crops require intensive labor forces, particularly the weeding season. The other reasons might be farm size and household income level. As per the focus group discussants said that the farm size and household income level that determines the degree of women's involvement in crop production. If the farm size is larger,

it needs more household labor forces including women. In some cases, the households with high-income level tend to use hired labor, not demand for females labor. The participation of women in agriculture everyday jobs is high in all agro-ecological zones. The only difference is the extent of participation. Women in *Kolla* area are more involved than in *Woina Dega* and *Dega* areas [FGD information during the field work].

Table 8. Women's participation in crop production activities.

Types of activity		<i>Dega</i>		<i>Woina Dega</i>		<i>Kolla</i>		Total	
		NRP	%	NRP	%	NRP	%	NRP	%
Participated	Act	74	74	82	82	94	94	250	83
	Exp	83	-	83	-	83	-	249	-
Not participated	Act	26	26	18	18	6	6	50	17
	Exp	17	-	17	-	17	-	51	-
Total		100	100	100	100	100	100	300	100

$\chi^2 = 7.23$; C.V = 5.99; $\alpha = 0.05$; df = 2; NRP: Number of respondents.
Source: Based on Field Survey.

Women and resources accessibility

In the study area to see land registration as an example, men have the right to register and control land resources, while women are culturally denied such a right except when they divorce or become widows. In the survey, a further attempt was made to understand the sentiment (attitude) of women regarding the existing land registration practice. None of the respondents have expressed dismay towards the tradition of registering land in the name of their husbands. The other aspect of resource control system is who holds the income derived from various sources. Different sources of income were identified and the respondents were asked to express who hold the money derived from this sources and who ought to hold.

The major income sources are decided and controlled by the husbands, while the minor income sources by wives in all agro-ecological zones. The management of crop production (86%) and large animals including cattle, sheep, goat, and equines (91%) were dominantly performed by the husbands, while the small animals like poultry (84%), dairy products (82%), and 88% of handicrafts (cotton and wool spinning, grass basketry, pottery) and 95% of local liquor (*areky/katicala, tella*) were carried out by women. In case of fuel-wood collection activities, it can be categorized in two ways. If the amount of fuel-wood/construction materials are large in size and quantity, for instance the eucalyptus tree, the resources are mostly managed by men (19%), while less amount and dry woods packed on human beings or animals, and animal manure preparation for fuel activity is carried out by women (81%) (Table 9).

As was also similar results stated by World Bank (2007), traditionally in all of Ethiopian indigenous cultures, public space is considered to be a male domain. Women have had little to say in public matters. They have virtually no decision-making powers with respect to resource distribution at the communal level. At the domestic level, however, women enjoy some limited decision-making power. When talking about the land resource in Ethiopia on a traditional or modern scale, one

thinks of the man on the front line. Women are in marginal positions with regards to access, decision and control of resources.

Challenges related to infrastructure and service provisions

Some of the main challenges that face the people of Delanta suffered from food shortage and famines, that is, food quantity and quality (84%) due to the backwardness of agricultural practice, erratic rainfall, small landholdings, recurrent drought, frost and the inappropriate use of resources, lack of transportation (85%), water resource quantity and quality (82%), the shortage of health service facility in the area (74%) and shortage of fuel wood (55%) due to deforestation and related provisions (Table 10). Women are the backbones of socioeconomic circumstances in rural Ethiopia in general and the study area in particular. However, the existence of different taboos and recurrent famines made their lives much more complicated.

When to look at women respondents alone, food quality and quantity (63%), water (62%), health problem (56%), lack of transportation (64%) and fuel-wood (41%) were more susceptible to women in the area (Table 11). As stated earlier, insecure land tenure systems reduces rural women's incentive to improve natural resource management and conservation practices as women have limited access to new technological innovations in agricultural extension programs, skill training and supportive programs, including credit and loan services, installation and maintenance of water or biogas plants are designed mainly to men rather than to women.

CONCLUSIONS AND RECOMMENDATION

Sustainable development in Delanta district depends primarily on a balanced approach that includes biodiversity conservation, sustainable management of existing land and forests, reduced exploitation of new

Table 9. Family asset control in the sampled households

Types of income sources		<i>Dega</i>		<i>Woina Dega</i>		<i>Kolla</i>		Total	
		H	W	H	W	H	W	H	W
Crop productions	NRP	74	26	89	11	94	6	257	43
	%	74	26	89	11	94	6	85.7	14.3
Large animals	NRP	94	6	82	18	98	2	274	26
	%	94	6	82	18	98	2	91.3	8.7
Small animals	NRP	22	78	17	83	10	90	49	251
	%	22	78	17	83	10	90	16.3	83.7
Dairy products	NRP	14	86	10	90	30	70	54	246
	%	14	86	10	90	30	70	18.0	82.0
Handicrafts	NRP	8	92	9	91	20	80	37	263
	%	8	92	9	91	20	80	12.3	87.7
Local beer	NRP	5	95	7	93	4	96	16	284
	%	5	95	7	93	4	96	5.3	94.7
Fuel wood	NRP	4	96	8	92	46	54	68	242
	%	4	96	8	92	46	54	19.3	80.7

H: Husband; W: wife; NRP: number of respondents.
Source: Based on Field Survey.

Table 10. Accessibility of the basic infrastructure and resources.

Activity	<i>Dega</i>		<i>Woina Dega</i>		<i>Kolla</i>		Total		Rank
	NRP	%	NRP	%	NRP	%	NRP	%	
Food (quantity and quality)	94	94	87	87	70	70	251	83.7	2
Lack of health service	68	68	62	62	92	92	222	74.0	4
Fuel-wood shortage	70	70	51	51	44	44	165	55.0	5
Lack of education service	20	20	28	28	28	28	76	25.3	7
Lack of transportation	86	86	89	89	80	80	255	85.0	1
Lack of agricultural inputs	46	46	47	47	38	38	131	43.7	6
Water (quantity and quality)	90	90	73	73	84	84	247	82.3	3

NRP: Number of respondents.
Source: Based on Field Survey.

forest resources, adapting efficient agricultural systems and building proper marketing linkages. Expansion of agricultural area into accessible primary forest should also be checked through adaption of better farming practices. The disparities of gender in terms of work opportunity, income, education and decision-making were observed in Delanta district. Women are excluded from economic opportunities, social network services, and decision making. Such exclusions are related with cultural taboos, backward technologies and partisan

religions. In the study area, women do not plough with oxen and men do not cook their food. These are taboos laid against women and men. The agricultural extension training programs hardly have women participants. This further marginalizes women.

Environmental depletion and resource degradation magnify women's workload and drudgery. These are the results of women walk long distances to collect firewood and to fetch water. Women's recognize the natural resources, not only for crop production but also for fuel

Table 11. Women respondents alone based on the agro-ecology zones.

Activity	Dega		Woina Dega		Kolla		Total	
	NRP	%	NRM	%	NRP	%	NRP	%
Food (quantity and quality)	71	70.5	65	65.3	53	52.5	188	62.8
Lack of health service	51	51.0	47	46.5	69	69.0	167	55.5
Fuel-wood shortage	53	52.5	38	38.3	33	33.0	124	41.3
Lack of education service	15	15.0	21	21.0	21	21.0	57	19.0
Lack of transportation	65	64.5	67	66.8	60	60.0	191	63.8
Lack of agricultural inputs	35	34.5	35	35.3	29	28.5	98	32.8
Water (quantity and quality)	68	67.5	55	54.8	63	63.0	185	61.8

NRP: Number of respondents.
Source: Based on Field Survey.

and water, and incorporating these concerns into plans and policies for environmental management would release more time for women for income generation, child care and personal development. Women are much closer to water, forest or fuel-wood, fodder and land resources than other members of the community make them indispensable for managing natural resources. Generally speaking, they are conservationists and sustainers of the natural environment in the study area. Therefore, recognition and empowerment of women in these and many other roles could accelerate the conservation and proper use of natural resources.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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REFERENCES

- Agarwal B (2010). Gender and green governance: The political economy of women's presence within and beyond community forestry. Oxford: Oxford University Press.
- Akeredolu M, Asinobi CO, Ilesanmi I (2007). Gender and Trends in Production Constraints among the Bambara People of Mali pp. 1-13.
- Africa Partnership Forum (APF) (2007). Gender and economic empowerment in Africa, 8th meeting of the Africa partnership forum, Berlin. 22-23 May 2007.
- Babu MSU, Nautiyal S (2015). Conservation and management of forest resources in India: Ancient and Current Perspectives. *Natural Resources* 6:256-272. <http://dx.doi.org/10.4236/nr.2015.64023>
- Belay Z (2016). Land Resource, Uses, and Ownership in Ethiopia: Past, Present and Future. *International Journal of Scientific Research Engineering Technology* 2(1):17-24.
- Blackden C (2006). Gender, time use and poverty in Sub Saharan Africa. Washington D.C. World Bank.

- Bremner J, López-Carr D, Suter L, Davis J (2010). Population, poverty, environment, and climate dynamics in the developing world. *Interdisciplinary Environmental Review* 11(2/3):112-126.
- Chayal K, Dhaka BL, Poonia MK, Tyagi SVS, Verma SR (2013). Involvement of Farm Women in Decision-making In Agriculture. *Studies on Home and Community Science* 7(1):35-37.
- Chen S, Ravillion M (2008). The developing world is poorer than we thought but no less successful in the fight against poverty. World Bank Policy Research Working Paper 4703. World Bank.
- Coleman F (2008). Pan-African Strategies for environmental preservation: Why women's rights are the missing link. *Berkeley Journal of Gender, Law and Justice* pp. 181-207.
- Central Statistical Authority (CSA) (2008). Summary and statistical report of the 2007 and population and housing census. Federal Democratic Republic of Ethiopia Population Census Commission, Addis Ababa, Ethiopia.
- Food and Agriculture Organization (FAO) (2010). Gender dimensions of agricultural and rural employment: Differentiated pathways out of poverty. Status, trends and gaps. FAO of the United Nations, International Fund for Agricultural Development and the International Labor Office, Rome, Italy.
- Food and Agriculture Organization (FAO) (2014). Enhancing gender equality in the management of Africa's natural resources. *Nature and Faune Journal* 29(1):12-17. ISSN-L2026-5611. nature-faune@fao.org <http://www.fao.org/africa/resources/nature-faune/en/>
- Fish J, Chiche Y, Day R, Efa N, Witt A, Fessehaie R, Johnson KG, Gumisizira G, Nkanfu B (2010). Mainstreaming gender into prevention and management of invasive species. *Global Invasive Species Programme (GISP)*, Washington DC, US, Nairobi, Kenya. 64.
- International Fund for Agricultural Development (IFAD) (2011). Women and rural development: Enabling poor rural people to overcome poverty. Rome, Italy.
- International Knowledge Network of Women in Politics (IKNWP) (2013). A new Regional Gender Project for Africa. Published on 3 April 2013. Available from: <http://iknowpolitics.org/en/2013/03/new-regional-gender-project-africa>
- Kaaria S, Osorio M (2014). Women's participation in rural organizations: Why is it important for Improving Livelihoods and Sustainable Management of Natural Resource? *Nature and Faune Journal* 29(1):12-17. ISSN-L 2026-5611. nature-faune@fao.org <http://www.fao.org/africa/resources/nature-faune/en/>
- Khadka M, Verma R (2012). Gender and Biodiversity Management in the Greater Himalayas: Towards Equitable Mountain Development.' Kathmandu: ICIMOD
- Mehra R, Rojas MH (2008). Women, food security, and agriculture in a global marketplace. *International Center for Research on Women (ICRW)*.
- Mihiret M, Tadesse A (2014). Women's role and their decision making in livestock and household management. *Journal of Agricultural Extension and Rural Development* 6(11):347-353.
- Mondal M (2013). The role of rural women in agriculture sector of Sagar

- Island, West Bengal, India. *International Journal of Engineering and Science* 2(2): 81-86.
- Nahusenay A, Kibebew K, Heluf G, Abayneh E (2014). Characterization and classification of soils along the toposequence at the Wadla Delanta Massif, Northcentral Highlands of Ethiopia. *Journal of Ecology and the Natural Environment* 6(9):304-320.
- New Course (2010). Women, Natural resource management, and poverty: A Review of issues and opportunities. *Change the Course of Her Life*.
- Nyamekye E, Oppong-Mensah SB (2016). Intra-household gender relations and women's informal economic activities in Tamale, Northern Ghana. *International Review of Social Sciences and Humanities* 10(2):13-25
- Ogato GS (2011). Gendered knowledge and innovation in crop production and management practices: A case study of three rural communities in Ambo district, Ethiopia. *Journal of Research in Peace, Gender and Development* 1(7):216-228.
- Ogato GS (2013). The Quest for Gender Responsive Information Communication Technologies Policy in Least Developed Countries: Policy and Strategy Implications for Promoting Gender Equality and Women's Empowerment in Ethiopia. *International Journal of Information Technology and Business Management* 15(1): 23-44.
- SOFA Team and Doss C (2011). The role of women in agriculture. *ESA Working Paper No. 11-02. Food and Agriculture Organization: Agricultural Development Economic Division P 47.*
- Solar WR (2010). Rural women, gender, and climate change: A Literature review invited perspectives on climate change impacts and processes of adaptation in Cambodia. Copyright @ Oxfam America, Cambodia.
- Genzebe OD, Ejegayehu KT, Mengistu DH (2016). Gender equality and women's empowerment endeavors in least developed countries to achieve MDGs. *African Journal of Gender and Women Studies* 1(1): 001-015.
- UN-Women Watch (2009). Women, gender equality and climate change. For more information on global UN commitments, resolutions and other Intergovernmental outcomes, UN publications, other resources on UN websites, and UN Events: http://www.un.org/womenwatch/feature/climate_change/
- United Nations Women (UN-Women) (2014). The World survey on the role of women in development 2014: Gender equality and sustainable development.
- Wereda Agriculture Office Report (WAOR) (2013). Delanta Wereda Agriculture and Natural Resource Development Department Office Report. Wegeltena, Ethiopia.
- World Bank (2002). Designing and implementing agricultural extension for women farmers. World Bank, Women and development division; Technical Notes. Washington DC.
- World Bank (2007). Women's economic empowerment for poverty reduction and economic growth in Ethiopia 2006. <http://www.prb.org/datalind>