Journal of Environment and Earth Science
ISSN 2224-3216 (Paper) ISSN 2225-0948 (Online)
Vol.7, No.6, 2017

Sustaining Natural Resources: The Impact of Developmental Agents on Natural Resource Conservation: in the Case of Mertulemariam District, North Central Ethiopia

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Abstract
This study assessed the impact of Development Agents (DAs) in natural resource conservation and challenges they faced. Respondents were selected based on simple random sampling technique. To gather relevant data, tools such as questionnaire, key informant interview, interview and observation were employed. Descriptive statistics with narration was used for data analysis. The result of the study showed that DAs have made great efforts to bring integrated natural resource conservation in the study area. They brought training and advice on natural resource conservation, established seedling nursery sites and seedling provision, construction of physical conservation structures, areal enclosures, plantation and afforestation of hill sides. However, heavy work load, lack of inputs, poor road network, un-sustainability of conservation structures, lack of disciplinary boundaries, low morale, lack of technical follow up and support are the inter-linked and prominent challenges faced DAs in the study area. Finally, the study recommended that provision of in-service training, inputs, frequent follow up and technical support is very crucial. Likewise, increasing the number of DAs and refrain them from extra works is must. Controlled grazing is also vital to sustain conservation structures.
Keywords: Sustainability, Developmental Agents, Natural Resource Conservation and Challenges

Introduction

The wellbeing of people all over the world depends on the various goods and services provided by ecosystems including food crop, fuel, shelter, construction materials, clean air and protection from natural hazards (IUCN, 1998). However, these resources are under increasing pressure from unsustainable use and other threats including absence of conservation.

According to Alemneh (2003), many developing countries like Ethiopia have very direct dependence on their natural resources such as soils, water, natural vegetation and forest. Therefore, the existence of good and productive natural resource is essential requirement for the sustainability of livelihoods in these countries. In spite of this fact, there is great pressure on the use of natural resources. The current way of using natural resource, which consists of drumming from nature with little compensatory inputs, are causing severe depletion on the available resources (MoARD and World Bank, 2007).

Consequently, the international community has given due attention in changing behavior and attitude of people of the world in general through education and training, particularly via environmental education as suggested in the international union for the conservation of nature and natural resources in 1970 (IUCN,1998). Natural resources can be conserved and sustainable development can be brought if it is supported by an educated and informed public (UNEP, 1999). This implies that, education can play great role in shaping decision people make use of natural resources. In this regard, DAs (Developmental Agents), who are teachers of farmers and immediate advisors, can bring a great deal of knowledge to the rural society. They are critical stakeholders in agricultural development and natural resource strategy of Ethiopia (World Bank, 1993; MoARD, 2010).

The government has established farmer training centers (FTCs) to assist farmers and pastoralists acquiring technical skill and knowledge in the management and conservation of natural resources (MoARD, 2010). These centers are staffed with three middle level professionals named as Developmental Agents (DAs), trained in the field of crop production, animal production and natural resource management. They are assigned to give training and advice in their respective field of study to farmers. They are also expected to bring sustainable development in rural Ethiopia through implementing the conservation strategy of the country by mobilizing the rural community at large. Hence, this study was conducted in Mertulemariam District to investigate the practice of developmental agents with respect to natural resource conservation in and examine the challenges DAs faced in carry outing natural resource conservation activities.

Materials and Methods

Description of the Study Area

Mertulemariam district is one of the districts of East Gojjam zone of Amhara region. The capital of the district, Mertulemariam town, is found 195 km from Debre Markos (the capital of East Gojjam zone), 180km from Bahir Dar (regional capital) and 365 km from Addis Ababa. Abay River is a natural boarder separating the district from South Wollo zone (Figure 1). Astronomically, the capital of district, Mertulemariam town, is found

between 10º 50` 00 ``N and 38º 16` 00``.

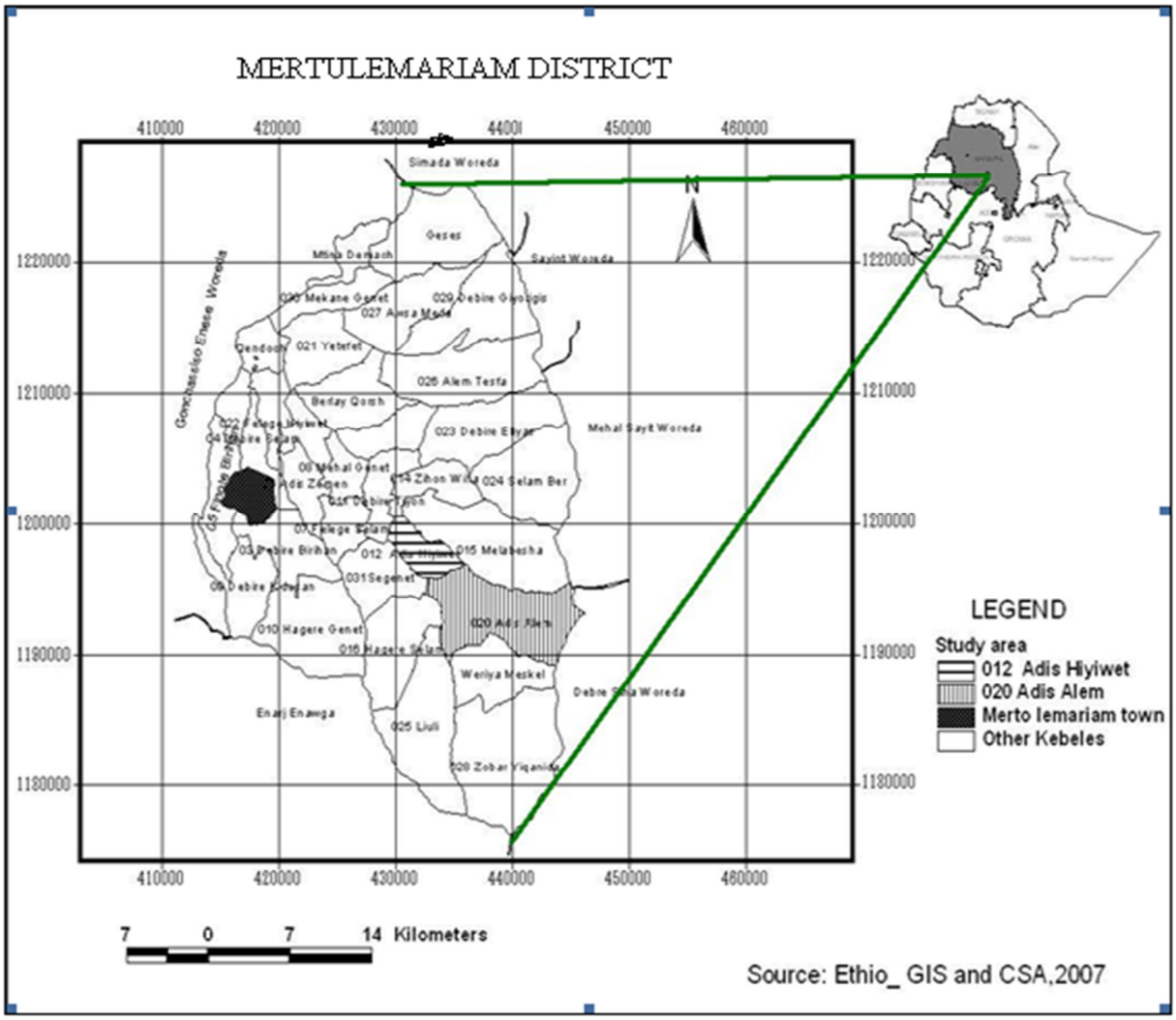

Figure 1 Location Map of Mertulemariam district

The district has very diverse topographic features such as mountains, river valleys, plains, deep gorges and steep sloppy areas. It has undulated and very rugged terrain which accounts about 45% of the total area. Mountains, plains and valleys comprise the remaining 30%, 20% and 5%, respectively. The altitude of the district ranges from 950m.a.s.l. at the bottom of Abay river valley to 3660m.a.s.l. at the top of mount Aba Minyos (ARD Office of the District, 2011).

The highest part of the district has temperate (*Dega*) climate, whereas the lowest parts have tropical (kolla) type of climate. The intermediate areas, which are found between tropical and temperate areas, have subtropical (*Woynadega*) climate. The *kolla* climatic zones owns more than half of the total area (53%), while *Woynadega* and *Dega* constitutes 33% and 14%, respectively (ARD office of the district, 2011). The district has many perennial springs, rivers, and seasonal streams. It has five rivers: Cheye, Guansa, waten, Feres- mada, and Menda. It has two crater lakes called Lie Bahir and Tach Bahir. All rivers of the district which are found in different catchment area finally drain to Abay River.

This study was conducted in two peasant associations (*kebele*) of Mertulemariam district, North Central Ethiopia. The two *kebele* were selected purposely mainly for two reasons. The first reason was familiarity of the researcher to the study area. As the researcher recognizes the socio-cultural conditions of the area, it was easy to collect the required data. Secondly, as low land parts of the area comprise much part of the district, one *Kebele* was selected from tropical areas; and the other from sub-tropical as it covers larger areas of the district next to tropical areas.

Having selected the two *kebele*, the researcher had employed simple random sampling method and sample respondents were selected by applying the principle of proportional sample selection method. Accordingly, of the total 1938 HHs (household heads), 137 sample respondents were selected by taking 7% of the total (Table1).

This was determined by the following formula (Kothari, 2004).

nh = (Nh/N) ×n
Where; nh= sample size of each *kebele*
Nh= total population of each *kebele*
N= total population (i.e. total HHs)
n= total sample size

To carry out this study, both primary and secondary data sources were used. Primary data were collected through household survey questionnaires, key informant interview (formal and informal), and field observations. In this regard, Six DAs were selected from the two *kebele* (3from each) and semi structured questionnaire and interview was employed to them and semi structured questionnaire was employed to sample respondents. Likewise, five ARD officers of the district (natural resource management experts) were interviewed. Five model farmers were selected as key informants. Finally, descriptive statistics with narration was used to analyze data.

Table 9: Sample *kebele* and sample size determination

Sample *kebele*	Number of HHs in each *kebele*	Sample size
Addis-hiwot	940	66
Addis-alem	998	71
Total	1938	137

Source: Field Survey, 2012

Results and Discussion

Farmer-Da Linkage as Path Way to Sustainable Natural Resource Conservation

Natural resource degradation is something not only attributed from unwise use but also because of communities' reckless use of that resource which is rooted from lack of understanding. Farmers' limited awareness about resources conservation has great effect on resource use. Of all respondents, 43.8% respondents replied that they had got training and advice about natural resource conservation. Despite this, few of them replied that the training and education was sufficient. Therefore, their participation in conservation works was insignificant.

The major cause that hinder the participation of farmers on conservation activities were lack of good knowledge and limited awareness about natural resource conservation which is attributed from less follow up and technical advice of DAs. In connection with this most of the farmers claimed as follows:

"Our knowledge is not sufficient and not good. We need training and support from experts. Then by following their advices, we can participate. Our role is to contribute labor. The
experts bring understanding and materials. We can do construction and maintenance works but we have little knowledge."

Most of the respondents agreed upon the fact that DAs were very few in number so that they visited and helped farmers less frequently. As they could not give expertise support and advice to every farmer, DAs preferred to work closely with some farmers who are participant in PADETES (Participatory Agricultural Demonstration Training Extension System). In line with this, some of the respondents said:

"Most of the time DAs spend time in their office, even we have not seen them by chance while they help farmers. Even, when they come to field, they tend to give advice to their relatives and farmers who are member of PADETES. As a result, we are accomplishing both conservation and agricultural farm duties with our consent.''
However, it is understood that there is conflicting idea between farmers on one side and DAs on the other side:*''Farmers sometimes do not want to take part in conference and meetings. Even if they come, they often come too late. Sometimes it is very difficult to work with them", DAs.* In the same manner, Natural resource management officer of the district claimed as farmers disobey DAs in the following way: *"In some occasion farmers are unwilling and do not tag along the advices. The experts need to be tolerant for that matter."*

The issue is reflected on both sides i.e. farmers blame DAs, and DAs in turn blame farmers, then who should be responsible? It is possible to conclude that DAs did not help and give training and advice properly. Asked how often do they visit and assist farmers, most DAs responded that they visited and assisted farmers once in a month. Interesting enough, all DAs responded that they could not give technical assistance and advice to every farmer frequently because of their number. Therefore, they preferred to work closely with farmers who are member of PADETES. Supporting this idea, MoARD and World Bank (2010), stated as there is no strong functional links between DAs and the community and DAs at all levels lack capacity in participatory planning technique related to natural resource.

Table 2: Respondents response on training and advice in natural resource conservation

Attributes	Frequency	Percentage	
Getting training and advice on NRC	Yes	60	43.7
	No	77	56.3
The training and advice was enough	Yes	20	33.3
	No	40	66.7
Problems to participate on conservation works			
Lack of knowledge about NRC		*75	35.37
Shortage of labor		5	2.35
DAs and don't encourage me		*78	36.79
Tenure insecurity		*59	27.83

*Multiple responses Source: Field survey, 2012

DAs and Resource Conservation in the Study Area

Efforts were under way to rehabilitate degraded areas and culminate degradation of resources. Afforestation of the communal hill sides unsuitable for agriculture, provision of seedlings to farmers for private planting, advising farmers about agro forestry practices and construction of soil and water conservation structures in cultivated fields were the major natural resource conservation activities under taken in the present study area. Regarding this issue, Plant science officer of the district said, *"Natural resource conservation is being carried out as part of the extension package (PADETES), the government is employing as a strategy to achieve its five-year growth and transformation plan."*

Asked what their primary task regarding natural resource conservation is, DAs replied that watershed management is the first and foremost activity they have accomplished with respect to natural resource conservation. Through the process of watershed management, the nature of the land is studied first and solution is proposed accordingly. Structural and biological conservation techniques could be done after the survey had made. In some mountainous areas, Plantations on hillsides and structures such as micro basins, eyebrow basins, and hill side terraces were made. Biological conservation techniques such as hedge raw were very little. Even if there is in lesser extent, it was damaged and eaten by animals because of free grazing. Areal enclosure was made in some areas to rehabilitate degraded land. In this regard, the researcher had observed two areal enclosures: Sembereja and Kechnay areal enclosures.

The results of key informant interview show that DAs had used different methods to protect the remaining forests and rehabilitate deteriorated areas. Primarily, they tried to train and advice about use and coverage of forests by comparing the present with the past. Furthermore, with the help of the community, DAs had assigned some individuals to protect forests from illegal cutting. Likewise, DAs had selected Seedling Nursery Site in some areas.

According to Natural resource management officer of the district, Seedling Nursery has been carried out as an important method to rehabilitate deteriorated forest areas and afforest new areas. In this regard, DAs accomplished tasks such as selection and preparation of seeds, selection of vigorous and healthy seedlings, and sowing of seeds on seedbeds.

Challenges Faced DAs in the Study Area

The data gathered through interview, observation and open-ended questionnaire indicates that DAs were working under difficult and disadvantageous conditions. They were working under conditions which foster low morale, lack of mobility and virtually no equipment.

Moreover, despite the presence of the DAs at *kebele* level, each with different expertise, there are no disciplinary boundaries. This is what the researcher understood from the response of the DAs. Supporting this idea, MoARD and World Bank (2007) dictates as, for instance, an animal science DA was obliged to advise on SWC measures and crop specific tasks. Likewise, the DAs were performing other tasks such as collecting taxes, delivering credits, promoting political agenda of the government and the like. This would lead to unclear chain of accountability that often put the DAs to perform difficult tasks and undefined position with communities they serve.

In the study area, the DAs were every small in number. As a result, they could not give technical support to every farmer. This condition led them to work closely only with farmers who were participant in PADETES and pay little attention to farmers who did not participate in PADETES. On the other hand, Farmers unwillingness to conservation works, shortage of finance and lack of knowhow on some conservation technologies were the major problems facing DAs. In this regard, some of the DAs alleged; *"The major*

challenge we face working with farmers is that they keep holding their own interest. Farmers do not believe experts. So, it is very difficult for me to carry out my task."

As interview results made with DAs reflected, sustainability of conservation structures was the very problem to natural resource conservation in the area. Farmers' willingness to maintain and reconstruct the prepared structures was very low. Structures are being dismantled to widen agricultural lands and because of free grazing. Farmers complained that the conservation structures are not suitable or don't allow oxen turn while plowing and consume and fragment their land; and conservation structures are creating favorable conditions for the reproduction of rodents. Moreover, financial constraints were also major factors to carry out conservation activities. Shortage of financial inputs had bound DAs and the community to construct modern conservation structures.

As the community was divided in to beneficiary and non-beneficiary of safety net program, it was challenging to DAs to carry out conservation activities with two separated groups. Beneficiaries of safety net program accomplished conservation works in good manner while non-beneficiary not. It shadowed the interest of farmers to exercise conservation activities by their own interest without food crop incentive in the long run. On the other hand, overlap of other development plans had diverted the attention of DAs to other works than conservation work. The overlap of unscheduled meeting also interrupted the exercise.

Table 3: Challenges facing DAs in conservation works

Problems	Frequency	Percentage
Farmers unwillingness to conservation works	*6	37.5
Shortage of time	1	6.2
Shortage of finance	*5	31.3
Lack of knowhow on some technologies	*4	25

**Multiple response* *Source: Field Survey, 2012*

Conclusion

In the study area, many natural resource conservation efforts have been going on. The DAs have made great efforts to bring the society to sound natural resource conservation activity. They have made their endeavors to conserve soil, water and forest resources by using different techniques. The DAs have made great efforts to bring the society to sound natural resource conservation activity. They have made their endeavors to conserve soil, water and forest resources by using different techniques mainly physical conservation structures such as stone bunds, terraces, contour plowing, eyebrow basins, micro basins and check dams. Likewise, they made selection of seedling Nursery Site, provision of seedlings and planting trees.

However, heavy work load, lack of inputs, poor road network, unsustainability of conservation structures, lack of disciplinary boundaries, low morale, lack of technical follow up and support are the inter-linked and prominent challenges faced DAs in the study area. As compared to some years back, natural resource conservation activities and efforts are encouraging. However, still it needs great integration and collaboration among stake holders.

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