

Non-Governmental Organizations Participation in Environmental Rehabilitation: Lessons Learnt and Identified Implementation Gaps for Natural Resource Conservation in Tigray

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Abstract: Drought and environmental deterioration have historically imposed heavy costs in Tigray. In response, Tigray has made huge efforts in soil and water conservation practices. The main objective of the article is to review and identify the lesson learnt, gaps of natural resources conservation and role of NGOs in environmental rehabilitation. The article utilized a qualitative research approach based on an exhaustive desk review of secondary data sources from different literatures. Moreover, key informant persons are communicated to augment the data obtained from the secondary sources. Based on the collected data and review of the related literatures, discussion, analysis and conclusions are drawn. With unique collective action and volunteer labor, the people of Tigray are restoring land on a massive scale. As a result, soil erosion has decreased significantly; groundwater levels are recharged significantly and this has become a catalyst to ensure food self-sufficiency and rapid economic growth. Despite, the success there is a need for improved coordination and synergy with a wide range of nongovernmental organizations. The study recommends the importance of sustainable participation of **government, community and non-governmental organizations** in natural resource conservation and ecosystem-based solution to environmental restoration can have potential policy implications in natural resource conservation to responds the impact of rapidly growing environmental degradation and impacts of climate changes so as to achieve sustainable development goals.

Keywords: Drought, Soil and water conservation, Synergy, Environmental rehabilitation

1. Background of the study

Land degradation is one of the major causes of low agricultural productivity and poverty in developing countries including Africa, with a considerable impact on the economies of many countries (Veen, 2014). During the beginning of 1980s land degradation has started to attract the interest of policy makers, researchers and different stakeholders (Stocking and Perkin, 1992). Various debates have been made in academic and policy circles about resource conservation approaches Tarekegn (2001, cited in Mekonnen, 2007).

Due to the unwise use of land and water resources different landscapes have been degraded globally. For restoring the degraded landscapes, soil and water conservation intervention plays an inevitable role to sustain environmental and ecological services if properly implemented (Gebremedhin 2017). Resource conservation will only survive if supported by the public, the private sector and a full range of government agencies (McNeely, 1995). NGOs play an important role in natural resource management in developing countries through policy advocacy, expert advice, mobilization of public opinions, representation of the voiceless, service provision, monitoring and assessment, consultation and policy dialogue with policy makers. However, policies are developed with little or no participation of NGOs (Adenew Taffa Aritia, 2018).

In many parts of Ethiopia soil erosion has made cultivation of farmland impossible. Farmers have been forced to constantly cultivate eroded areas. An afforestation programme was started in Tigray in 1971 (Esser et al 2002). During the drought of 1985 in Northern Ethiopia particularly in Wello and Tigray people mainly participated in conservation programme to receive food for survival. From 1988 to 1990, REST² took over the soil and water conservation programs to promote food security, prevent

¹Main areas of interest are civil society, environmental Economics, Project management, climate change mitigation and adaptation

²The Relief Society of Tigray (abbreviated REST, also known as Maret) is an NGO based in Tigray, northern Ethiopia engaging in providing relief efforts to civilians.

environmental degradation and desertification. The program also emphasized the importance of community involvement at all levels of problem identification, planning, implementation and evaluation (Kejela, 1993). Environmental NGOs in Ethiopia are engaged more on reacting to the damage that has been caused by the unsustainable business practices rather than working proactively by collaborating with all concerned stakeholders (Tibebe Sirak Asfaw, 2017).

In natural resources conservation promising good practices are emerging in Tigray. However, a real partnership has not yet been seen due to lack of resources, lack of active local NGOs involvement and lack of ownership of natural resources conservation by local communities. More than ever, local NGOs also need to be able to influence, which is not evident in the region where few NGOs are actively participating. Ethiopia has already started implementing SDGs set to be achieved by 2030. There is a need for meaningful engagement to strengthen local NGO partnership in natural resources conservation to achieve SDGs in Tigray, Ethiopia. This article seeks to enhance the current knowledge base of policymakers on natural resource conservation for grass root active involvement of local communities through local NGOs in combating desertification and impacts of climate changes.

1.1 Description of the Study area

Tigray regional state is one of the nine regional states in Ethiopia located at the northern part of the country and geographically it is located between 14° 10' 0 N latitude and 38° 49' 59 E longitude with an area of 80,000 km² (Mulubrhan, Mitiku and Liang). According to the projected population of 2018, the region has a total population of 5,377,144 (Tigray Region Bureau of Finance and Economic Development, 2018). The livelihood of the people relies on agriculture and rain fed crop cultivation is dominant (Gidey, 2015). The climate of Tigray is semi-arid, dominated by distinctive dry and wet seasons (Meire et al., 2013; Walraevens et al., 2015 as cited by Gebremeskel, G., Gebremicael, T. G., & Girmay, A. 2018).

The average rainfall varies from about 200 mm in the northeast lowlands to over 1000 mm in the south western highlands (Hagos et al., 1999). The dry period over the region extends up to 10 months, and the maximum effective rainy season extends from 50 to 60 days (Zenebe et al., 2013). Variations in rainfall are mainly associated with seasonal migration of the inter-tropical convergence zone and complex topography (Nyssen et al., 2005). The average temperature is estimated to be 18 °C, which reaches approximately 40 °C (Hagos et al., 1999). Four land-use types are identified in the region, including cropland, villages and built-up areas, exclosures and pastures and rangelands (Meire et al., 2013).

Figure 1. Map of study area



Source: Gebremeskel, G., Gebremicael, T. G., & Girmay, A. 2018

1.2 Statement of the problem

Environmental degradation is severe in Tigray, which is threatening many parts of the region (Veen, 2014). Tigray has been hit by recurrent droughts and this has caused severe land degradation, which in turn led to recurrent drought that affected the livelihood of many farmers (Lemessa, 2003). In response to this, huge efforts are made to rehabilitate the environment (Gidey, 2015; Gebremeskel, G., Gebremicael, T. G., & Girmay, A. 2018). The land management practices and vegetation cover have improved in Tigray. However, sustainable soil and water conservation through active participation of local NGOs have not got adequate attention. Synergy among various actors were usually not highlighted in the remedial measures of environmental rehabilitation.

Land degradation taking the form of severe soil erosion and nutrient depletion, is the most serious environmental problem calling for combative action if sustainable agricultural development and environmental rehabilitation is to take place in Tigray (Holden, 2017). To transform the SDGs into active collaboration with domestic and international partners have vital roles. Some international and local NGOs have been involved. Despite these efforts, the financial mobilizations are not adequate. Due to this, most of these successes in Tigray only operate on a small scale and focus on physical conservation. Moreover, there exists a lack of transferring ownership of conserved areas to local communities.

Many studies on the soil and water conservation and the achievements have been reported by many scholars. However, most of the studies were conducted on small catchment scale, none of them have attempted to report the achievements region level. Hence, a general review is important to evaluate the interventions. Thus, in order to make the existing soil and water conservation practices in Tigray region sustainable, it requires investigating the synergy of actors. The current legislation of NGOs that was introduced in 2010 has reduced spaces and for NGOs and tended to reposition most of them as service provide

(Save the children, 2015). Most Ethiopian NGOs are set up by a few individuals and rely on foreign funds. Local NGOs in Ethiopia reflected donor rather than local priorities, instilling the notion that these groups were foreign, not indigenous organizations (Kendra Dupuyabc, 2014). Therefore, the implementation gap lies in creating successful natural resource conservation that requires effective synergy between the public sector, local NGOs and communities which the study seek to address the identified problem.

1.3 Purpose of the research

The overall purpose of the article is to review the roles of non-governmental organizations participation in environmental rehabilitation; lessons learnt and identified implementation gaps for natural resource conservation in Tigray, Ethiopia.

More specifically, the study aspires to:

1. Review natural resource conservation efforts and the lesson learnt for the success in Tigray
2. Investigate the role NGOs for sustainable natural resource conservation in transforming SDGs into action
3. Identify implementation gaps in natural resource conservation
4. Forward policy recommendations in scaling up the best practices in natural resource conservation

2. Review of related literature

2.1 Theoretical literature review

2.1.1 Conceptual Definition of Environmental Stewardship

Environmental stewardship refers to responsible use and protection of the natural capital through conservation and sustainable practices. It is a necessary activity to protect, enhance, and maintain the environment (Arakawa, S., Sachdeva, S., & Shandas, V., 2018). Aldo Leopold (1887–1949) championed environmental stewardship based on a land ethic dealing with man's relation to land (Flader, 1994). Environmental stewardship in community may improve your image, lower costs, and result in a safer work place (Manning, 2004). The natural environment benefits greatly from the work of volunteers in environmental stewardship. The environmental movement would not exist without the help of thousands of dedicated volunteers. Both public and private environmental organizations rely on unpaid volunteers to further the cause of protecting and helping degraded natural environment. Volunteers help to restore ecosystems and participate actively in environmental governance (Ryan et al., 2001).

2.1.2 Theory of change

A theory of change is a tool to help you describe the need you are trying to address, the changes you want to make, and what you plan to do (De Silva, 2014). The approach can be used for organizations of all shapes and sizes from service delivery charities, to campaigning organizations and to funders (Harries, E., Hodgson, L., & Noble, J., 2014). ToC is an approach to developing, implementing and evaluating programmes of development, and has been applied across a wide range of programmatic contexts. ToC as an approach to evaluating community development programmes (Mary, 2014). The idea of the ToC approach seems to have first emerged in the United States in the 1990s, in the context of improving evaluation theory and practice in the field of community initiatives (Valters, 2012).

A theory of change helps to identify solutions to effectively address the causes of problems that hinder progress and guide decisions on which approach should be taken (UN, 2017). Using a common theory of change across projects for supporting conservation enterprises provides the comparative framework for assessing the soundness of assumptions across projects will help inform what works, what doesn't, and under what conditions (USAID, 2017).

The author proposed a theory of change for integrated natural resources conservation, where short-term environmental and socioeconomic benefits will first accrue at the local level. Implementation of improved integrated natural resources conservation and practices at the local level can then be extended through various actors participation that strengthening of innovation systems. Financing and incentive mechanisms at the local level coupled with supporting policies could sustain and enhance ecosystem at even larger scales and longer time spans. The evolving scientific understanding of factors influencing social, technical, and institutional innovations and transitions towards sustainable management of natural resources should be harnessed and integrated into influencing theory of change for complex social, economic and environmental problems of land degradation.

2.2 Empirical literature review

2.2.1 Environmental degradation and its management

Sustainable land management has emerged as an issue of major international concern due to the fact that the degradation of land and water resources is accelerating rapidly in many countries in general and Ethiopia in particular (Mitiku, H., Herweg, K., Stillhardt, B., 2006). The need for soil and water conservation is well known, there is a wealth of experience in the farming communities, but there is an implementation deficit (Ina Porras, 2007). Soil erosion is one of the major challenges of Ethiopia deteriorating the productivity of land and threatening both the economic and survival of the people. Soil and water conservation are the only practice to reverse the threat and protect the land (Gebremichael, 2014).

In Ethiopia, soil and water conservation measures are not only socially accepted and integrated in most farming systems; they are also economically viable from a 30-year. Despite all the successes observed, However, only about 18% of the rained croplands have so far been treated with soil and water conservation measures. If we consider that 77% of the rained croplands have slopes steeper than 8%, there is a need to further apply measures on nearly 60% of all croplands, i.e. nearly 12 million hectares still have to be treated (Zelege, 2018).

Environmental management in Ethiopia is not only closely related to the improvement and conservation of ecological environment, but also to the sustainable development. Efforts towards this conservation goal were started since the mid-1970s and 80s. However, some of the management approaches were successful and other not (Aklilu, 2006; Wogayehu and Drake, 2001; Bekele and Holden, 1998) as cited in (Birhanu, 2014). Soil conservation research in developing countries has changed during the past decade, from a technical-fix approach to an approach where several aspects of land degradation and restoration are brought into focus. It is important that farmers participate in the planning and implementation phases to a greater extent than before. The food-for-work projects organized by REST in Tigray take the participation largely into account. Community involvement is emphasized in the approach taken by REST. Farmers in the region are now quite committed to soil and water conservation not only as a means of getting food aid, but also to reduce land degradation (Esser et al, 2002).

Ecosystem health is directly addressed in several SDGs. With an expanding population and developing economies, the pressure on land has been relentless and has often led to the loss of ecosystem. Thus, conserving natural resources is fundamental to sustainable production in the long term, especially given the vulnerability of agriculture to climate change (Asia Khamzina, 2017). SDG Target 15.3 states by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world through active involvement of stakeholders including local NGOs (UNDP, 2017).

2.2.3 Roles of NGOs in environmental rehabilitation and SDG implementation

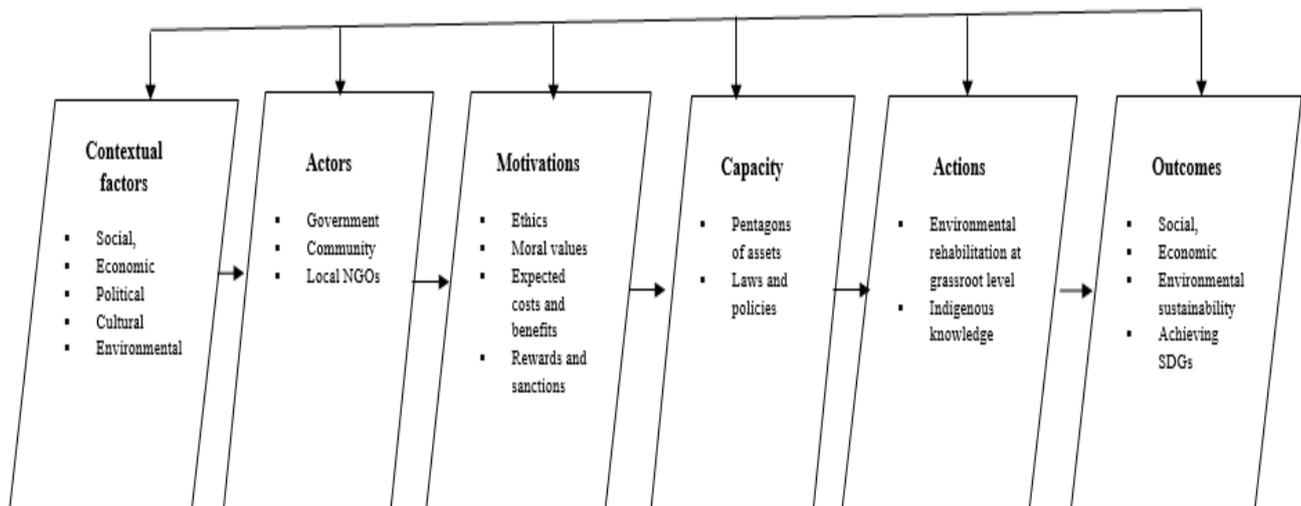
Ethiopia 'government has opened up the agenda of good governance, decentralization and capacity building. This has created a political space for NGOs to work on the issue of community empowerment. On the other hand, the government recently started to revise its own approach to natural resource management at the household level. A number of scholars undertaking research in the field of participatory resource management have emphasized the significance of community empowerment as a pre-requisite for sustainable management of natural resources (Mekonnen, 2007). According to NGO Major Group Forum (2017) SDGs are integrated and indivisible and no goal can be achieved in isolation. Holistic, coherent, multi-sectoral and multi stakeholder response can prioritize the most marginalized groups, adequately protect the environment. NGOs can disseminate information on any progress being made by governments and make policy processes more transparent. NGOs are mobilizing around the SDGs because they see an added value in the universal and integrated Agenda 2030. At the same time, achieving this ambitious global agenda is a tremendous task. To encourage more NGOs to take an active role in SDG implementation, be it through advocacy work or new on-the-ground projects, public as well as private funders will have to increase their financial support (Hege et al, 2017).

Local NGOs need to recognize the role of indigenous knowledge in natural resources conservation, value it and appreciate it in their interaction with the local communities. Before incorporating it in their approaches, they need to understand it and critically validate it against the usefulness for their intended objectives (Mitiku, H., Herweg, K., Stillhardt, B., 2006). Indigenous methods for soil and water conservation are cost-effective (Rajasekaran, 1993). Environmental local NGOs have played a major role in promoting the inclusion and advancement of local knowledge (Dumoulin, 2003).

2.3 Conceptual framework for the study

The conceptual framework presented here is an integrated way of looking at the problem under investigation. Furthermore, it shows the series of action this study intends to carry out. A general conceptual framework could strengthen the ability to understand the factors that lead to the success and failure of soil and water conservation and how to support and enable grassroot level efforts. This study propose framework for local environmental rehabilitation as the actions taken by various actors including government, communities and local NGOs that can support research on natural resources conservation.

Figure 2: conceptual framework for grassroot level environmental rehabilitation



Source: The author based on literature review,2020

The conceptual framework depicts that the contextual factors encompasses social, cultural, economic, political, and biophysical factors that determines which environmental rehabilitation actions will be socially, culturally and politically appropriate and ecologically effective. The different actors across scales of organization who are driving stewardship initiatives. Actors have different actual and desired rights, roles, and responsibilities. Actor characteristics may influence willingness, motivations, and ability to participate in stewardship. Motivation encourages actors to take action to care for the environment. The capacity of actors to take stewardship actions is enabled or constrained by Pentagons of assets and broader governance factors. Pentagon of assets that support stewardship capacity can include social, financial, physical, cultural, political human and institutional capital. Broader governance including institutions (i.e., laws and policies, organizations and networks, and decision-making processes) and structural processes related to power and politics (i.e., economic inequality, discrimination, and exclusion from decision-making) might also empower or constrain the agency, options and capacity of stewards. The stewardship action includes activities, behaviours, and technologies applied to protect, restore or sustainably use the environment. Stewardship actions can occur at different scales, can address issues that are more or less complex, and are taken by different actors based on their characteristics, motivations, and capacities. The outcomes of stewardship can be intended or unintended, produce synergies or trade-offs, be desirable or undesirable, and have differential costs and benefits for diverse actors.

2.4 Literature gap

Many studies on the soil and water conservation and the achievements have been reported by many scholars. However, most of the studies were conducted on small catchment scale, none of them have attempted to report the achievements and lessons learnt at region level. Hence, a general review is important to evaluate the interventions. Thus, in order to make the existing soil and water conservation practices in sustainable, it requires investigating the synergy of actors. Several Studies on environmental rehabilitation in semi-arid areas are conducted on small scale, and do typically not include detailed biophysical components. This study makes a regional level study of environmental rehabilitation in one of the world’s most degraded areas of Ethiopia, Tigray region. The implementation gap lies in creating large-scale adoption of successful natural resource conservation that requires effective synergy between the public sector, local NGOs and communities which the study seek to address the problem.

3. Research Approaches and Methods

The study utilized a qualitative research approach based on an exhaustive desk review of secondary data sources from different literatures on natural resource conservation. Selection of previous published studies were searched using search engines of Research Gate, Google Scholar, Springer databases using relevant key words. Government and UN policy, related legal and policy frameworks documents at both the local and national levels have been reviewed. In addition to this, MA, Ph. D level published theses and dissertations have also been included. The sources of the secondary data include articles, books, websites and seminar papers. Moreover, to substantiate findings of the secondary source of data interview with two directors from Tigray Bureau of Agriculture and Rural Development have undertaken. In collecting the primary data, the author conducted key informant interviews, for an average time of one hour, with two directors of natural resources conservation. The primary motivation for an in-depth structured interview is to obtain to the relevant experiences and knowledge of soil and water conservation success and gaps, trends of soil and water practices and sustainability in relation to soil conservation practices were discussed. In determining the sample size, purposive sampling technique was used to identify possible respondents who

have good experiences and knowledge on natural resources conservation. The author employed narrative analysis to analyse the collected data. Based on the collected data and review of the related literatures, discussion, analysis and conclusions are drawn.

4. Results and Discussion

4.1 Efforts made to combat land degradation and the lesson learnt for the success of natural resources conservation in Tigray

Tigray had been suffering by recurrent drought and food security problems for several centuries (Esser ,2002). For over three decades period of fierce struggle stripped of its green mantle Tigray's land had been naked and it was cutting a deplorable image. It was a place that appeared disagreeable to inhabit. People dependent on agriculture were challenged to live or not to live on their land. The incumbent intends to root out poverty from the whole country once and for all mobilizing the public for action (Reij,2017). The region has succeeded to implement and put in to action world's best policies that combat desertification, land degradation and improve soil fertility. Since 1991, managed to improve soil and water conservation, and fenced off 1.2 million hectares of land to allow plants to regrow. Voluntary labor and involvement of women, men and youths both in physical and biological conservation have been participated. Over 90 million tons of soil and rock had been moved by hand to restore denuded lands extending over 1 million hectares (UNCCD³ ,2017).

Since 1991 the Ethiopian government has been following an economic development strategy known as ADLI. The Tigray region has embarked on resource conservation-based ADLI⁴, focusing on conservation and development of soil and water resources, environmental rehabilitation through area enclosures and tree plantation and the development of small-scale irrigation systems. An integral part of the resource conservation and development effort has been popular participation of local communities (Gebremedhin et al,2000). The perception of land degradation and awareness of the problem among the people as playing an enormous role in not only raising voluntary labor for ecological conversation but also up taking sustainable agricultural practices such as the construction of stone terraces, build stone walls on mountains and hillsides and micro dams, etc. which by large made a remarkable contribution to food self-sufficiency in the region.

Farmers have actively participated in effective ways of reforesting the arid land and building hundreds of large and medium dams. As a result, the volume of groundwater has risen, soil erosion is downsized and people's ability to grow food and gain an income has improved. These effective strategies in environment protection could be exemplary to fight out hunger-related problems in Africa. The success story shows how a region in a climate vulnerable country can find a smart and highly effective way to successfully address climate changes. This is placing Ethiopia firmly on the map as an environmental leader. The people also dedicate 40 days in a year to voluntary natural resource conservational tasks. As a result, lands which previously were ragged and naked have turned to green and fertile. This achievement, first and foremost, benefited the people of the neighborhoods. They become food self-sufficient, the youth starts securing income from beekeeping and other relating agri-businesses. On top of this, the upstream environmental protection activities have prevented soil-erosion while making small streams to revive at downstream. The people have practically shown as barren lands can be turned to forest and farm lands (UNCCD ,2017).

Availability of institutions in terms of grassroots organizations and rules and regulations was a major factor in the positive response to the call for action. Moreover, social networking with neighbors, the clergy, and leaders of grassroots organizations provided the knowledge and information on climate variability and solutions required to conserve the ecology and improve human livelihood. There were no differences in gender division of labor except that women worked half the workload of men in a day. Both men and women played active roles in leadership with regard to mobilization of people, communal work planning and scheduling, conflict resolution and sharing of community products (Kumasi and Asenso, 2011).

4.2 Policy outcomes in natural resources: Tigray's lesson for transforming degraded dry lands to green landscapes

Land degradation has far-reaching impacts, but prevention and restoration can reach even further. Ethiopia's Tigray region earns gold award for natural resources conservation from UN in 2017 for tackling environmental degradation and combating desertification (UNCCD, 2017). Ethiopia's development strategy focuses on food security and accelerated economic growth by conserving land and promoting sustainable agriculture. The combination of collective action, voluntary labor and the

³United Nations Convention to Combat Desertification is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

⁴ Ethiopia's Agricultural development led industrialization is development strategy that aims to achieve initial industrialization through robust agricultural growth and close linkage between the agricultural and the industrial sector.

involvement the rural farming community, the people of Tigray are restoring land on a massive and unstoppable scale. The Tigray region of Ethiopia is now greener than it has ever been during the last 145 years (Chris R., 2017).

A study was carried out over 8884 km² of the Tigray highlands using Landsat series data from 1972, 1984/86 and 2000. Results show that a gradual but significant decline in bare ground (32% in 1972 to 8% in 2000), a significant increase of bushland (25% to 43%) and total forest area from 2.6% to 6.3% and creation of numerous lakes and ponds (Mûelenaere 2014). Based on a 30-year photographs and validated by field investigations Tigray sheet and rill erosion rates have decreased by approximately 68 %, spring discharge are enhanced and vegetation cover has improved (Jan Nyssen, 2008). Repeat photography assessment compared land cover from 1974–75 and 2006 photographs; show that positive changes to vegetation were shown in 85% of landscapes analysed (R. Neil Munro, 2019).

Figure 3: Soil and water conservation



Source: UNCCD, 2017

Figure 4: Terracing in Hawuzen, Tigray



Source: Gebre, 2017

Ethno-engineering is practiced in Tigray region. The potential of these indigenous soil and water conservation practices have very often been ignored or underestimated by researchers, soil conservationists and government staff (IFAD⁵, 1992) as cited in (Esser et al ,2002). The decrease in sheet and rill erosion resulted from changes in crop cover (48 per cent) and conservation practice (29 per cent). The perception of land degradation and awareness of the problem have also played an enormous role in the willingness to contribute labor for ecological conservation (UNCCD ,2017).

Sustainable management and periodic pruning and harvesting of regenerated vegetation have the potential to produce significantly more economic and environmental benefits than just leaving natural regeneration untouched (Chris Reji and Robert Winter bottom,2015). According to UN (2015) Goal 15 states that Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss and Target 3 indicates that by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation neutral world. Tigray contribute to the protection of life and livelihoods in the drylands, and help achieve sustainable development Goal 15 and target 3. Bottom up policy of Tigray region, and the determination and compassionate of Tigray people about land, desert and reforesting drylands, conversely, people can play a key positive role. The conservation of natural resources is based on integrated approach. The specific activities are the result of participatory planning process resources while taking into consideration environmental sustainability; includes soil water conservation measures and reforestation and environmental rehabilitation which has direct impact on improving food security and water security.

Many gullies have been treated and became sources of water for irrigation consumption. Many households stuck to change their life with catchments and watersheds works. In Tabia⁶ Abreha Atsbeha a quiet revolution is occurring. In some areas, creation of enclosure areas and implementation have resulted in water tables rising from 9-meter depth to 2 to 4 meters, making irrigation cost effective. Dried up springs have started flowing again and steams flow for longer while pastured lowlands remain green the whole year. Flooding and siltation of grazing and cropland has all but ceased in the best areas. The conditions in Abreha Atsebha were so bad that the community was to be resettled. However, with assistance and through hard work, the community transformed the catchment area. Dam construction, digging trench bunds and chains of ponds for 'water banking and re-vegetation has resulted in at least 50% of the rainwater being trapped to recharge ground water stores. Some 180 wells have been dug for high value market gardening which produces two to three crops per year, irrespective of rainfall (Rinaudo,2010).

⁵The International Fund for Agricultural Development is an international financial institution and a specialized agency of the UN dedicated to eradicating poverty and hunger in rural areas of developing countries.

⁶A Tabia is the lowest administrative unit comprising usually four - five villages.

The people of Abraha Atsbeha were awarded the UN Equator Prize⁷(UNDP,2012). Today, there are hundreds of other areas comparable to the one in Abraha Atsbeha throughout Tigray, Ethiopia, and the principles of sustainable resource management are spreading like wildfire.

To sum up, the success story of Tigray is highly dependent on the existence of institutions in terms of grassroots organizations and rules and regulations with appropriate sanctions were major factors in the positive response to the call for community action in Tigray. The community was structured and organized into development groups and men, women, and youth associations. These community organizations played a vital role in mobilizing their respective members for compulsory free labor. During communal work, the developmental group leaders, tabia heads, work group leaders, and officials of regional bureau of agriculture were in control of the organization of people and tasks, and ensured that the work was carried out (Kumasi and Asenso ,2011).

4.3 Role of local NGOs for sustainable natural resource conservation: Transforming SDGs plan into action

Ethiopia has commenced the implementation of SDGs which require all stakeholders to engage in implementing. Throughout the SDGs implementation, creating the awareness of stakeholders and promoting their sense of ownership of the SDGs shall remain one major task in the years ahead. Effective participation of stakeholders across the country in the implementation of the SDGs is fairly evident. Increased efforts shall be made to coordinate the stakeholders utilizing the government institutional mechanisms for them to be able to monitor and evaluate the implementation. Government executive organs at all administrative levels implement development plans coordinate stakeholders and engage them in the monitoring and evaluation of the implementation of the SDGs (National Plan Commission of FDRE, 2017).

The importance of public awareness through local NGOs involvement in environmental protection is acknowledged worldwide. Government alone can achieve the objectives of environment protection without individual and public participation which can be achieved only through a network of motivated and dedicated voluntary organizations, like local NGOs(Agarwal, 2008).NGO experts can be used as teachers in public awareness for the community(Aziz, 2012).

NGOs have been participated in rehabilitating the degraded land of Tigray. The Relief Society of Tigray is the one and the boldest organization in restoring the land of Tigray. Under the environmental rehabilitation and agricultural development programs REST was engaged in 22 districts in natural resource management programs (Gebu, 2017).Many foreign NGOs were in Tigray with REST and the DoA, which were funding equipment, tools, and providing technical support, such as the Christian Aid (UK), Community Aid Abroad (Australia), Danish Church Aid, Oxfam, War on Want (UK), Trocaire (Ireland). The DoA introduced community facilitator farmers for dissemination of a wide range of extension messages to the local farming communities(R. Neil Munro, 2019).

Local NGOs in Tigray can play a significant role through undertaking research and publication on natural resources conservation ,conducting education and citizen awareness, innovation and experimenting in areas which are difficult for government agencies to make changes ,providing expertise and policy analysis, solidarity and support to environmental defenders working in collaboration with the government for capacity building and promotion of community participation in environmental awareness and protection and working out at the grassroots level. It is necessary to support and encourage genuine, small, local level NGOs in Tigray which can provide much needed institutional support specific to the local needs.

Local NGOs represent an important element in the political and economic transformation of Ethiopia sought by its people and government and supported by the international donor community(Clark, 2000).Ethiopia's NGO sector changed dramatically following the 2010 implementation of the Charities and Societies Proclamation(Kendra Dupuyabc, 2014). Local NGOs which are non-government-aligned working on non-contentious issues of natural resources conservation can have niche opportunities and a driving force for active mobilization of all stallholders in natural resource conservation.

4.4 Implementation gaps in natural resource conservation

Soil degradation is one of the crucial issues in mountainous areas of Ethiopia which needs collaborative efforts to reduce it. It requires the participation of various actors for its sustainable management. Despite the good progress in combating desertification in Tigray, financial mobilizations are inadequate. Due to this most of these successes in Tigray only operate on a small scale. Moreover, there exists lack of transferring ownership of conserved areas to benefit local communities. Strong attention was paid to building the physical structures of soil conservation. In principle and practice, the biological measures are the cheapest, most easily adoptable and effective measures, but little attention was given. The performance of physical soil and water conservation structures is not adequate for ecological sustainability. Biological measures for soil and water conservation

⁷ The Equator Prize, organized by the Equator Initiative within the United Nations Development Programme is awarded biennially to recognize outstanding community efforts to reduce poverty through the conservation and sustainable use of biodiversity.

work have paramount impact for sustainable soil conservation. The biological measures are an effective method of soil and water conservation, especially since they are low in cost. The gap lies in creating the conditions for large-scale adoption of successful natural resource conservation that requires effective partnership.

Though the natural resource conservation success in Tigray is impressive and have been confirmed by many studies, mobilizing public support due to limited immediate economic benefits from interventions and a misguided approach for recruiting popular support and specific technical challenges with some interventions issues threaten the sustainability of the positive benefits of natural resource conservation

(Mulubrhan, Mitiku and Liang, 2019). Moreover, based on the interview made with two directors in Tigray Bureau of Agriculture and Rural Development, household level practices of the interventions still remain very limited. Almost all practices are implemented in communal land. Without popular household-based adoption, the sustainability of the interventions could be under question. Therefore, it is important to raise awareness on the short and long term economic or livelihood benefits of interventions, so that individual farmers can adopt them.

The findings show that local farmers, government and a few international non-governmental organizations are the main players in the success of natural resources conservation in Tigray. However, local NGOs has so far played only a small role. The gap identified shows a more active role for local non-state actors in soil and water conservation initiatives; is needed for sustainability of the success so far achieved.

5. Conclusion

This study reviewed studies on decades of extensive natural resources conservation practices, implemented in one of, the most ecologically fragile Tigray region that has been repeatedly affected by recurrent drought and extreme weather variability turn around the challenges and rehabilitate degraded land into productive ecosystems. The finding of the study showed that soil and water conservation have been successful in Tigray region. Most of the environmental degraded landscapes are significantly restored. An important lesson learnt is the active participation and the strong commitment of local communities. Despite these achievements, the interventions lack adequate local NGOs participation to sustain the good practices. The identified implementation gaps can inform governments to better integrate local NGOs in the implementation of natural resources conservation and transforming the SDGs in action at regional level.

6. Recommendations

Based on the findings of the study, recommendations dealing with the means and ways of strengthening government and local NGOs partnership for deepening the natural resources conservation practices and up-scaling the success in natural resources conservation are provided below as follows:

The study recommends the importance of sustainable participation in natural resource conservation and the need to explore further conservation strategies and methods. Clearly, a continuous awareness raising efforts through farmers' participation and a follow up process on the proper management and maintenance of the physical conservation is necessary. On the other hand, ecosystem-based solution to environmental deterioration need to be implemented and transfer ownership in conserved areas to local community. Local NGOs at the grass root and grassroots support organizations are important dealing with environment. Wide consultation is required along with funding to assist in natural resources conservation. Improved working systems should be employed for the success of soil and water conservation activities in Tigray.

Local NGOs in community empowerment for natural resource conservation should intensively work on awareness of the land users so that rate of adoption can be improved at household level. Wherever, possible, biological measures such as enclosures, tree and shrub planting and management, agroforestry, strengthening the structures with grass or shrub, etc. should be given priority due to their multiple and sustaining roles. SDGs need unprecedented involvement of local NGOs for cooperation. They have been very active in this process by proposing targets and have thus taken ownership of the SDGs. However, this is much less the case for national local NGOs, which were consulted very little, and do not yet use SDGs to strengthen their actions. SDGs need NGOs, and NGOs need SDGs. Local NGOs are expected to reinforce their actions and consider the indivisibility of SDGs in protecting the environment to be done to the detriment of local populations. Therefore, despite the good lesson in natural resources conservation in Tigray, to fill the gap and to scale up this best experience strong partnership for the achievement of SDGs is highly needed.

To mitigate climate adversaries' countries, remain reluctant on resource mobilization. The climate change negotiation continues to be less productive due to delay and silence on mobilization of financial resources. Ethiopian government is working to mobilize NGOs. Although many development partners support Ethiopia with funding and technical assistance, the geographical coverage of programs is still relatively limited. To achieve synergies between different projects and activities they have to concern the same area. Natural resources conservation cannot happen if the measures are scattered with limited effectiveness.

And thus, the way that public and local NGOs collaborate (States, local authorities, development agencies, private foundations, businesses) seize the SDGs. Local NGOs have a decisive role to play in ensuring the proper functioning of SDGs and natural resource conservation, to hold governments accountable and to raise awareness on issues that have been insufficiently considered.

The approaches presented in this article could serve as a starting point for visualizing and jointly exploring a more integrated approach. Such an approach would help identify potential synergies, win-win solutions and make the SDGs more cost-efficient. The achievements and implementation can provide a good lesson to other areas with similar semi-arid climate and socio-economic status.

For future studies

Satellite Remote Sensing data can be used to assist land rehabilitation efforts in Tigray. It has the advantage of offering large area coverage, large amount of rehabilitated land cover data and retrieving land cover information for remote. Therefore, future studies should integrate historical spatial data to corroborate the achievements of natural resources conservation at regional scale.

List of Abbreviations

ADLI	Agricultural Development Led Industrialization
FDRE	Federal Democratic Republic of Ethiopia
IFAD	International Fund for Agricultural Development
NGOs	Non-Governmental Organizations
REST	Relief Society of Tigray
SDGs	Sustainable Development Goals
ToC	Theory of Change
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
USAID	The United States Agency for International Development

Declaration

Ethics approval and consent to participate

The author needs to accept and confirm the manuscript and agreed to its content and are accountable for all aspects of the accuracy and integrity of the manuscript. The article is original, has not already been published in a journal, and is not currently under consideration by another journal.

Availability of data and material

The dataset(s) supporting the conclusions of this article is (are) available in the Google scholar, JSTOR, Google, UNDP website, world resource institute website and Tigray bureau of agriculture and rural development, Ethiopia and that all publicly available datasets are fully referenced in the reference list.

Competing interests

'Not applicable'

The authors have no competing interests

Authors' contributions

- 1) The Author (Dr. Shishay kiros weldegebriel) makes substantial contributions to conception and design, and/or acquisition of data, and/or analysis and interpretation of data;
- 2) The Authors participate in drafting the article or revising it critically for important intellectual content; and
- 3) The Authors give final approval of the manuscript to be submitted

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