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Environmental Security Factors and Sustainable Natural Resource Management: The Case of Choke Mountain Watersheds, East Gojjam, Ethiopia

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Abstract
Through sound governance, accountable management and sustainable utilization of natural resource and environment takes effective steps towards promoting or creating social, economic, and political stability and insuring the common welfare of the country. This paper assesses the existing environmental security and identified critical environmental concerns or issues on bases of natural resource utilization, management and governance. A cross-sectional survey design was employed in this study. Questionnaire survey, key informant interview, focus group discussion, field observation and secondary data sources, were utilized to generate the data required for the analysis. Both qualitative and quantitative analysis approach, descriptive analysis and analytical technique like chi-square tests were employed to analyze the data.Finding of the study revealed that an environmental insecurity (scarcity of natural resource, conflict on natural resource utilization, migration and unemployment) were occurred in the study area. This insecurity happened mainly because of natural resource utilization problem by the community, natural resource management and governance problem by the government are considered as a secondary and third factors respectively.The common critical environmental concern that threats the sustainability of land and forest resources in the study area, (Choke Mountain) in general includes: Scarcity of agricultural land, soil erosion, deforestation, exact district and kebele demarcation problem and poor land use practices.VSTM analysis model has been employed so as to identify major environmental security factors of each critical environmental concerns or issues. These are: for scarcity of cultivation land the major environmental security factor is population pressure, for soil erosion deforestation and slope of the land, for deforestation free grazing scarcity of cultivation land and high demand of fuel wood, for exact district and kebele demarcation problem population expansion to choke mountain and for poor land use practices absence of reaching land use planning implementation document from regional rural land administration office are the main and important security factors for the occurrence of those listed above critical environmental concerns or issues.
Keywords: Critical Environmental Concern, VSTM analysis, Environmental Insecurity

INTRODUCTION

Environmental security is the current and future availability of goods and services from a healthy environment for humankind and nature. The availability is reduced when there is environmental destruction. Environmental destruction leads to scarcity and scarcity triggers conflict which can develop into violence. Thus, environmental security is vital to human security and well being. Conflict or violence can also be caused by the availability of abundant rather than scarce environmental goods or natural resources. The situation could also be reversed in that, for reasons other than scarcity or abundance of environmental services and goods there is conflict or violence. This conflict or violence can then lead to environmental destruction - as wars often do - and as a result there is scarcity which results in conflict and the cycle continues (IES, 2005).

The Ethiopian economy is predominately dependent on agriculture (Shibru, 2007). It is the major source of employment, revenue, exports earning and livelihood existences. However, mismanagement and improper utilization of the natural resource bases are not only threatening the productive cap city of the land and its resource but also the socioeconomic setting of the country, especially the rural community. The impact of environmental degradation soil degradation, impairment of water retention capacity of forests and soils, the loss of biodiversity, and socioeconomic problems like the loss of income, poverty and the inequitable development among rural communities. Today the natural resources base (land, water forest, wildlife and biodiversity), which is the basis of Ethiopia's economic development and food security is under intense pressure from population growth and inappropriate traditional farming and management practices. The livelihoods of the farming communities that provides over 85 percent of the total employment and foreign exchange earnings and approximately 47 percent of the GDP are facing severe constraints related to intensive cultivation, overgrazing and deforestation, soil erosion and soil fertility decline, water scarcity, shortage of livestock feed, and fuel wood crisis. These factors often interact with one another resulting in a reinforcing cycle of "poverty, food insecurity and natural resources degradation trap". This natural degradation triggered to social instability or conflict(Shibru, 2007). .

The Choke Mountains is considered as one of the Ethiopian Biodiversity Hot Spot. The Biodiversity in this geographic region is highly threatened, the vegetation cover and the soil are degraded and the fertility is depleted today grazing land scarcity and reducing of water quality because of long history of human settlement and the ever-mounting population pressure. There is also abject poverty and the opportunities for alternative livelihoods are in a continuous downward spiral. The flood incidences of 2006 which were triggered by the relatively higher spell of the summer rains is an indication that a threshold beyond which the vegetation cover can help in the percolation of the water to the ground has been surpassed (Belay ,2007) hence, proper management of mountain resources and socio-economic development of the people deserves immediate action.

MATERIALS AND METHODS

The study site

The study site Choke mountain watershed is located approximately between coordinate $10^0$33'06" to $10^0$50^0'24" and 370 42'36" to $37^0$58'24". Topographically, the watershed lies in the altitudes range of 2100 to 4413 M.a.sl. As a result of these altitudinal variations, about 27%, 82% and 9.7% of the watershed is found in W/Dega (Midland) Dega (highland) and Wurch (Hail) traditional agro ecological zones respectively. The watershed is found interiorly in Eastern Gojjam Zone wereda such as Bibugn, Debay Telatgin, Gozamen, Hulet Eju Enessio, Machahkel, and Sinan. Specifically, the study was conducted into two kebele of two woredas, namely, Shewa kidanemiharet from Sinan woreda and Sheme from Debbay Tilagin.

Data Type and Sources

The data was employed qualitative and quantitative research methods combined in a creative and logical manner so as to fully capture pertinent information to address the research agenda .The mixed approach of this kind can potentially overcome the pitfalls of using single research method and help to take their complementary.

The research used both primary and secondary data sources Primary data was generated through questioner interview, focus group discussion, key informant interview, filed observation and transect walk or photograph. Whereas secondary data was collected from internet, archives, research journals, document files, different reports and proceedings and books.

Data collection tools

Modified ESAF methodology was the primary tool for data collection process .The Environmental Security Assessment Framework (ESAF) developed by FESS was one Of the first attempts to create a comprehensive methodology that encompasses the necessary variables in a systematic, yet flexible and adaptive, manner. For this purpose, with support of the ESAF methodology, the researcher also incorporated the following procedures to find/collect data.

Interviews with farmers was carried out at village level using a combination of participatory rural appraisal(PRA) techniques including semi structured interviews, key informant interviews ,focus group discussion ,transect walks and filed observation and photographing. The objectives of the informal diagnosis was to obtain first hand information on specific issues such as age category, natural resource asset, scarce resources, abundance, utilizations, management and governance of natural resources, critical environmental concerns and environmental security factors of the area.

Key informant interview (KII)

At the kebele level, elderly people aged more than 30 who have sufficient knowledge about the area and are able to memorize the historical environmental conditions or trends and experts with environment and natural resource and agriculture background in the kebele and government officials were interviewed.

Focus group discussion (FGDs)

Community-based focus group discussions that helped us capture community perceptions of natural resource, degradation, management, utilizations and governance. One focus group discussions were carried out within each kebele, each group involves 8 individuals. To guide the discussion, semi-structured checklist was designed on a wide range of issues such as farmers' knowledge about natural resource; environmental problems, natural resource management, utilizations and critical environmental concerns, conflict on the utilization of natural resource, their expectation from the governmental to tackle the environment related problems; and others.

Field observations and photographs

During field surveys, transect walks down the PAs on farms was carried out with the guidance of the kebele chairman leading the team, including voluntary farmers, an enumerator, a development worker and the researcher. In so doing, the field surveyors take notes on specific observation in advance, if any, during field visits and walk-through. Pictures on some important observations was taken to support the qualitative information like serious environmental degradation, critical environmental concerns and environmental security factors impacts on environment and others.

House hold survey

Detailed information was derived through survey from sampled households. Semi-structured interview schedules were prepared to collect qualitative data on major specific issues knowledge of natural resources, management,

utilization and critical environmental concerns and environmental security factors.

The survey was conducted by experienced enumerator (DAs) who was volunteer to take in advance a three days training session on techniques of households survey questioner administration. After the training the questionnaire was pre-tested in both PAs on four sample households for the following major purpose(1) to check whether it can capture the required information or not,(2) to evaluate the enumerators' skills on house hold survey questionnaire administration.

Method of Data analysis and presentation

The collected data was analysis by the support of modified environmental security analysis frame work (ESAF) developed by foundation for environmental security and sustainability to identify the critical environmental concerns of Shewa kidanemehert (Sinan) and Debayilatign (Shime kebele).

For quantitative information, latest versions of statistical programme for social science (SPSS) were used as a help in the overall process of data management and analysis.

Descriptive statistics like; percentage and frequency tables are amongst the methods used to analyze the data for the study. In addition to that Chi Square was run as part of quantitative analyze tool. Findings from the primary and secondary data were compared with the findings of focus group discussion and key informant interviews using descriptive statistics as data triangulation.

The chi-square test was used because of the following reasons: firstly, the data is randomly selected, secondly, all samples are independent, and thirdly, the group is greater than 10 (Kothari,2004).To understand or analyze, the frequency variation between Sheme and Shewa kidanemhert like: sex, age, education, marital status, educational level, family size, source of income, landowning, land utilization, topography, soil erosion, natural forest availability and utilization, natural resource scarcity and abundance, and natural resource utilization conflict.

Qualitative information recorded on notebook from FGDs, conversations with key individuals and interviews was organized and constructed coherently and analyzed on the basis of thematic analysis.

For environmental security factors, vulnerability/stressor/threats/mitigator (VSTM) analysis model for environmental security factors were used.

VSTM analysis model (table)

Contributing factor:						
VSTM	**ECONOMYY**	**TECHNOLOGY**	**GOVERNACE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (inherent/existing)						
Stressors (existing)						
Threats (potential)						
Mitigators (existing and potential)						

Source; VSTM analysis model taken from PAES and FESS, 2004, see the full description at appendix.

VSTM analysis*:* Chart key problems affecting the CCC by examining each contributing factor and determining its nature and origin. For the purposes of this exercise, a ***vulnerability*** is a condition inherent to the problem and not likely to be mitigated in the short- to medium-term by external actions (e.g., geographic location, average precipitation, economic dependence on natural resource base). A ***stressor*** is an existing condition that causes stress or pressure (e.g., harmful agricultural practices, high unemployment, and poor governance). A ***threat*** is a potential event or shock that may occur in the future (e.g., natural hazard, economic collapse, labor strike). A ***mitigator*** is a condition or event that alleviates the negative impact of these factors to some degree (e.g., economic or government programs to address an issue, improved technologies, migration). Each component will be placed in a column that best describes its nature (Economic, Technological, Governance, Natural, Social, or others to be determined).

RESULTs AND DISCUSSION

Source of Environmental Insecurity

The summarized bar graph tells us about source of environmental (land and forest) insecurity. Majority of respondents from Sheme and Shewakidanemhert, reported that, natural resource utilization by community(production on steep slopes and fragile soils with inadequate investment in soil conservation or vegetative cover, erratic and erosive rainfall patterns, declining use of fallow, limited recycling of dung and crop residues o the soil, limited application of external source of plant nutrients deforestation and overgrazing (ILRI,2000) is the major factor next to natural resource governance or administration and management problem by community.

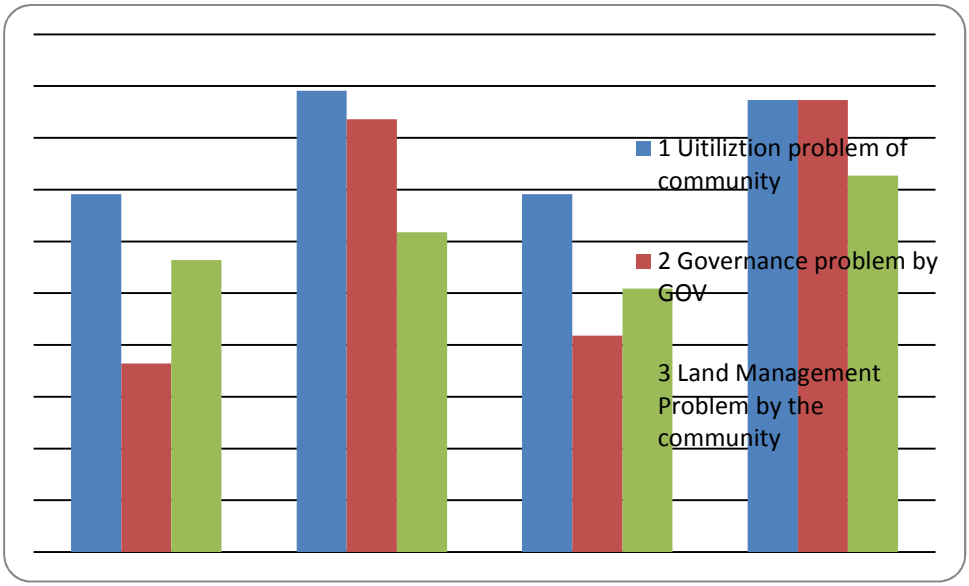

Figure 3.Source of forest and land insecurity,Source: computed from own survey data, 2011

N.B Respondent **s** means (Respondants from Sheme and Respondants **k** means respondents from Shewakidanemhert.

ENVIRONMENTAL SECURITY FACTORS ANALYSIS FOR EACH CRITICAL ENVIRONMENTAL CONCERN

Scarcity of Cultivation Land VSTM analysis

CONTRIBUTING FACTOR: Population pressure						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)					Traditional out look(having a child is considered as an asset	
Stressors (existing)					Awareness problem to family planning, Increase un-employment	
Threats (potential)					Conflict ,migration, drought	
Mitigators (existing and potential)	Diversify livelihood system	Use family planning	Apply development program(use cheap labor for industry)		Use family planning	

Soil Erosion VSTM analysis

CONTRIBUTING FACTOR: 1.Deforestation						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)	Dependence on natural resource base					
Stressors (existing)	-Free grazing -High fuel wood demand			Climate change		
Threats (potential)				climate change, loss soil nutrient, flood, soil erosion, Desertification	-Drought	
Mitigators (existing and potential)		Use improved stove			Control free grazing	Re-afforstation

CONTRIBUTING FACTOR: 2.Slope of the land						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)				Nature of the topography		
Stressors (existing)	Traditional farming Over cultivation free grazing	-lack of conservation practice				
Threats (potential)	Reduced productivity			Soil erosion by flood	Drought	
Mitigators (existing and potential)		Terracing Cut of drain	Use appropriate land use planning			

Deforestation VSTM analysis

CONTRIBUTING FACTOR: 1.Free grazing						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)			Demarcation problem Poor land use planning			
Stressors (existing)	Increase livestock population					
Threats (potential)				Deforestation Desertification Soil erosion Drying of rivers and streams	drought	
Mitigators (existing and potential)			Apply land use and demarcation			Keep and feeding Control utilization

CONTRIBUTING FACTOR: 2.Scarcity of cultivation land						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)				Limited amount of cultivation land		
Stressors (existing)	Increase human population pressure					
Threats (potential)	Deforestation (so as to get cultivation land)				Famine Migration	
Mitigators (existing and potential)	Change livelihood system of communities		Planting industry			

CONTRIBUTING FACTOR: 3.High demand of fuel wood						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNACE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)					Population pressure	
Stressors (existing)					Increases consumption of fuel wood	
Threats (potential)				Deforestation		
Mitigators (existing and potential)		Use improved stove Use biogas				

Exact District and kebele demarcation problems VSTM analysis

CONTRIBUTING FACTOR: population expansion to choke mountain						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)			Absence of demarcation that separate choke mountain from the surrounding district			
Stressors (existing)	Increase utilization of natural resource(grazing, forest resource, cultivation, settlement		In effective land distribution(1989) Accountability problem by district and kebele land administration office.		High population pressure Traditional story by communities("lame ena nib bewlchebet wella tigebalech and chokew yegara new"	
Threats (potential)	Decline productivity of mountain			Deforestation Soil erosion Change micro climate Desertification	Long lasting Conflict among district and kebele	
Mitigators (existing and potential)		Demarcation of choke mountain alone from the surrounding district and kebele which as a property of government not to community				

Poor land use practice VSTM analysis

CONTRIBUTING FACTOR: Absence of reaching land use planning implementation document from regional office						
VSTM	**ECONOMY**	**THECHNOLOGY**	**GOVERNANCE**	**NATURAL**	**SOCIAL**	**OTHER**
Vulnerabilities (Inherent/existing)			Lack of commitment and accountability from regional and district rural land administration office.			
Stressors (existing)			Lack of skilled man power from district level		Farmers poor awareness on land use	
Threats (potential)	Planting eucalyptus tree on productive land Illegal use of mountain beyond60 degree slope for cultivation land, grazing and settlement purpose.				Conflict among farmers who want to utilize his/her land e.g. eucalyptus tree, here the owner of adjacent land forcefully again he/she change the productive land in to eucalyptus tree.	
Mitigators (existing and potential)			Apply the Federal Democratic Republic of Ethiopia rural land administration and land use proclamation through extensive and inclusive communication with regional, district and kebele leaders.			

CONCLUSION

The study was undertaken in Choke Mountain in East Gojjam zone, North Western Ethiopia to explore or assesses an environmental security and sustainability on the basis of natural resource utilization, management and governance.

The local level environmental security assessment was conducted on both kebeles (Sheakidanemhert and Sheme).This assessment result tells us that there were environmental (natural resource) insecurity problems on forest and land resources. Some of the symptoms of environmental insecurity include the conflict between Showakidanmehert and Sheme and with the neighboring woredas and kebeles on the utilization of natural resources particularly because of scarcity of agricultural land, grazing land and forest resources (fuel wood) which resulted them to migration and unemployment.

Condition of environmental insecurity arise when severe environmental stress or scarcity becomes a threat to individuals, community, or national welfare and survival (IGAD-FESS ,2009).Source of environmental (land and forest) in security problems are; natural resource utilization by the community which is the major and the first problem (production of steep slope, inadequate investment in soil conservation, erratic and erosive rain fall patterns, deforestation problems) and natural resource governance by the government and management problem by the community are the second and the third factors for land and forest insecurity respectively.

Environmental security factors (which are discussed under VSTM analysis model) for each critical environmental concerns or issues are: : for scarcity of cultivation land the major environmental security factor is population pressure, for soil erosion deforestation and slope of the land, for deforestation free grazing, scarcity of cultivation land and high demand of fuel wood, for exact district and kebele demarcation problem population expansion to choke mountain and for poor land use practices absence of reaching land use planning implementation document from regional rural land administration office are the main and important security factors for the occurrence of those listed above critical environmental concerns or issues.

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