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Population Growth and Land Resources Degradation in Bantneka Watershed, Southern Ethiopia

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Abstract
The study was conducted to examine the effects of population growth on land resources degradation in Bantaneka watershed, Southern Ethiopia. For the study, both secondary and primary data were used. The secondary data were collected from population data of 1984, 1994, 2004, 2007 and 2010. While, the primary data were collected through survey questionnaire, semi structured interview, field observations and focus group discussions. Questionnaire survey was conducted on 60 samples of farming households which were selected from upper, middle and lower part of the watershed. The study result revealed that both population number and density was increased from 1984-2010, and the average landholding size per households has decreased from 0.68ha in 1994 to 0.48ha in 2007. Due to high population growth, agricultural practices have expanded into upland and marginal areas, and clearing of indigenous trees has become prevalent. Thus, the existing population growth puts pressure for land resources degradation in the study watershed.
Keywords: population growth, degradation, watershed

1. Introduction

Several studies in Ethiopia have disclosed that deforestation, over cultivation, expansion of cultivation on marginal and steep lands, and overgrazing enhanced by the rapidly increasing population have been the causes for serious land resource degradation (Lakew et al., 2005; Fock and Cao, 2002). Similarly, Young (1989) and Aklilu (2006) argued that there is a causal link among population increase, limited land resource, poverty and land degradation. In line with this, Berry (2003) reported that the loss of land resource productivity in Ethiopia is due to the continued population growth. The shortages of land with very high density of population are believed to intensify land degradation in the form of soil erosion, loss of vegetation, drying of rivers and loss of biodiversity. Again, it is believed that upstream land and water management inevitably has impacts on the downstream environment, not only on the quantity and quality of water flows, but also on other environmental services such as biodiversity, carbon sequestration and natural disaster (such as flooding and draught) vulnerability reductions (Darghouth et al., 2008). In parts of the study area, a study conducted by Bogale (2007) in Gedeo Zone reported that natural forest has declined from 1.1 % in 1986 to 0.6 % in 2006. Land under little vegetative cover is subject to high surface runoff and low water retention. The increase of runoff causes sheet erosion to intensity and rills and gullies to widen and deepen (Woldeamlak, 2003). Therefore, this study aims to examine the effects of population growth on land resources degradation in Bantaneka watershed, Southern Ethiopia.

2. Materials and Methods

2.1 Study area

The study was carried out in Bantneka watershed, Southern Ethiopia which is found in the Eastern Escarpment of the rift valley. Specifically, it is located between the coordinates of 6° 23' - 6° 25' N latitude and 38° 18' -38° 22' E longitude. Its altitude ranges between 1750-2200m above sea level, and covers about 574hectars of land. The watershed has annual average of 1300mm rainfall and 21^0C temperature. The main soil type includes Dystric Nitosols, Eutric Nitols and Luvic phaeozems. The area is characterized by undulating topography and coffee with enset form of old age indigenous agroforestry systems (Tadesse, 2002; SLUF, 2006; Bogale, 2007; Abiyot et al., 2013). Main cultivated crops including maize, bean and root crops, and perennial crops including coffee, enset and fruits such as banana, avocado and mango are some of the agricultural crops in the study watershed.

2.2 Data collection and sources

For the study, both secondary and primary data were used. The secondary data were collected from population data of 1984, 1994, 2004, 2007 and 2010. Population data of 1984, 1994 and 2007 were obtained from central statistics authority (CSA, 1984, 1994 and 2007) where as population data of 2004 and 2010 were projected from 1994 and 2007 respectively. While, primary data were collected through survey questionnaire, focus group discussion, field observation and semi structured interview.

Questionnaire survey: - Closed and open-ended questionnaire were used to collect primary data. The questionnaire was distributed for 60 sample households which were selected from the upper, middle and lower part of the watershed. The samples were selected using simple random sampling method.

Focus group discussion: - A total of three focus group discussions having a group member of seven were conducted from the upper, middle and lower part of the watershed. Male and women elders were selected for focus group discussions.
Field observation: - The study also gathered information from direct observations via transects walks in various parts of the watershed.
Semi structured interview: - Interview were conducted on village elders and experts. A total of 9 elders and 6 experts were interviewed.

2.3 Data analysis

The collected data was analyzed using both quantitative and qualitative methods. Descriptive statistical analysis was used to analyze quantitative data which were collected from demographic data and questionnaire survey. Data that have been gathered through focus group discussions, field observation and semi structured interview were discussed in relation to quantitative data. The quantitative data were analyzed using SPSS v.16 software.

3. Results and Discussion

In the study area, population number and density were increased (Table 1 and 2). The population density in 2007 was 2767 persons/km^2 which is extremely higher than the national population density of 67 persons/km^2. Due to these, agricultural practices have expanded into upland and marginal areas, and clearing of indigenous trees has become prevalent. Having the problem, the annual growth rate was increased from 1.2% (1984-1994) to 2.6% (2007-2011) (Table 1). The result of this study is similar to a study conducted by Temesgen et al. (2014) in Dera District, who reported that both population number and density were increased from 1984 to 2011. High population growth has led to enlarged requirement for water, food, wood fuel, fodder and land for settlement, which has subsequently put pressure on land, water and forestry resources (Wamalwa, 2009). According to Belay (1995), the growth of population beyond the carrying capacity has led to sever degradation and impoverishment of the land resources and rapid disintegration of the ecological and social conditions in many parts of the under developed areas. He also argues that in Ethiopia, the expansion of agriculture as a result of the ever growing population especially towards the steeper slopes has accelerated soil erosion.

Table 1: Population number and growth rate in the watershed

Kebeles in the watershed	Total population in number					Annual growth rate (%)			
	1984	1994	2004	2007	2010	1984-1994	1994-2004	2004-2007	2007-2010
Andida	3800	4334	5826	6056	6532	1.4	3.4	1.3	2.6
Gola	4340	5281	7081	8111	8750	2.2	3.4	4.8	2.6
Sisota	5109	5233	6784	6998	7318	0.2	2.9	1.0	1.5
Total	13249	14848	19691	21165	22600	1.2	3.3	2.4	2.6

Table 2: Population density (person/km^2) in the watershed

Kebeles in the watershed	1984	1994	2004	2007	2010
Andida	500	570	768	796	859
Gola	542	659	884	1013	1093
Sisota	696	713	953	958	1002
Total	1738	1942	2605	2767	2954

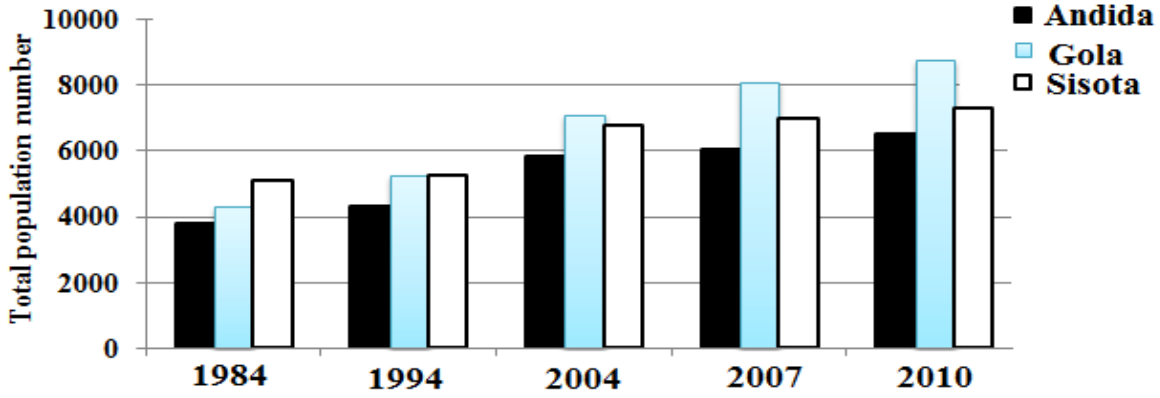

Figure 1: Population growth in the watershed

As a result of high population growth, landholding size per households has decreased from 0.68ha in 1994 to 0.48ha in 2007 (Table 3). Deforestation, decline of soil fertility, local climate variability and change, wildlife reduction, gully formation, drying of springs and stream, problem of water quality and water quantity during dry seasons are some of the significant biophysical changes due to the effects of population growth in the study watershed. Again, due to population pressure which comes from the growing population, indigenous trees such as *Wanza (Cordia Africana), Zigiba (Podocapus falcatus), Dokma, Birbira (Milletia ferruginea), Yeabesha Tid (Juniperous procera), Tikure Inchet (Prunus africanas), Bisana (Croton macrostachys)* and *Sesa (Albizia summitera)* were degraded in the watershed. In this regard, Tilahun et al. (2001) argued that declining vegetative cover and increased levels of farming on steep slopes in Ethiopian highlands is associated with population pressure have eroded and depleted soils in the area, so that soil degradation is now a widespread environmental problem. Similarly, a study by Fantaw (2007) in the South-eastern highlands of Ethiopia depicts that clearing of forests and their subsequent conversion into cropland reduces the soil C content and increase erosion rates. Shibru (2010) also argues that deforestation accelerated land degradation in many ways. Firstly deforested land is easily susceptible to erosion; both wind and water, and hence cause a considerable nutrient movement. Secondly the amount of litter that could have contributed for maintaining the soil organic matter is considerably reduced. Thirdly deforestation in the highlands caused lack of fuel wood, and hence farmers use manure and crop residue for fuel rather than using as soil fertility replenishment.

Table 3: Landholding size in the watershed

Kebele in the watershed	Total area/ (ha)	1994		2004		2007	
		No. of HHs	landholding size (ha)	No. of HHs	landholding size (ha)	No. of HHs	landholding size (ha)
Andida	760	1042	0.72	1393	0.57	1447	0.53
Gola	800	1165	0.68	1557	0.51	1783	0.49
Sisota	730	1135	0.64	1517	0.48	1564	0.46
Total	2290	3342	0.68	4467	0.52	4794	0.48

4. Conclusion

The rapidly growing population of the study watershed result the reduction of farm size and expansion of agricultural practices into upland and marginal areas. In addition, due to improper utilization of the land by the rapidly growing population, the productive potential of natural resources such as forest, soil and water were lowered. Thus, introducing and further expansion of family planning and off-farm activities will alleviate the problem. Furthermore, integrated watershed development will conserve natural resource degradation.

Reference

Abiyot L, Bogale T and Axel B (2013). Indigenous agroforestry knowledge transmission and young people's participation in agroforestry practices: The case of Wonago Woreda, Gedeo Zone, Southern Ethiopia. Avhandlinger og rapporter/Theses and reports, Februar 2013.

Aklilu A (2006). Caring for the Land: Best practices in soil and water conservation in Beressa watershed, highlands of Ethiopia. Thesis Wageningen UR–with ref. – with summary in English and Dutch.

Belay T (1995). Population pressure and problems of arable land degradation in Ethiopia: Integration of population, environment equitable and sustainable development issues into the curriculum of the demographic training and research center of the institute of development research at AAU. Aklilu Kidanu (ed). pp33- 53.

Berry L (2003). Land degradation in Ethiopia: its impact and extent in Berry L, Olson J. and Campbell D (ed): Assessing the extent, cost and impact of land degradation at the national level: findings and lessons learned from seven pilot case studies. Commissioned by global mechanism with support from the World Bank.

Bogale T (2007). Agroforestry practices in Gedeo Zone, Ethiopia; A Geographical Analysis. Ph.D Thesis, Panjab University, Chahdigarh, India.

CSA (1984, 1994 and 2007). Summary and statistical report of population and housing censes. Federal Democratic Republic of Ethiopia Census Commission, Addis Abeba. Central Statistics Authority.

Darghouth S, Ward C, Gambarelli G, Styger E and Roux J (2008). Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up. The World Bank, Washington, DC.

Fantaw Y (2007). Soil properties in relation to topographic aspects, vegetation communities and land use in the South-eastern Highlands of Ethiopia. Ph.D thesis, Swedish University of Agricultural Sciences.

Fock A and Cao W (2002). Small watershed rehabilitation and management in a changing economic and policy environment.

Lakew D, Carucci V, Asrat W and Yitayew A (eds) (2005).Community Based Participatory Watershed Development: A Guideline. Ministry of Agriculture and Rural Development, Addis Ababa.

Shibru T (2010). Land Degradation and Farmers' Perception: The Case of Limo Woreda, Hadya Zone of SNNPR, Ethiopia. MSc thesis, Addis Abeba University, Addis Abeba.

SLUF (Sustainable Land Use Forum) (2006). Indigenous agroforestry practices and their implications on sustainable land use and natural resources management: the case of Wonago Woreda. Report No 1. Addis Ababa, Ethiopia.

Tadesse K (2002). Five Thousand Years of Sustainability? A case study on Gedeo land use (Southern Ethiopia). PhD Thesis. Wageningen University.

Temesgen G, Amare B and Abraham M (2014). Population dynamics and land use/land cover changes in Dera District, Ethiopia. Global Journal of Biology, Agriculture and Health sciences. 3(1):137-140.

Tilahun A, Takele B and Endrias G (2001). Reversing the degradation of arable land in the Ethiopian highlands. Managing Africa's soils No. 23. International center for research in agro forestry. pp1-20.

Wamalwa I (2009). Prospects and limitations of integrated watershed management in Kenya: A Case Study of Mara Watershed. Lund University. Sweden.

Woldeamlak B (2003). Towards integrated watershed management in highland Ethiopia: the Chemoga watershed case study. Tropical resource management papers, No.44. pp 1-163.

Young A (1989). Agro-forestry for soil conservation, International Council for Research in Agroforestry, Narobi, Kenya.

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