

Environmental implications of Universal Rural Road Access Program (URRAP) roads in Southwestern Ethiopia: The case of Jimma and Buno Bedelle zones

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Abstract

Ethiopia has been undertaking numerous development programs and projects with the objective of taking a country to the middle-income countries in the near future. Universal Rural Road Access Program (URRAP) roads being constructed in Jimma and Bunno Bedele zones are among the projects in Ethiopia. Although these projects are assumed to bring desirable positive change, there are sometimes negative consequences on environmental issues. Accordingly, the objective of this study was to investigate the negative sides of these projects on environmental elements. Household survey with randomly selected household heads and in-depth interview, focus group discussion (FGD) and observation for purposively selected samples were used to collect relevant and required data. Thereby, data were analyzed quantitatively by using Statistical Package for Social Sciences (SPSS) and qualitatively through thematic method. The findings from the analyzed data show that rural roads being constructed by URRAP have both positive and negative impacts on plant species, bird species, reptile species, mammal's species, amphibians' species, soil, and climate. Finally, URRAP is in dilemma and needs an extensive and frequent supervision, monitoring, inclusive, interdisciplinary and sound strategies and policies by responsible bodies at all expected levels and contexts.

Keywords

Dilemma, Development, Environmental issues, Ethiopia, Universal Rural road

INTRODUCTION

Physical infrastructure like road is often indicated as a key input to economic growth both in developed and developing countries (World Bank, 1994; Roberts et al., 2006; Karani, 2007). The world governments have a set vision to make public, economic and social services physically more accessible to all the people: rural and urban (ERA, 2012; Arethun and Bhatta, 2012). There remains a critical need to provide rural communities with transportation infrastructure and services that ensures permanent accessibility to social and government services (Porter, 2003); reduces the physical costs of access to resources and markets (Lulit, 2012); provides economic and business services (Jacoby, 2000), decreases poverty (Allport and Anderson, 2011; Bryceson et al., 2008); creates better opportunities for employment (Karani, 2007); and helps in income generation (Vandana and Potter, 2008; Willis, 2013; Asher and Novosada, 2017).

Historically, in Ethiopia road, there were constant flows of passengers, animals or erosion in the past regimes, though there was a commencement during the Italian occupation (Tarekegn, 1987; Bahru, 1991; Keller, 2005). In other words, Ethiopia has the lowest road density in the world, which is even far below the average African standards (Arethum and Bhatta, 2012). Currently, with its more than 100 million, the second-most populous country in Africa, it has been undertaking rapid expansion in road infrastructure (CSA, 2015). It is alleged that the fundamental causes of poverty, isolation, powerlessness, vulnerability, unemployment, and high income inequality particularly in rural parts of Ethiopia is the result of insufficient and also unequal access and custody of road (Escobal, 2005; Wondemu et al., 2012; Stifel et al., 2012). Consequently, after 2010, the government has launched a new Universal Rural Road Access subprogram to address the rural accessibility and connectivity (ERA, 2012). The effects of roads tend to be complex and also very context specific, and therefore hard to presuppose a direct relationship between road development and economic growth, as the conditions under which road development will lead to positive economic growth outcome are not sufficiently specified. Tighes (2008) also argue that transport development may also bring in its wake, the problem of environmental degradation.

Ethiopia has several major ecological systems that support varied plant and animal species (Fikadu and Melesse, 2014). It is a country with great geographic diversity like rugged mountains, flat topped plateaus and

deep gorges incised river valleys and rolling plains (Egziabher, 1988; Wondie and Temesgen, 2013). These diversified topographic features made the country to had indigenous and alien plant and animal species and soil in tropical Africa (Tolera et al., 2008). These species are essential for human survival and wellbeing. They provide us with food, oxygen, shelter, recreation, and spiritual sustenance, and they are the source for over 5,000 commercially-traded products, ranging from pharmaceuticals to timber and clothing. In addition, these resources help to maintain the fertility of agricultural land used as habitat for wild life, protect water resources and reduce the risk of natural disasters such as land slide and flooding (World Bank, 2004), and helps as a site of tourism which might increase the income of a country (Fikadu and Melesse, 2014).

Throughout history, humans have used the environment resources of plants, animals, soils and others to gain great socio-economic development (Tigabu, 2016) of which many of the methods are now being seen as unsustainable (Abdelfattah, 2009). For example, forests undergo changes in various ways. Its areas can be reduced either by deforestation or by natural disasters such as volcanic eruptions. As a result, the expanse of forest areas are declining across the globe, partly through logging activities and also due to conversion of habitats to croplands (agricultural expansion) accounting for up to 40% of Ethiopian forest losses (Pant and Samant, 2007; Tesfaye, 2007; Winberg, 2010). In spite of the fact that deforestation was highly known in the northeastern part of a country (Woldie and Temesgen, 2013), nowadays it is expanding to southern parts, which has plenty of plant and animal species.

Because of the disappearance of forests, most of the mountainous sides are bare. Valleys have been gullied; strips and streams which used to have water the whole year round are now mainly dry in dry season (Abate, 2003). Among other factors accelerating the decline of plant and animal species diversity in Ethiopia, is the enlargement of public infrastructures in rural parts of the country and its policies are playing a great role (Tefaye, 2007). Along with an advancement of rural road, agricultural investment, resettlement schemes, charcoal production, relentless expansion are having a profound and determinant effect on the woody plant resource availability (Winberg, 2010; FDRE, 2012; Tigabu, 2016). Sucoff (2003) also argue that corruption of government institutions in Universal Rural Road Access Program (URRAP) road construction is the leading factor for the loss of biodiversity. These activities directly or indirectly contribute to increased deforestation, soil erosion and loss of biodiversity in a country (Tigabu, 2016).

There is a common thought that roads constructed under URRAP create highly devastating pillars which cause environmental issues in Ethiopia. However, there was no directly, explicitly, and scientifically conducted researches on the issues, particularly on study areas of this paper which are known by rich plant and animal species and fertile soils. Finally, this research was intended to fill this gap within a short plan and be a source of achieving a sustainable development within a long plan.

Objectives of the study

General objective

The general objective of the study was to investigate environmental implication of URRAP roads in Southwestern Ethiopia; the case of Jimma and Buno Bedelle zones

Specific objectives

- (1) To find out the associated factors with URRAP roads in degrading pillar¹ environmental issues.
- (2) To identify the types of degraded plant and animal species by URRAP roads.
- (3) To identify the consequences of changing pillar environmental issues as in the case of construction of rural roads under URRAP.

Limitation of the study

Like every researches, this study is not free from limitations. It has conceptual/theoretical, methodological and knowledge limitations. Since, the issue of road is interdisciplinary; the concepts which have been used in this study were not exhaustively listed, used and/ or identified. For example, “non-URRAP roads”² were not included in this study. Besides, sample size used in this study was not too enough which extends to the limitation of sampling techniques. The less attention given for quantitative data in the study might be another limitation of the paper. Directly or indirectly these limitations had association with the given time and budget.

Research Methodology

Study setting and population

The study area is in the Oromia National Regional State (ONRS) of Ethiopia, Jimma and Bunno Bedele zones, South Western Ethiopia. The total population of Jimma zone is 2,986,957, of which 1,498,021 are male and 1,488,936 are female. Gera and Gomma districts from among 20 districts of Jimma zones and Didessa district among ten districts of Bunno Bedele zones were randomly selected. Interest of the researcher officially allowed time to conduct a research and distance of selected sites were the reasons for the selection of these

¹ Forest, soil, and animal species for the purpose of this study

²Admassu et al. 2013: 27

two zones. The other reason was that, official data describe that either Oromia National Regional State or federal government has been giving significant emphasis for these zones in constructing universal rural road, because of its plenty resources: coffee, honey, and fruits.

Research design

The study at hand deployed qualitative approaches supported by quantitative. The philosophical foundation of the study was pragmatism. The reasons for the selection of pragmatic approach were: to use variety of data sources, to use multiple methods in the study at the same time or one after the other and to use multiple perspectives to interpret the results. Cross-sectional design was employed to collect data at specific data. Moreover, this study was descriptive, exploratory, and explanatory.

Methods of data collection

Household survey

Through household survey: demographic and socio-economic data; nature, types and changes of pillar environmental issues; accessibility to URRAP roads; and feeling of household heads about URRAP roads along with pillar environmental issues.

In-depth interview

In-depth interview was employed in collecting detailed data which are a complete picture of the objectives of this study from purposively selected respondents. The researchers selected those participants assuming that they have an experience on issues under study and can provide pertinent information.

Field observation

Observation was served as a complementary method to triangulate data collected through in-depth interviews and other methods. Accordingly, the researchers observed about road construction, road structure, deforested areas, and soil erosion as a result of URRAP road.

Focus group discussion (FGD)

So as to get detail information, FGD was employed with purposively selected discussants. The criteria to select members to FGD were: living areas, age, and distance from rural road. Accordingly, data were collected through FGD in all selected districts.

Instruments of data collections

The main data-generation instruments were structured questionnaires, check list and interview guide. The primary objective of structured questionnaire was to elicit quantitative information from household head. Altogether, the contents of the questionnaire items covered issues on an association and extricable effect among an accessibility of URRAP road infrastructure and pillar environmental issues. Checklists were used for observation while interview guide was used to elicit qualitative information through deeper consultations from informants, key informants and discussants.

Table 1. Sex, marital status and religion of respondents (Household Survey, 2017).

Variable	Category	Percentage
Sex	Female	11.9
	Male	88.1
Marital status	Single	2.9
	Married	87.6
	Widowed	9.5
Total		100

Sampling techniques and sample size

Simple random sampling technique appeared appropriate since the lists of the units studied was accessible. In it, each member of the population under study had an equal chance of being selected from a list of the population. The sample size of the respondents was determined depending on the formula of Yamane (1967: 886) because it is simplified in the case of finite population. The formula considers 95% of confidence, and 5% margin of error. Accordingly, 210 household heads were randomly selected. Concerning, the sample size for qualitative methods: 18 individuals for in-depth interview, 15 key informants, and 3 FGDs which is one in each district were selected. The total discussants of FGD were 27 without facilitators. Overall, the sample size was determined by saturation points under all the discussed qualitative methods.

Reliability and validity

Reliability

The aspects of inter-rater technique of reliability proved its usefulness in the context of the pilot testing. The inter-rater reliability assessed the reliability of research instruments by utilizing four interviewers per site. Through cross-examination of the reflections of the pilot testers, the evidence was obtained. Researchers also

ensured internal consistency of instruments by the split-half correlation from plot-testing of 20 questionnaires. This was done by comparing the results of one half of instruments with the results from the second half which had been separated as first half and second half.

Validity

Both the face validity and content validity were assured to judge whether the instrument capture the core concepts in the study or not. Besides, content validity was assured by giving the instrument for four experts in the area of study. Then their comments and suggestions were included to verify the validity of the instrument.

Methods of data analysis

Quantitative analysis methods were used with the numeric data. Both descriptive and inferential statistics were calculated. The descriptive analysis emphasized on percentages, central tendencies and graphic presentations. Consequently, the interpretations that followed presentations were made through pie charts and frequency tables portraying numeric facts in finding chapter of the study. The Chi-square test of association was tested for looking at the prevailing associations among the interactional variables. The qualitative data were transcribed, categorized, schematized and interpreted based on their respective contents and themes. The meanings, words, symbols and argumentative texts formed basic premises in the structures of reporting the sub-titles, sections and chapters.

Ethical considerations

In conducting this study, an ethical considerations and safety measures were made. Before going to the field the letter from Jimma University was taken and given to the districts' administrative and other required bodies. After going to the field and contacted with respondents, the purposes and importance of the study was explained for the participants of the study and informed consent was obtained from each of them. Thus, participants were given the authority to permit or refuse in the collection of data in any form; full right was deserved to withdraw at any time: to change ideas or to edit recorded materials. Besides, the privacy of the participants was promoted, and they were informed that whatever information they provide will be kept confidential.

RESULTS AND DISCUSSION

This chapter deals with data analyses, presentation, interpretation and discussion of the study. It attempts to answer the research objectives concerned with environmental implications of URRAP road in Southwestern Ethiopia. Specifically, it includes the presentation of: (a) demographic and socio-economic information of respondents; (b) URRAP roads and environmental sustainability from the perspective of local people; and (c) possible effect of accessibility to URRAP roads on pillar environmental issues. The analysis and presentation of these parts predominantly and comprehensively appeared from qualitative data and lightly supported by quantitative data.

Demographic and socio-economic characteristics of sample respondents

Table 1 shows that majority of respondents were male (88.1%) and married (87.6%). This is consistent with the reality of the study areas that the majority of rural household head are male and married, which is consistent with the secondary data obtained from the districts showing that majority of the household heads of study areas (Gomma, Gera, and Didessa) were male (73%) and married (68.6%). Sex and marital status are directly or indirectly associated with URRAP road construction and usage in the study area. For example, all of the drivers of the vehicles in the study areas are male. Married women are not allowed by their husband to get job opportunities of road construction, because of myriad factors including socio-cultural factors. Table 2 shows that averagely, the age of respondents is 40 years old; the years he/she stays in education was five; and the size of household size was 6.4.

Table 2. Age, education level, and household size of respondents (N =210) (Household Survey, 2017).

Variable	Mean	SD
Age	39.8	12.3
Education level	4.91	4.1
Household size	6.37	2.7

URRAP road: Environmental sustainability

There have been debate and struggle about the definition of environmental sustainability among the scholars for the past decades (Moreli, 2011). The process of prioritization from social, economic, and environment is different from country to country. Ethiopia has also been expanding various programs for the purpose of social and economic sustainability including URRAP. However, majority of the respondents of this study (76%) believe that the concern had not been given for environmental sustainability, while URRAP road construction have been expanding and implementing in a country in general and in rural areas in particular. Accordingly, this subsection deals with the negative impact of URRAP on environmental sustainability from the households perspectives. In case of pillar environmental issues like deforestation, soil erosion, loss of wild animals, and climate change have been selected. Likely, the impacts of un-surfaced roads on ecological resources include direct habitat loss, facilitated invasion of weeds, pests and pathogens many of which are not indigenous as well as a variety of edge effects (Habitat Council, 1980).

What is environmental sustainability?

Before analyzing to the impact of URRAP road on environmental elements, having some opinions about environmental sustainability from the perspective of people under the study might have a pertinent hint and clarifications for the following sub-topics. The discussion among the discussants of FGDs reveals that Ethiopia has indigenous values, principles, and laws of protecting their environment since ancient time. They believe that natural environment is what God has given for all human beings: past, current and future generations. That is why our grand fathers and mothers had been selectively and purposively utilizing natural resources through identifying animals and plants as sacred and/or not. The discussion of the discussants of FGD in Gera district shows that our grand fathers and mothers had set rules along with identified sacred natural resources like some trees, water bodies, hills, mountains, and fields which have been serving in conserving and utilizing natural resources till today. Their foot has been followed in using these limited resources without compromising the coming generation. Generally, for these discussants, environmental sustainability is not the recent issue or new thing coming from other areas, „westerns“. Again, in the future, also these values and principles will have been working for ever in order to assure environmental sustainability.

Respondents³ attached environmental sustainability with mercy, altruism, peace, development, stability, wisdom, healthy, and civilization. They argued that in one way or another, environmental sustainability is the causes and consequences of these human life basic values. In words of an interviewee from Gera district (male, 67 years old) “If the inverse works, the world will wait for destruction, disorganization, instability, chaos, and loss of self-identity. Superficially, these problems are not concerned with environmental elements like that of our life and socio-economic satisfaction.” This implies that nowadays people are deviating from existing and an old value of keeping sustainability of environment by indigenous⁴ people.

URRAP road and soil erosion

Many respondents argue that during wet periods, perennial streams and major rivers start to flow. There are no adequate cross drainage structures, such as, culverts and water-crossings-drifts, causeways and bridges. Thus, access can be prevented and often for long periods; three months is not uncommon. Majority of respondents (94.5%) expounded as the maintenance for the road is very weak. An expert of rural road construction from Gomma district (male, 30 years old) associates the problem of maintenance with lack of trained personnel in the private sector who can carry out the appropriate type of maintenance works. Leader from road authority from Gera district (male, 32 years old) also Authority, 2017). contended that the challenges for providing all-weather rural road is a complex interaction between availability of the right materials, climate (wind, rainfall, and intensity), terrain demands, service standard demands, and providing appropriate and cost effective services.

³ Survey respondents

⁴ People who have been living in the study area for a long period of time and have their own way of life or who don't come from another place.



Figure 1. Roads with potholes, ruts, and mud (Picture taken from Gera District Office of Road

Researchers observed that in majority of URRAP roads in the study area, there is no draining of water from the road surface quickly without letting it concentrate. Many of them have potholes, ruts, and mud on the surface of the road which are symptoms of drainage problems. It is characterized as improper steepness and slope and shape of the road (Figure 1). Majority of a ditch system plugged debris causing water to flow onto the road surface. Ditch water captured by the road surface can cause severe erosion and wash out the road completely (Kocher et al., 2007). Respondents also argue that rural roads are not appropriately designed for all-season use. They believe that these rural roads are assumed and considered to be used year-round and are intended to be in continuous service for the for-seeable future. However, the structure of the road is completely changed between the summer and winter. In addition, the construction makes the slopes on the roadsides vulnerable to landslides and erosions. Generally, all these and other factors lead to soil erosion and complications in maintaining stable rural roads. Similarly, final report (1997: 12) on the environmental impact analysis of the road sector stated that: one of the most important issues of environmental impacts in a road project is soil erosion. Erosion is a function of the stage of construction (rehabilitation/ upgrading and new construction) and the physical environmental condition (geology, climate, soil, topography and surface and groundwater hydrology). Sheet and rill erosion and formation of gullies happen both naturally but is also

highly accelerated by road construction if fresh soil slopes are not properly and timely protected and if drainage arrangements are not efficient (Figure 2).

URRAP road and deforestation

Respondents believe that during and after construction, URRAP road has an impact on the terrestrial



Figure 2.Slopes that resulted from URRAP road (Picture taken from Didessa Natural Resources Office, 2017). vegetation in the vicinity. They also argue that there were uncontrolled uses of wood for energy and for construction purposes during a road project which lead to significant destruction of forest resources. Logging roads result into clearing about 50 acres for each square mile of commercial forests, degrading about 10 acres for every mile of road and each square mile of forest averages 5 miles of road (Noss, 2004). One interviewee from Didessa district, Natural Resource Bureau (male, 34 years old) argued that “local communities have been engaging in deforestation during and after road construction.”

During road construction, correspondingly, project staffs collected firewood. One respondent from Gera district stated that “those who came for road construction from another area had been collecting and enchanting firewood in vehicles.” Another expert from natural resources bureau of Didessa district (male, 30 years old) argues that “throughout road construction there was voluminous deforestation in our district. Deforestation has been leading to extinction of indigenous tree like “Woddeessaa, Qaraaroo, Heexoo, Oomoo, and Birbirsa.” Respondents of the study areas had various arguments about how and why road construction might lead to deforestation if not controlled. These factors can be categorized as the following:

Socio-psychological factors: Displacement, conflict, corruption, low integration and local communities’ motivation. These play a great role in deforestation if handled anomalously. An interviewee from Didessa district (male, 56 years old) stated that “individuals who had been displaced from their farming land and living

house occupied another land instantaneously. To construct their house and palisade, they were cutting trees. This may gradually bulldoze to deforestation.

Haplessly, vendetta happens among local communities, clients, contractors, consultants, and another sectors on limited resources. Accordingly, one interviewee from Gomma district (male, 65 years old) said that: "Have big ideas of road construction, clients and other project staff churned design out in my friend's farming land. They cut down his entire coffee's tree and displaced him out. I think they did it because of two interplayed reasons. These are: firstly, he came from another area and secondly, responsible bodies were corrupted. My friend started to cut down natural trees and enfold spacious land for his life. Again, kebele leaders and neighbors accused him for this reason. Both sides fall in belligerence and in-between forest is victim". This implies that on one hand, new opportunities for income generation were welcomed but at the same time it could result in conflict or ill feelings depending on how resource extraction activity takes place.

Economic factors: Marketing, IMX in rural areas, expropriate, lack of public infrastructure like electrification and cost of road construction. Principle road facilitates marketing and development. People sell their products and consume others products easily if there is road access. It is not uncommon that rural people sell the products of natural resources such as charcoal and timber. Getting access to road has been instituting local communities and people from other areas in cutting down natural forests. In other words, discussants of FGD from Didessa district claimed that since a road was in place in the study area, it has been providing access to people wanting to supply urban markets with wood products such as charcoal, fuelwood, bush meat, or construction materials, contributing further to deforestation. Consistently, expert from Gera district natural resources bureau (male, 34 years old) states that "road construction has been motivating people to entangle with forest products." Regarding data collected through survey, 67.3% of respondents believe that URRAP roads have paved the way for deforestation since various investments being expanded along with all the newly constructed roads.

Together with URRAP road, there was expansion of IMX in the study areas. For example, almost all (98%) „kebeles“ of the study areas, which have access to road, have at least one IMX. The types of IMX are: energy and stones digging, farming, goat and sheep breeding, wood work, metal work, and the like. All these economic activities need extensive land. Thereby, intentionally and/ or unintentionally there were the cases of deforestation. An interviewee from Gera district, Tumaateessoo kebele (female, 43 years old) claimed: "The supersize of IMX is causing deforestation. Getting money and becoming richer and richer is a skeletal clandestine of life. Low sector-sector and sector-people coalescence and unpracticed rules are the pressing and preponderant reasons. People are flinging to win their today's life; incidentally, there are numerous scenarios such as deforestation, loss of animal species, climate change, etc."

Ethiopia is the second poorest country in the world (HDI, 2014). Predominantly, it has been relying on aid from western countries for a long period of time. It is characterized by ineffective and inefficient use of resources. Consequently, public infrastructures services are known by low quality. Road being constructed under URRAP is not different. In other words, as of low budget there was no rationally and practically balancing the cost of forest and constructing road. Correspondingly, surveyor from Gomma district (male, 29 years old) expounded that "practically and virtually, the costs of cutting down trees to that of constructing road have not been benchmarked. Parenthetically, they only have to finish off the road with small amount of money. It is believed that this may cause extinction of big and indigenous trees in our country." The leader of the road authority of Gomma district (male, 35 years old) likely inclined to his colleagues saying that

“everything have both advantages and disadvantages. To get one, we lose another. They have been plodding not to deforest hence are being bulldozed by our budget and landscape.”

URRAP road and loss of animal species

The construction of some URRAP roads penetrates sensitive areas, which cause an impediment to movement of wildlife and destruction of wildlife habitat. As a proposed road project could be new, therefore, the wildlife which presently inhabits the proposed project area may be forced to migrate to other areas. 70.1% of respondents argued that the URRAP roads can cause the loss of animal species. Interview with respondent from Didessa district (male, 63 years old) indicates that the following are gradually decreasing in number. They are: “Saasoo, Jaldeessa, Booyyee, Weennii, Qamalee, Dhaddee, Woongoo, Doollee, Bosonuu, Yayyii, Leenca, Qeerransa, Arayaa, and Iyyaa. Another interviewee from the same district (female, 43 years old) added that “Boyoo, Rumicha, and Booqaa are indigenous birds which are leaving these areas to another area.” The data from FGD, in-depth interview, key informant interview and household survey were indicated as immediate causes for the loss of biodiversity along with road construction are as follows and these reasons are intractably associated with each other; change in one reason can result in change of another.

Inequitable road line selection: The stakeholders, who have been constructing road, select road line depending on only cost analysis. Surveyor from Gomma district (male, 29 years old) rationalized as poverty is influencing them to do so. Another interviewee from Didessa (male, 50 years old) also argued that: “They come to select road line without any material in their hand. There is some body from the district, contactor, kebele leader and others; stand on some place; and they say let it be this way. Generally, they select only short distance in place of identifying the required characteristics of the road”.

Roads crossing areas with high water tables or wetlands may act like dams to block surface and subsurface water flows. This is especially true where large quantities of material must be added to raise the road above the land surface, and where new material must be added annually to keep the road elevated. Discussants from FGD⁵ argue that under these circumstances, land on one side of the road can become much wetter than it was before the improvement, while land on the opposite side may be drier. This may adversely affect crop production, the composition of species in the ecosystem.

Vehicles pollution: Vehicles sound and chemical pollution forces wild animals to live the area. They need an area free from disturbances. They also require to be kept hidden. Thus, the sound of vehicles (clasci or other related sounds) has been acting against the principles of these animals. One respondent from natural resources office, Gomma (male, 32 years old) confirmed that “wild animals run away from the sounds of human and vehicles during and after the construction of rural roads.” Likely, Karani (2007) also found that road construction and upgrading and vehicles pollution have a negative impact on bird species, reptile species, amphibian species, mammal species, and butterfly species. The effects of new road include pollution from moving vehicles, chemical spills from trucks, displacement wild animal species due to construction of new roads, disturbance of hydrology and the ecosystem among others.

⁵ FGD held with 10 individuals in Didessa district (male = 6, female = 4, average age = 33.4)

Expansion of farming land: Along with the enlargement of rural road, there is expansion of farming land either by rural community and externals (called „investors“). In other words, rural roads help people to engage in farming through modern technology. Since there is no land out of function, the coming modern technology for farming demand the land occupied by another forest, wild animals and small creatures. Besides, the technologies which are being used, it can also be the reasons for the running away of wild animals. Consistently, 53% of the respondents believe that expansion of farming land alongwith the construction of rural road is causing the loss of wild animals. Among the participants (R1 and R2) of FGD, nine discussants from Gera district depicted this reality as follows: R1 (male, 32 years old) stated “displaced people need the land. Land is limited, but demand for land is unlimited.” R2 (male, 43 years old): “after we have gotten the road, the tractor and other technologies of farming have been coming to this area. We think this has a potential impact on the wild animals to live in the areas.”

Change of households’ settlement: Data from FGDs discussants implies that along with the construction of road, there were people who moved to the edge or nearby to the road line by leaving their origin place. Thus, they lived their former place and found another place for their house and other activities. This might have been directly or indirectly impacting wild animals. The Chi-square test found that there is a significant association between the distance of households’ house from road and their responses regarding either the wild animal species are leaving the areas as a result of the rural road enlargement with $(\chi^2(18) = 56.795, P = 0.000)$ at $\alpha = 0.05$.

Conclusion

URRAP road have been constructed from 2012 in differentpartsofEthiopia.Its players are both government and people. The eager and enthusiasm of people to get road is greater than what the government has been undertaking. People need road institution with all acceptable definitions: process, methods, and outcomes. This means, people give balanced weight both for quantity and quality of roads. However, the government has been going on only quantitative dimensions. The connection and association of road institution with other social institutions was not given considerable and required value. In other words, they are standing alone. The problems resulted from road institution caused by the failure of all social institutions interconnection; road institution is also among social institution. Consequently, URRAP road has been inserting various problems into pillar environmental issues. It has resulted in soil erosion, deforestation, and loss of animal species. Indigenous trees are being cut and indigenous animal species are been moved. As a result, climate change appeared in most parts of the country. Inequitable road line selection, investment and farming land expansion, and corruption are among the main causes of these problems associated with URRAP road construction in Ethiopia. However, if managed, designed, supervised, customized and internalized, road would play a vital role in environmental sustainability. Even though there are a large number of problems, URRAP road has also been providing various services for rural people. It creates a job opportunities, increases socio-political participation encourages social network, facilitates production and consumption, increases tourism, and assists the expansion of other social services.

RECOMMENDATIONS

Recommendations for government bodies include:

- (1) Government bodies⁶ should integrate road institution with other social institution (family institution, education institution, religious institution, political institution, and health institution) comprehensively, explicitly, transparently, and officially.
- (2) Government bodies should change what is on the document into practice. In other words, let the criteria for road line selection and environmental impact analysis be applied. In light with this, the government bodies should encourage monitoring and evaluation at all levels.
- (3) Government bodies should customize imported modernization elements into the local people indigenous knowledge of keeping the environment sustainable. (4) By taking into account the aforementioned recommendations, government bodies should increase the resources⁷ for rural road construction.

Recommendations for policy makers include:

- (1) Policy makers should come up with inclusive policy, which includes issues about pillar environment elements. The policy makers should cooperatively work with researchers from different disciplines from natural sciences and social sciences.

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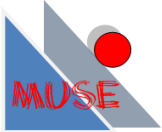
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⁶ Road authority sector (office) from federal up to district level.

⁷ Time, budget, personnel, technologies

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