# THE IMPACT OF PROSOPIS JULIFLORA INVASION ON REGIONAL DEVELOPMENT IN ETHIOPIA

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**MOLLAW Demillie**
Addis Ababa University, Center for Federalism and Governance Studies, College of Law and Governance
demilliemollaw@yahoo.com

***Abstract:*** *The purpose of this study is to analyze the impact of Prosopis-Juliflora invasion on development in Ethiopia by taking Afar Regional State as Case Study. Prosopis Juliflora has become the most invasive plant in the Ethiopia. Although the social, economic and environmental impacts of Prosopis in Afar Regional State has become threatening, both the federal and regional state governments were late to start the practice of controlling and managing its spread in the region. Data for this study were collected through qualitative methods like informant interviews, observation, focus group discussions and document analysis. Ninety six participants were interviewed and eight focus group discussions were conducted. The qualitative dataset was thematically analyzed through deductive identification of themes. The researcher recommended that both the federal and regional state governments should give prior concern to the eradication of the invasive plant before it covered the whole land in the regional state.*
***KeyWords:*** *Afar Region, development, Ethiopia, Impact, Prosopis*

## Introduction

Prosopis Juliflora (henceforth referred as Prosopis) is a fast growing, drought resistant and invasive evergreen tree of South America, the Caribbean, and Central American origin which spread to most arid and semi-arid areas of the world. Currently, *Prosopis* has become the worst weed in Pastoral and agro-pastoral communities of Ethiopia, Kenya and generally in the eastern part of Africa (Mwangi, and Swallow, 2008). According to FARM Africa (2008, p.6) Prosopis has several peculiar features which made it grow tremendously and covering large areas within a short period of time than any woody species within its niche such as "*tolerance of arid conditions and saline soils, fast growing, nitrogen-fixing, rooting abilities, coping abilities, ability to stay dormant for longer time in a soil and germinate during favorable conditions, number of seeds/pod, sweetness of pods, made it grow tremendously, covering large areas within a short time than any woody species within its niche".*

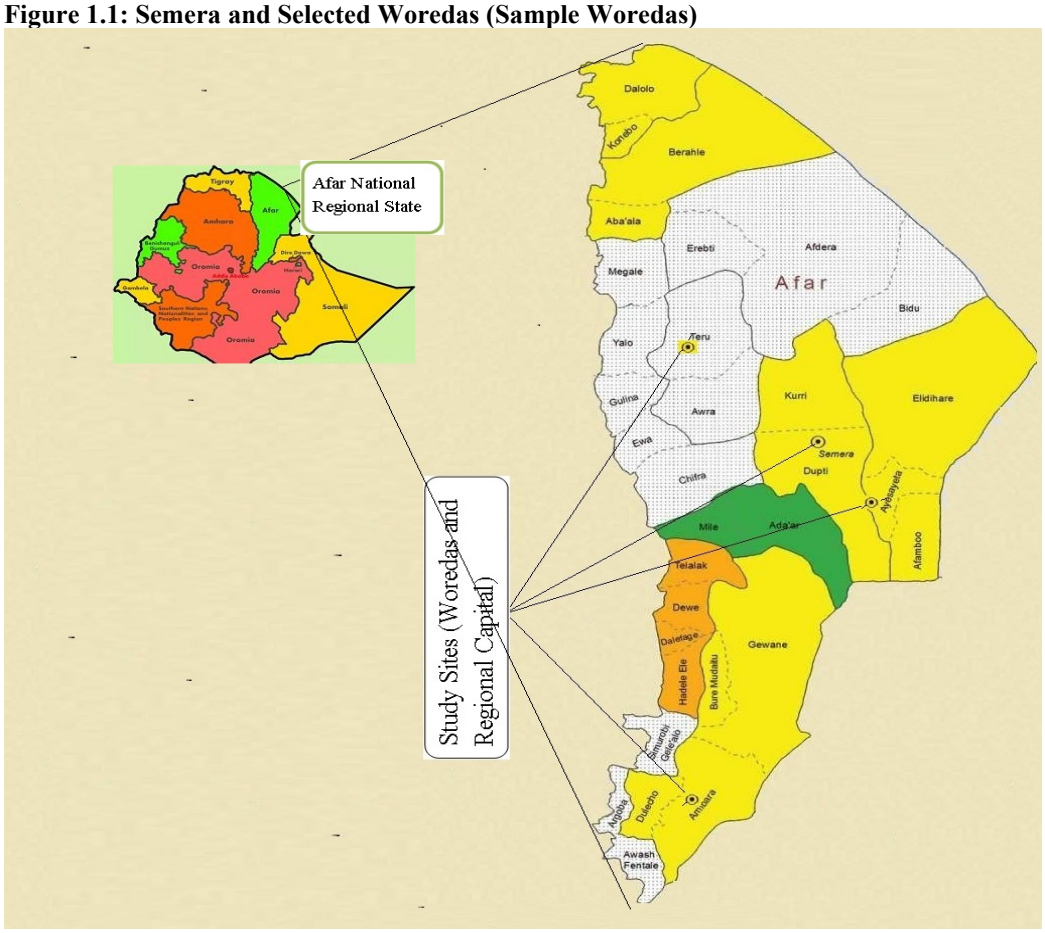
The introduction of Prosopis to the Ethiopian lowlands during the Derg regime was part of its environmental rehabilitation campaign in which the planting of Prosopis was conceived as an afforestation measure to halt desertification processes in dry land areas. Local administrators were ordered to plant Prosopis seedlings around state farms and in few permanent settlements in the vicinity of these farms for the benefit of governmental agriculture and the settled population. However, in the process the best areas in terms of agro-ecological conditions, the wetlands, large floodplain areas along the Awash River were affected. These were areas where seasonally flooded fertile soils provided abundant grazing opportunities for pastoralists as well as a good potential for irrigation agriculture. Therefore, Prosopis was introduced into Afar region without giving due consideration to

the invasive nature of the plant which as a result it rapidly spread throughout the country and in particular in dry lands and along water courses overtaking critical dry season grazing areas and irrigable land (FDRE, 2017).The study analyzes the social, economic and environmental impact of the invasion of Prosopis in Afar Regional State in particular and the socio-economic development of the regional state in general.

## Study Area

This research was carried out in the Afar Regional State of Ethiopia which is one of the eleven regional states legally constituted based on the 1995 FDRE constitution. Geographically, the Afar Regional State is located in the northeastern part of Ethiopia between 39° 34' to 42° 28'E longitude and 8° 49' to 14° 30' N latitude. The total geographical area of the regional state is about 270,000 km$^2$ (CSA, 2008). It shares common international boundaries with the State of Eritrea in the north-east and Djibouti in the east, as well as regional boundaries with the Regional States of Tigray in the north-west, Amhara in the south-west, Oromia in the south and Somali in the south-east (Art (2) of the 2002 Revised Constitution of Afar Regional State).

**Figure 1.1: Semera and Selected Woredas (Sample Woredas)**




Sketched map of Afar Regional State and the three sample Woredas where data for this study collected

*Research Design*

Research Design is the blueprint for collecting, measuring and analyzing of data. It clarify what data are needed, what methods will be used to collect and analyze the data, and how all of this is intended answer research question (Kothari, 2004). Explanatory research design is employed in this study because this research design is used to examine the reasons "why" something occurs (Lee, 2008). The data obtained from the National Planning Commission (NPC) indicated that Afar Regional State is the least developed regional state in the country and hence explanatory research design was appropriate to explain why this is the case. This study tries to examine the impact of the spread of Prosopis on the development of the regional state.

*Sources of Data*

Afar Regional State is divided into five administrative zones which constitute 32 Woredas (Districts). Based on the economic livelihood of the peoples of the Afar region, the Woredas in the regional state can be classified in to three categories: predominantly pastoralist, agro-pastoralists, Woredas having better infrastructure, investment projects and modern mechanized agriculture. Teru, Assaita and Amibara Woredas were selected to reflect the above respective Woreda characteristics. Accordingly, data for this study were collected from the Federal institutions, Semera (regional capital) and from the three selected Woredas.

*Sampling Design and Sample Size*

Purposive and snowballing sampling technique was employed to get knowledgeable participants voluntary to discuss about the issue to be researched. As suggested by Marshall and Rossman (2016), this technique helped the researcher in removing worthless answers and gaining comprehensive and practical viewpoints. Thus, participants were purposefully selected from federal institutions, Afar Regional State Bureaus, Zone and Woreda Offices, Regional State Council Members, members of Afar Peoples Democratic Party, local officials, clan leaders, community members, young people and women.

*Data Collection Instruments*

Data for this study was gathered through in-depth interviews, focus group discussions, personal observation and document analysis. Generally, Ninety Six participants were interviewed from federal institutions, regional, Zonal and Woreda levels administration, community and experts in the regional state Coordination Office for Basin Development and Villagization Programme. The researcher also conducted 8 focus group discussions with a group of 6- 8 purposefully selected participants in each focus group discussions both in the regional capital and in the three selected Woredas.

**The Socio-economic and Environmental Impact of Prosopis in Afar Regional State**

The 2018 reports of Afar Regional State Pastoral and Agriculture Development Bureau pointed out that the Afar region has been seriously affected by the invasion of Prosopis. At present 20 Woredas of the region are affected by the adverse effects of Prosopis at different levels. The magnitude of the problem related to the invasion of Prosopis is worse in Woredas found in Zone 1 and Zone 3. The report of the Bureau mentioned that 60% of the land in most affected Woredas like Amibara, Gewane, Awash Fentale and Bure Medayitu

has been covered by Prosopis plant.). According to Herrie (2014), the invasion of Prosopis has been rated as the second most important ecological problem next to reduced volume of Awash River. Rettberg (2014) mentioned that the uncontrolled floodwaters are a major agent for the spread of *Prosopis* seeds to new areas. Similarly, pastoralists interviewed in the three selected Woredas explained that the main mechanisms for the spread of Prosopis in the region include animals (both domestic and wild), rivers and water flow through irrigation channels. Animals eat the pods that contain the seeds. The seeds get released into the land through the animals' dung, where they germinate after rain.

*Social Impact of Prosopis Invasion in Afar Regional State*

The social consequences that come as a result of the invasion of Prosopis in Afar region include animal and human health problems, increased incidences of malaria, displacement of the community from their residence areas as well as exposure to wild animals (Interview, 21 December, 2018, Andido). Research findings on the impacts of feeding on the pods of Prosopis agree with the above idea of pastoralists. For instance, Inkermann (2014) stated that animals are subjected to problems of digestion as a result of eating too many of the pods of Prosopis. Abiyot and Getachew (2006) also asserted that ingestion of the pod over long periods of time will result in death of cattle and stomach poisoned by the pod may induce a permanent impairment of the ability to digest cellulose. According to a pastoralist from Assaita Woreda, Galifahge Kebele, the health, quality and productivity of their animals has been increasingly declining since the introduction of Prosopis into their locality. He explained that, the toxic thorns of Prosopis have been causing injuries and damage on the eyes and feet of animals. Sometimes they see that the jaws of animals get deformed and their teeth fall out which reduced their grazing ability. The animals become thinner and thinner until their final death due to underfeeding. Moreover, after injuries animals are exposed to serious infections which adversely affect their health condition (Interview, 14 December, 2018, Assaita). Another pastoralist in Teru Woreda resident of Berentu Kebele explained that the invasion of Prosopis has resulted in the reduction of the number of animals and milk productivity at alarming rate. He further elaborated that their pastoral way of life has been endangered for the last two decades. According to him, Prosopis has double blades through which it cut their livelihood. It devastated their grazing lands and denied their cattle to have access to pasture. Secondly, feeding on Prosopis has been causing death of animals. Cattle feeding on Prosopis became sick, getting weak and thin until their final death as a result of consuming pods for prolonged time (Interview, 13 December, 2018, Alelu). The other social impact of Prosopis is its impact on human health. Various research findings (Herrie, 2014; Inkermann, 2014) revealed that Prosopis has been severely affecting the health conditions of pastoral communities. For instance, according to Herrie (2014), the impact of Prosopis on human health has complex nature:

*The thorns of the plant are inflicting wounds on legs, hands and eyes causing blindness, lameness and even amputation of legs and hands due to infection of wounds. People are becoming disabled and could not perform their day-to-day duties and are exposed for food insecurity. People especially children, women and the elderly are suffering from malnutrition causes by the shortage of milk at household level. Additionally, their immunity level is very poor and thus they easily succumb to diseases. Children feeding on the Prosopis-Juliflora pods are suffering from impaction and constipation (Herrie, 2014, p. 120).*

Participants of FGD supported the above idea. During the discussion, pastoralists living in Amibara Woreda, Sediha-fageKebele asserted that the encroachment of Prosopis into their farms and settlement areas has been inflicting heavy harm on the health of the local community. For instance, one of the participants of the discussion reflected:

*Our children like to eat the pods of Prosopis for their test but it leads to constipation. The thorns of Prosopis are very poisonous and people thrust by the thorns of Prosopis have been getting sick or may get permanent disability. Although the thorns of Prosopis inflict harm on all categories of people, it has been causing more health problems on women than men because of their interaction with the environment. Women are in charge of domestic chores such as nourishing the family, collecting water and fire wood, looking after small livestock as well as building traditional houses. Six years ago, the thorn of Prosopis thrust the leg of my wife while she was collecting firewood. We were able to pull out the thorn after few days. But she encountered permanent disability due to the poisoning effect of the thorn (FGD, 26 December, 2018,Andido).*

The other health problem related to the invasion of Prosopis is the increased incidences of malaria. Pastoralists interviewed in the three Woredas mentioned that in spite of the efforts of the regional state government to control malaria disease, it remained to be one of the serious health problems among pastoralist communities. The national strategic document for the control and management of Prosopis substantiate the ideas forwarded by the interviewees. According to the document the incidence of malaria is said to have increased due to a moister microclimate than before (FDRE, 2017). The other socio-economic problem caused by the invasion of Prosopis is its effect of deterring mobility. During the interview community members highlighted that Prosopis trees form dense stands, making it impossible for animals (sheep, goats, cattle and camel) to move through and graze.

The other social problem caused by Prosopis is displacement of pastoralists from their settlement areas. A pastoralist from Assaita Woreda Galigage Kebele underlined that their economic life has been severely affected by the fast encroachment of Prosopis into their rangeland, farms and villages. Prosopis grew well in dry seasons while other types of grasses, shrubs and trees gradually vanished. Grasses and other types of plants cannot grow around Prosopis. Nowadays, it encroached to their villages. However, the efforts made so far by different stakeholders, could not help to control its spread. They have a threat that the invading tree will force them to leave their residence with no hope of returning back unless some kind of solution is designed ahead of their decision(Interview 17 November,2018, Assaita).

**Economic Impacts of Prosopis Invasion in Afar Regional State**

Most of the Afar people are pastoralists whose livelihood and income sources are based on the rearing of animals. On the other hand, the sustainability and productivity of animal husbandry is determined mainly by the supply and quality of pasture in the region. The spread of Prosopis has been ever endangering the future fate of the pastoralist community by devastating their economic base (pasture lands). An overview of the impact of Prosopis on the economic life of pastoralists and agro-pastoralists in the selected Woredas could reflect the economic situation of Afars reg. A 57 years old pastoralist living in Assaita Woreda, Kede-bura Kebele expressed how the invasion of Prosopis has changed their life from bad to worse. He explained that in the past, one pastoralist could have up to hundred cows or some had fifty. However, people who have had a several number of livestock in

the past, have one cow, or might have two cows today. Prosopis has killed their animals directly through its poisoning effect or indirectly by denying them access to have water and pasture. Now pastoralists are leading destitute way of life. They became aid dependent after losing their resources (Interview, 8 November, 2018, Assaita).

In line with this view, an educated Afar, lecturer at Semera University asserted that the Afar people gone from very well of to be a community who are living in malnutrition, stricken by thirsty and hunger, stricken by herd lost, not being able to get into the market and the whole thing is challenging for them. They need long term support to bring about change and to enable them move out of the vicious circle of poverty (Interview, 21 February, 2018, Semera University). According to Halai-deghe Kebele administrator in Amibara Woreda, in the past there were no trees in the Kebele and the whole land was covered by grasses. The grasses which grew over vast areas in the Kebele were comfortable for cattle, sheep, goats and camels as well as to herbaceous wild animals. Pastoralists were competing in the number of cattle they owned. He further elaborated that the introduction of Prosopis has drastically changed the situation. Prosopis invades the grazing lands and the rate of its expansion is progressive. Now more than 80,000 hectare of land of the Kebele is covered by Prosopis plant and the residents of the Kebele have been severely affected. The number of cattle and camels that individual households possess reduced. Pastoralists are forced to live in poverty due to the loss of their animals that resulted from the loss of pastureland (Interview, 27 December, 2018, Andido).

Pastoralists underscored that the number and productivity of animals has been significantly declined due to loss of dry season grazing areas by *Prosopis* plants. An agro-pastoralist from Halai-Debi Kebele in Amibara Woreda mentioned that meat, butter and milk were the main food items in their diet. However, this situation is completely changed today due to the invasion of Prosopis and the accompanied loss of grazing lands which in turn caused reduction in the number of animals and their productivity. The situation in Teru Woreda is also similar. Pastoralists who participated in the FGD during the field work underscored that the adverse effect of the invasion of Prosopis is well felt in many of the Kebeles in the Woreda. A pastoralist resident of Awidi Kebele asserted that their pasture lands are highly invaded by Prosopis trees. The number and productivity of their animals declined from time to time due to diseases and malnutrition caused by the invasion of Prosopis. This is because Prosopis formed a dense canopy prohibiting their animals from grazing. Had it not been the aid provided through the safety-net programme, many of them would have died probably years ago (FGD, 15 November, 2018, Alelu).

An expert in the Regional Pastoral Agriculture Development Bureau reported that the Afar region is known for its irrigation development next to its animal resources. He pointed out that the region has several medium and large government irrigation projects and private investments along the courses of the Awash River. However, the sustainability and profitability of these sectors have been facing serious challenges as the result of the invasion of Prosopis plant (Interview, 12 March, 2018, Semera). Preparation of land for cultivation is a labor-intensive task. Due to its laborious nature, individual agro-pastoral households producing crops through irrigation find it difficult to clear Prosopis which reclaimed their farm after every production cycle. Agro-pastoralists from Berga Kebele of Assaita Woreda who participated in the FGD expressed how producing crops is tiresome while at the same time struggling against the encroachment of Prosopis. They explained that Prosopis covers most of the land which they have been using it for different livelihood

activities. They have been producing Tomatoes, Onion, Pepper, cotton and Maize using water from Awash River. The supply of water to the soil both during land preparation and cultivation phases creates favorable conditions for Prosopis. Prosopis has been growing well along irrigation channel which supply water to their farms and in areas where water is available. It took over farm lands if they are left uncultivated for a short time. Therefore, managing and controlling Prosopis plant is difficult and time consuming task (FGD, 14 November, 2018, Assaita).

Tendaho Sugar Project which is expected to support the realization of the country's growth and transformation plan could not be free from the adverse impacts of the invasion of Prosopis plant. Although Prosopis has been identified as drought resistant species, its growth and land coverage following the direction of the water drainage system is greater than areas far away from the system. Regarding this issue, one junior manager of the factory reported that the growth and greenness of the Prosopis plant is greater on the right and left side of irrigation channels which supply water to Tendah Sugar Factory. Clearing the channels has been a routine activity to protect Prosopis from invading channels and the farms where sugarcane grows (Interview, 10 November, 2018, Tendah Sugar Factory).

Environmental Impact of the Invasion of Prosopis in Afar Regional State

Prosopis has been threatening the environment or biodiversity in many ways. Decline of the number and variety of wild animals in pastoral areas is one of its adverse effects. The strong and dangerous thorns of Prosopis plant which has the character of controlling the ground and growing sideways make the invaded areas difficult for the movement and sheltering of wild animals and subject them to death and migration. The spread of Prosopis is also one of the contributing factors for the reduction of domestic animals in Afar region. According to a senior expert in Amibara Woreda Civil Service and Capacity Building Office, the Afar people love their environment and they knew every trees and grasses grew in their locality. They never destroy the environment, trees, grasses or whatever around. Instead, they want to preserve it and they have rules and regulations in their tradition which had enabled them to rear large stock size at times where there was no drought. Now the situation is completely changed due to the rapid expansion of Prosopis at the expense of important trees and grasses which in turn threatened the livelihood of pastoralists and agro-pastoralists by further complicating livestock food shortage and hindering crop production (Interview, 23 December, 2018, Andido).

Still another interviewee further elaborated the ecological impact of Prosopis. According to him, there were different varieties of trees and grasses in Afar region. However, they disappeared following the introduction of Prosopis plant in the region. In areas where it spread, Prosopis has destroyed natural grazing lands, displaced indigenous trees, and led to fewer and lower quality rangeland sites available to pastoralists. Prosopis is water consuming species and has very deep root system and this nature has enabled it to take over the lands which once were covered by grasses and various species of trees. Pastoralists resident of Galifage Kebele in Assaita Woreda who participated in FGD asserted that the Woyane tree destroys everything upon which their livelihood depends on. It invaded areas which were covered by grass, herbs, and shrubs, trees, overtaking pasture land and reducing its productivity. The number of animals they had reduced from time to time due to loss of pasture. Prosopis grew well along livestock routes where their animals regularly migrating from one place to another and hence movement in search of grazing lands and water points became difficult at times when it is critical and leaving our

residence became a must. This is because the densely growing Prosopis created blockage denying both humans and animals access to roads and water points(FGD, 13 November, 2018, Galifage).

According to an expert in the regional Bureao of Pastoral and Agricultural Development, the Afar called Prosopis '*Woyane Tree'* because they made a kind of analogy between the characteristics of Woyane (which TPLF called itself when it started its struggle) and Prosopis. According to this analogy, Woyane entered into Afar Region without their will, exploit all available resources of their region and prosper itself at the expenses of the Afar People. Similarly, the nature of Prosopis was not clearly understood by the Afar when it was introduced into their area. But it soon became invasive, covered the resource base of pastoralists and grew well and thereby it worsened the living conditions of the Afar people (Interview, 6 March, 2018, Semera).

The invasion of Prosopis has also adverse effects on the water resource development in Afar region. According to one agricultural expert, the roots of Prosopis grew deep into the soil in search of water. Naturally the Afar region has erratic rainfall and it has been obtaining water sources from the neighboring highland drainages. The growth of dense thickets of Prosopis along the Awash River has been contributing for the reduction of the volume of water. If it continued to expand more without being controlled, it will destroy the whole dry season grazing lands which in turn will exacerbate the suffering of Afar pastoralists. The increase of the volume of the Awash River which caused unprecedented flooding in the summer of 2020(July-September) and the displacement of more than 143, 000 Afars could confirm the above assertion. In general, all the available research findings of different authors and the data obtained from the participants of this research showed that the rapid expansion of Prosopis has become the major socio-economic and environmental threat to peoples of the Afar region.

**Control and Management of the Invasion of Prosopis**

The discussions above showed that the spread of Prosopis in Afar region has been threatening the socio-economic life of pastoral and agro-pastoral communities. In extreme cases agro-pastoralists have to leave their farms, change the composition of their herds and that herd productivity has been reduced by as much as 85% (Yibekal, 2012). Although there is an increasing use of Prosopis for firewood and charcoal production, most people in the Afar region consider it as a serious threat and they have been trying to use mechanical controlling mechanisms like cutting and stumping it (Ilukor, et al., 2014). The researcher's discussion with pastoralists found while selling the pods of Prosopis during the field visit at Alelu, the capital of Teru Woreda substantiates the above idea. They reported that they earn income from the sale of Prosopis pods during the dry season, 60-70 Ethiopian Birr/sack which has the capacity to contain 50kg of other crops. Pastoralists in the town buy Prosopis pods to feed their cattle, goats, donkeys and camels. However, the perception of pastoralists who generate income from the sale of pods towards Prosopis is still negative. This sentiment has been voiced by a pastoralist as:

*Although we use Prosopis for firewood, construction of houses and fences as well as for generating income, we don't like it. The process of collecting pods, transporting it and the waiting time before the sale at the market are all very tedious works. Prosopis has taken all the good things we had before it was introduced to our areas. It covered the rangelands and this severely affected our animals. It decreased our herd size because it covered the*

*dry season grazing areas and diseases that come as a result of feeding on it. Meat, Milk and Butter were available in our diet. There were times where we dump milk to the soil. Now everything is changed, no milk and the income we generated from the sale of animals is low because lack of animal feed has reduced their quality. Therefore, we use Prosopis pods as life sustaining strategy and not because we fond of it (Interview, 7 January, 2018, Alelu).* The rapid expansion of Prosopis has been endangering the livelihood of Afar pastoralists and agro-pastoralists. Some authors contend that most pastoralists perceived Prosopis as a harmful bush or express their hatred to Prosopis and they need for its complete eradication because it began to take over their resource base, formed impenetrable thickets which blocked human and herd mobility, and the strong thorns cause physical injuries to both humans and animals (Hailu,et *al*., 2004).

Although there were no national and regional policies and strategies which aimed at controlling and managing Prosopis until 2011, there have been piecemeal efforts by government bodies, NGOs and others to control the spread and prevent the impact of Prosopis on the livelihood of the Afar pastoralists and agro-pastoral communities (Herrie, 2014). A senior expert in the Afar Region Pastoral Agricultural Development Bureau clarify that before the enactment of regulation on Prosopis, the first strategy of the regional state to control and manage the spread of Prosopis was to encourage the people to cut the tree and use it for the production of charcoal. Thus, members of the community were organized into cooperatives for the purpose of coordinating their efforts. This strategy was thought to be helpful for both controlling the spread of Prosopis and creating income generating opportunities for those involved in clearing Prosopis trees(Interview,8 May, 2018, Semera). One senior Amibara Woreda official stated that initial efforts of eradicating Prosopis was encouraging but soon the regional state government prohibited the activities of cooperatives and individuals who engaged in clearing Prosopis mainly for two reasons: *First*, charcoal production has been used in some cases as a cover to produce charcoal from more easily accessible but protected tree species particularly Acacia spp, an act adversely affecting biodiversity in the region. *Second*, the emergence of conflict of interest associated with the income generated from the sale of charcoal. There is also some concern expressed that if cooperatives make a profit from Prosopis, they may have an incentive to let the tree return to their lands through coppicing, rather than to take the additional effort of removing stumps, which is the recommended action (Interview, 2 December, 2018, Andido).

On the other hand, the regional state government supported the efforts of the British NGO, FARM Africa which worked in Afar Region since 1998. Senior agro-pastoralist professional in the region's Pastoral Agricultural Development Bureau explained that FARM Africa has implemented integrated pastoral development projects which included regular development interventions and livelihood-based emergency services, pastoral extension approach-mobile outreach system. He further pointed out that in 2001 this NGO conducted research on the management of Prosopis in two Prosopis affected Woredas of the Afar Regional State, Gewane and Amibara (Interview, 13 March, 2018, Semera).

Wondimagegne (2014) mentioned that FARM Africa organized a project known as Afar Prosopis Juliflora Management Project and implemented Prosopis management in two phases. The first phase lasted from 2008-2011 and the second phase from 2012 to 2015. The First phase was implemented in four and five Kebeles of Gewane and Amibara Woredas respectively. The second phase was implemented in 20 Kebeles of three Woredas, Amibara, Gewane and Burmudaytu. FARM established Community Development

Committees (CDCs) on Woreda level in order to prepare and implement Community Action Plans (CAP), Participatory Resource Use Plans (PRUP) and Community Development Funds (CDF). FARM Africa mobilized local communities and providing them hand tools to clear invaded lands and started to use the cleared land for crop and pasture production.

The second phase was originally designed for four years (2012-2015) and it was planned that the Prosopis which covered vast areas could be eradicated by uprooting the tree and making charcoal out of it and reclaiming the cleared land for crop and pasture production. However, the project phased out one year earlier due to the evaluation made by the funding organization. The evaluation proved that such intervention in limited Kebeles made the successes registered limited while the invasion continued at alarming rate in other Kebeles (Ibid). The Other NGO which worked on Prosopis management in Afar region was USAID under CARE Ethiopia consortium with its program Pastoral Livelihood Initiatives. CARE Ethiopia worked with the Gewane Woreda Pastoral and Agriculture Development Office where it organized seven groups to clear land invaded by *Prosopis* and use the land for crop cultivation. To make the management of Prosopis successful CARE made different efforts like providing technical support, capacity building trainings, purchasing water pump and creating links to the central markets. Yet, success remained to be far since the reclaimed land through this mechanism was by far less when compared to the land invaded every day. In line with the above idea, a pastoralist resident of Sideh-Faghe Kebele in Amibara Woreda described the situation as:

*Prosopis tree covered almost all the available land in our Kebele, farms, pathways, pasture lands, water points and resident areas. With the support of NGOs, we were organized into cooperatives in order to control and manage Prosopis tree in a coordinated manner. Although we were able to clear several hectares of land, we were not able to control the invasion. This was because the pace of the invasion exceeds our capacity of clearing by cutting and uprooting the tree. What makes things worse is that Prosopis reclaimed the already cleared land before we use it either for crop production or for pasture development (Interview, 17 November, 2018, Andido).*

Although the challenge of Prosopis started before two decades, Afar Regional State governments was late to show their concern about it. On 7th of July 2011 the Afar Regional State issued the Regulation No. 5 to control, manage and eradicate the invasion of *Prosopis in* the Afar Region. The regulation describes the control strategy and the roles and responsibilities of the pertinent regulatory bodies at Regional, Woreda and Kebele levels to implement the strategy designed to prevent, control and eradicate *Prosopis*. In order to accomplished plan-based activities, the Woreda administration council established Prosopis Committee at Woreda and Kebele levels comprising of different stakeholders specifying their roles and responsibilities.

Article 3 of the regulation make clear that the regulation will be implemented only in areas severely affected by Prosopis identified by research and assured by the regional state Pastoral Agricultural Development Bureau. Article 2 (6) of the regulation listed the main types of indigenous trees prohibited not to be cut in the process of clearing Prosopis. Moreover, Article 4(2) of the regulation stated that the land use purpose and use plan has to be presented and get approved before clearing the infested areas.

According to the explanation of regional leaders interviewed during the field visit in 2018 and 2019, the negative perception of Afar pastoralists concerning the invasion of Prosopis has forced the regional state to give concern about its regulation. Although, the impact of Prosopis on the livelihood and environment of pastoralists was not discussed in the parliamentary section, the regional state has felt the threat posed by Prosopis. The issuance of the regulation may indicate the concern of the regional state government about the problems of the people living in Prosopis infested areas however its implementation on the ground is still pending.

Experts in various regional Bureaus and Woreda Offices interviewed during the field visit in 2018 and 2019 mentioned that regional leaders have been heard expressing about the threat posed by the spread of Prosopis. To that end, they established a task force and tried to mobilize the community. But, during the campaign, the community cut all the indigenous trees and used it for charcoal production. The Regional State government decided to stop the campaign to design mechanism which could help to protect indigenous trees. But, the regional state failed to correct the problems and start the campaign against the fast spreading Prosopis. In the meantime, the invading tree got the opportunity to cover vast areas in the region. As stated by the respondents during the focus group discussion, many efforts have been done to eradicate and control *Prosopis* from its areas of invasion. However, the spread of Prosopis continued to be unresolved problem because efforts have been done in the form of uncoordinated campaign and lack of consistency in discharging stated responsibilities among the various stakeholders.

At national level, there was no policy and strategy regarding the control and management of Prosopis until January 2017. The Government of Ethiopia (GoE) has declared Prosopis to be a dangerous plant, which should not be cultivated or planted, and requires containment, control, management and ultimately its removal (FDRE, 2017). It was in this year that the government of Ethiopia recognizes the importance of a strategic approach to control and manage this invasive species particularly in pastoral areas. In this regard the federal government developed a strategic guidance to deal with the problem of Prosopis invasion.

A national Taskforce of experts in pastoralism and the management of Prosopis coordinated the development of the document. This document provides policy and strategic direction for the control of Prosopis invasion, technical guidance and lays out the institutional arrangement and human and physical resources required for the implementation of the Strategy. The objectives of the Strategy are to i) prevent the expansion of Prosopis to un-invaded areas, ii) to reclaim and restore invaded areas after Prosopis clearance and sustainably manage Prosopis for productive use and increasing biodiversity and iii) to regulate and coordinate Prosopis management initiatives for complimentarily and synergy.

The strategy document suggested several arrangements for effective control and management of Prosopis such as setting up of Prosopis Management Councils at national, Regional and Woreda levels; deciding which interventions should be done where and by whom; intervention mechanisms for Prosopis control and management (improve knowledge about Prosopis and build capacity and commitment to address the problem, prevention of new introductions of Prosopis and removal of Prosopis where it is already established); monitoring, institutional arrangements and knowledge management

mainstreaming of Prosopis in land use planning and development activities and management structures required, and roles and responsibilities.

The national Prosopis management strategy document mentioned that a National Prosopis Management Council (NPMC) has to be established in order to coordinate the process of Prosopis management. The Council will constitute ministers and executives of agencies including key stakeholder institutions such as the Ministry of Agriculture and Natural Resources (MoANR), Ministry of Environment, Forest and Climate Change (MEFCC), Ministry of Federal and Pastoralist Affairs (MoFA), Ethiopian Institute of Agricultural Research (*EIAR*), CSOs and NGOs. However, regional officials and experts in various Bureaus and Offices of Afar Regional State interviewed during the field Visit in 2018 mentioned that the federal government did anything accept designing Prosopis management strategy and facilitating structures for the various stakeholders.

Experts in Teru Woreda Pastoralist and Agriculture Development Office who participated in the FGD during the researcher's field visit in Feburary 2018underscored that the Federal government is too late to act against the threat posed by the invasion of Prosopis at least in terms of designing strategy to control and manage Prosopis in affected areas. They further elaborated that by the time the federal government designed a strategy on the control and management of Prosopis, most of the Woredas in Afar region were infested by Prosopis and pastoralists and agro-pastoralists have already lost their water points, rangeland, farms and passing corridors.

The plan of the regulation presented different procedural approaches and mechanisms of controlling the expansion of Prosopis such as identifying areas already invaded, areas started to be invaded and areas which will be invaded soon and create awareness to the various stakeholders. Preparing land use plan with the participation of professionals should precede the start of clearing invaded areas. The controlling mechanisms were uprooting Prosopis three that grew around residence areas and passing corridors either individually or in groups with the support of Kebele and clan leaders; picking the seeds of Prosopis before spreading, cutting immature Prosopis trees and use for firewood, charcoal and other uses; to avoid further germination of Prosopis, the tree has to be cut 15-30 cm deep inside.

Participants of the interview mentioned that the effort of the various stakeholders to control the invasion of Prosopis was not properly coordinated. The area of land invaded every time was by far greater than the land cleared. Although pastoralists were allowed to use Prosopis for charcoal, it was found that they cut other indigenous trees instead of Prosopis. Due to this reason, the regional state passed a decision which forbid cutting of Prosopis until it will design another strategy of controlling the spread of Prosopis. However, the regional state government did not yet come up with a new strategy and the uncontrolled Prosopis has been expending to Woredas in the regional state(Interview 8 November, 2018, Andido).

Although the proposed development of a National Land Use Plan provides an opportunity to integrate Prosopis and other invasive species into land use management decisions across the country, there is a wide gap between the practical implementations and actual performance on the ground. According to the participants of the interviewees, neither the national strategy nor the regional regulation on the control and management of Prosopis bring significant change in solving problems related to the invasion of Prosopis in Afar region. In line with this, one regional official in the Regional Bureau of Finance and Economic Development has the following to say:

*Prosopis invasion has created severe threat to pastoral and agro-pastoral livelihood in our region. We use Productive Safety Net Project to coordinate the efforts related to control and manage Prosopis and our communities have invested their time, energy and resources in clearing Prosopis. Development agencies and NGOs have also supported activities to eradicate Prosopis. However, effective control of Prosopis is not yet achieved because efforts remained to be fragmented. Due to the aggressive nature of the plant, the proportion of land invaded every time is more than the reclaimed land. Our development goal of improving pastoral and agro-pastoral livelihood and reducing poverty will remain a dream unless serious and coordinated action is taken to mitigate the threat posed by Prosopis (Interview, 26 March, 2019, Semera).*

An expert in Assaita Woreda Pastoral and Agriculture Office interviewed in February 2019 underscored that the invasion of Prosopis has been significantly affecting the benefit of pastoralists from their animals. He further elaborated that, Prosopis has been covering grazing lands and water points and it also restricted the seasonal movement of pastoralists with their animals in search of pasture.

## Conclusion

The invasion of Prosopis has been adversely affecting the socio-economic life of Afar pastoral and agro-pastoral communities by claiming rangelands and water points and thereby causing decline in livestock production and productivity. The Volume of the Awash River has been reduced due to the growth of dense Prosopis thickets along the valley. The plant also cause harm on the health of animals and human beings, as well as environmental degradation. Loss of livestock and inability of agro-pastoralists to further engage in crop production because of the reclaiming of agricultural lands by Prosopis has subjected the people to food insecurity.

The federal and the Afar Regional State governments, NOGs as well as local community members became concerned about the control and management of Prosopis for the last two decades due to the multidimensional adverse effects of the invasion of Prosopis. Federal government designed national strategy on Prosopis Management and the Afar Regional State issued Regulation to control, manage and eradicate Prosopis. Moreover, NGOs like FARM Africa and CARE Ethiopia have tried to support the community's effort of controlling and managing Prosopis in the region. However, the national strategy and the regional state regulation were not practically implemented due to lack of leadership commitment, lack of coordination among the various stakeholders and the fragmented nature of efforts of controlling and managing Prosopis. The invasion of Prosopis continued to be a severe threat to the livelihood of Afar pastoralist and agro-pastoralists. Therefore, the challenge posed by Prosopis remained to bea contributing factor hindering the socio-economic development of Afar Regional State.

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