

Study on Production & Trade of Charcoal from Prosopis Juliflora

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BACKGROUND INFORMATION

- Among others, *P. Juliflora*, a multipurpose tree or shrub native to South America, Central America and the Caribbean was *introduced to Ethiopia intentionally as an agro-forestry species in early 1980s* (Ameha, 2006).
- *Prosopis* has had a major impact on the Afar people, who are pastoralists and agro-pastoralists. *Prosopis* often grows to form dense, impenetrable thickets which crowd out other trees and grass, reducing grazing and browsing potential for animals. It has closed off access to important watering holes and migration routes. The large thorns of *Prosopis* can cause injuries to animals and people. Eating large volumes of unprocessed seed pods of *Prosopis* can damage animals' teeth and jaws, and cause constipation and even death if consumed heavily. For these reasons, *Prosopis* has earned the name of *'Devil Tree' among the Afar*.

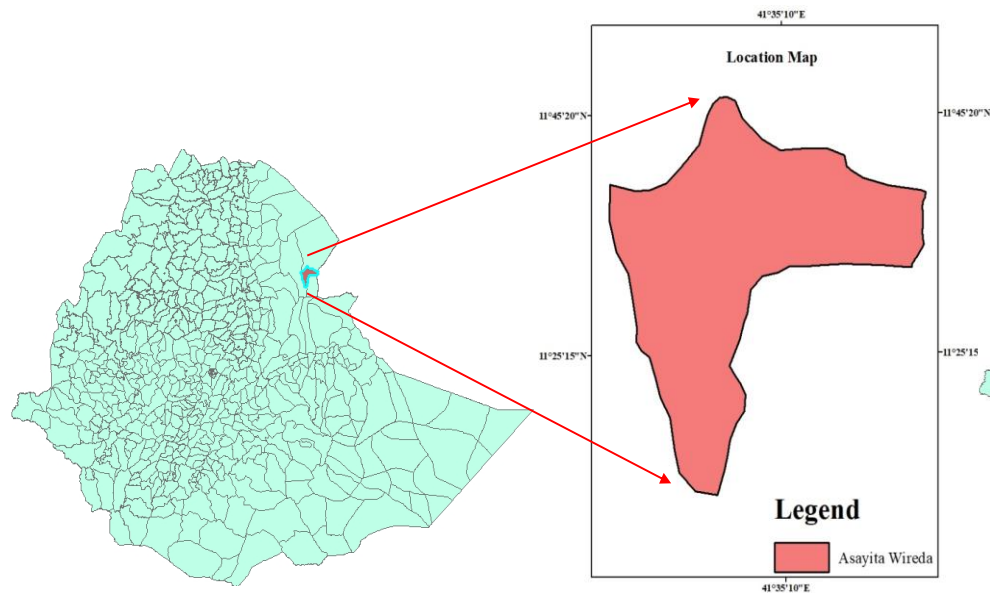
- A number of characteristics make *Prosopis* very difficult and costly to control.
 - It has very deep roots and coppices vigorously unless roots are excavated at least 30 centimetres below soil.
 - Its seeds are very small and are viable for a long period of time.
 - It is spread very quickly as wild animals and livestock feed on the seed pods, which come twice a year.
 - As pastoralists migrate around the landscape, their animals fertilise the land with *Prosopis* trees.
- Despite these threats, nowadays the species ***create benefits*** widely used for firewood, charcoal and construction purpose. The interviewed community member admitted that use *Prosopis* products in their households and many people in *Afar made money from Prosopis charcoal that motivated by this new source of income*, even for several Afar people it used as alternative livelihood to better income source, economic job opportunities and coping strategy to the recurrent drought.

- The main purpose of this study is to understand why an increasingly illegal charcoal production and transportation observable facts in Afar while government banned, what could be main stakeholder's arguments concerning on the production and trade of Prosopis charcoal through a licensing system and what could be main focus areas of changes in behaviour relation to Prosopis management and utilization (what people know, what people can do, and what they think).
- Respectively Afar region BoLAND is interested and motivated by a number of reasons to this study: 1st since regional government was banned charcoal production, an increasingly illegal charcoal production and transportation observable facts; 2nd by the name of Prosopis tree, hardly available indigenous trees used to charcoal production; and 3rd dramatically expansion of Prosopis which resulted very serious risks to livelihoods of afar people and biodiversity.

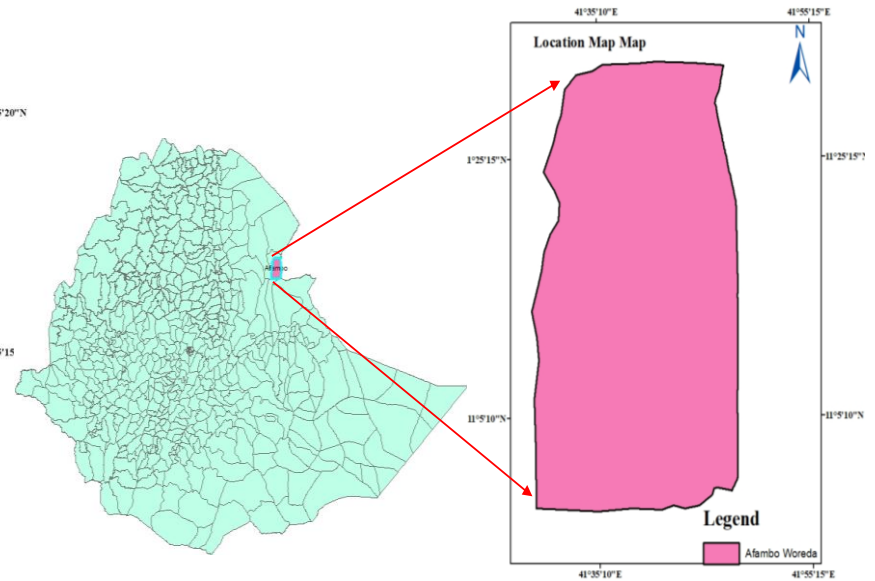
- The study focused on the charcoal producer, charcoal trader and government respond to the issues of Prosopis management and utilization such as charcoal production from Prosopis trees.
- Individual and community member interviews, focus group discussion, key informant interviews and field observation were made to collect some valuable data and information relevant for this study.
- Besides, literature reviews were made to verify and triangulate what has been collected primary data and analysis Prosopis charcoal production and trade in the study areas.

The study is located in Aysaita and Afambo woreda of Afar region

Location Map of Aysaita Woreda



Location Map of Afambo Woreda



LITERATURE REVIEW

- The historical contexts of Prosopis and different opinions have led to the present position with two widely held points of view. There is one argument for further planting and improved management of Prosopis Juliflora while the other one supports eradication and control. (Magid et al, 2014).
- In the late 1990s, the Forestry Research Programme of the UK Department for International Development supported a project by the HDRA in the UK and CAZRI in India to collate information about the most common Prosopis species. The three main conclusions of that effort are (1) Prosopis can be a very valuable resource for the dry lands; (2) efforts to eradicate this species are overly expensive and likely to be ineffective; and (3) Prosopis can be managed to be a very valuable source of commercial products and livelihoods in the dry lands.”
- In the assessment of the Afar eradication program for instance the area under Prosopis expands more than 20 times faster than the area that is brought under productive use. Also menaces such as Prosopis have not had much attention from research and development community and this would need to be changed too (Mehari el 20).

- Prosopis produce high quality charcoal depending on the type of species. The wood does not spit, spark, or emit much smoke and thus, it is called wooden anthracite. Moreover, the durability, strength, less shrinkage, less cracking and hardness make the wood of Prosopis Juliflora more useful for many purposes (Victor, 2007).
- In Ethiopia, a wood energy survey of 1996/97 indicates that **230,000 tonnes of charcoal are used every year**. Seventy percent of the total production is used in towns, supplying 97% of household energy needs (Mugo and Ong, 2006).
- In Afar the production of charcoal from *Prosopis* was very much encouraging. The problem however is that the *Prosopis* charcoal is inferior to the one from acacia for instance. Instead of *Prosopis* charcoal the acacia was widely processed accelerating the degradation of the common land. A total ban on charcoal trading was hence re-invoked in several parts of this region (Mehari *et al*, 2013).

CONCLUSION

- **Frustration:** during the interview there were very high frustrations to talk about charcoal issue that 22% of the respondents were rejected interview. Most of the frustrations are common to their charcoals were detained by government and fear to be in prison. The degree of frustration high in urban than rural; and this could directly related government supervision focused on urban areas.
- **Illegal charcoal production:** is an increasingly and a major cause of deforestation in the study areas that government should emplaced Prosopis management and utilization system and program that by name of Prosopis charcoal hardly available indigenous trees are burning.
- **Gender mainstream:** study confirmed gender is an important factor to charcoal production and trade intervention that women have little involvement into production aspect while very high into trading aspect.

- **Complementary livelihoods:** study confirmed an overall assumption that charcoal businesses are frequent source of income paired with other livelihood in the study areas. In rural area, significant people livelihoods are complementary with charcoal business especially during drought period & dry season. The charcoal businesses in the study area are an element of livelihoods to fulfil family basic and economic needs; and also it is a primary option to fill income gaps when the event of disaster/drought provoked their main livelihood.
- **Business orientation:** finding indicates degree of business oriented and exploiters to charcoal production and trades are great numbers to commercial and intermediate exploiters. Thus charcoal business for producers are more to intermediate exploiters and traders are more to commercial exploiters while subsistence exploiters were very small to both producers and traders.
- **Household expenditures:** findings to household expenditure use from charcoal earn is large in particular to charcoal producer of rural people than trader. In general charcoal business was contributing a lot for household expenditure and well-being of the people who involved in charcoal production and trade. It normally contributed to household foods, goods, medicals, schools expenditure and part of remained money was also used to fixed asset and savings.

- **Household basic needs:** findings on household basic and economic needs have showed charcoal business well pleased economic supports into better income sources with degree to comprehensively and spontaneously helpful. It obviously known that in the study areas there are very abundant Prosopis raw materials that available throughout a year, increasingly in communal land, low investment cost, high market; these all enforces charcoal business to be energetic economic support to better income sources and entering points to economic jobs opportunities.
- **Charcoal burning area:** there was no charcoal burning areas allocated by concerned bodies that charcoal producers were used area's selected based on raw material nearness and other preferable conditions. Regarding to burning area importance, more respondents were believed that specific areas allocate to charcoal burning is important associated with environment and health issues. While some of the respondents were contrarily believed not important associated with uncertainty of specific areas possibly will far away from their residence, Prosopis raw materials, selling points and incurred additional cost.
- **Charcoal maker:** scenario to afar local people were not practicing charcoal production; these days such scenario completely changing and trends to partnership is declining through time as production skills & knowledge were gaining throughout and major livelihoods were weakening to cope with the recurrent drought; corresponding to abundant availability and low investment cost are factors to afar local people involvements an increasingly observed in the study areas.

- **Mainly burning trees:** findings show more charcoal were from *Prosopis* and few also from indigenous trees. Moreover community members were described presently in their areas nobody used indigenous tree except *Prosopis*, this assumption might in question if we associated to individual respondents. Government charcoal restriction couldn't stop charcoal production either from *Prosopis* and indigenous tree. These associated to very poor control and increasingly illegal charcoal productions are reason for hardly available indigenous trees lost by now and previously.
- **Government approach:** Encase of the study area's scenario "existing government approach to control charcoal businesses are grounds to aggravating incidence to indigenous tree burning as result of increasingly illegal charcoal production.
- **Clearing & cutting methods:** more charcoal producers were used coppicing method; some were used extraction method when land used for farming and few were used also both methods.
- Coppicing method greatly applied by charcoal producers are more expanding *Prosopis* than controlling; except necessary awareness creation, conducive regulation, licensing system, incentives and associated with land cover/mapping activities are emplaced and reinforce producers to practice and use extraction method.
- Occasionally coppicing method's may recommended based on land use, community mapping and reached consensus to *Prosopis* lands are marginal and demarcated only for charcoal production; it possibly will use coppicing method. At least it will have implication to flowering and seeding stages.

Table 5. Per hectare production costs and revenues; 120 birr/day (opportunity cost of labour) and 170 birr/bag (farm gate price)

Level of Prosopis invasion	Total labour Clearing, pyrolosis, packing (man- days)	Margin al costs (birr)	Average charcoal yield (bags)	Marginal revenue	Margina l profits (birr)	Cost-Benefit ratio: For every one birr invested, producers get this much birr in return
Coppicing						
Sparse	50	6000	150	25500	19,500	4.25
Moderate	60	7200	200	34000	26,800	4.72
Heavy	120	14400	500	85000	70,600	5.90
Extraction						
Sparse	90	10800	200	34000	23,200	3.15
Moderate	120	14400	300	51000	36,600	3.54
Heavy	180	21600	700	119000	97,400	5.51

- **Techniques for managing:** study identified five control techniques & come to a decision for three techniques such as mechanical, utilization and cultural; that using these three control techniques are more applicable and tested by Ethiopia forestry research institution and Farm Africa at Afar region.
- **Prosopis stand management:** the experiments carried out at Aysaita and Amibera woreda have proved *Prosopis* can be managed using the different techniques such as cutting, burning and stand management; that very vital to consider and include in *Prosopis* management and utilization regulation and guidelines. The stand management trial has verified that if continues follow up and supervision is carried out in managing an established *Prosopis* stand, the rate of invasion and expansion of *Prosopis* can be controlled.
- **Conducive regulation:** more people were underlined regional government should facilitate conducive regulation and lift restriction; community members expressed “at present nobody can judge about our people fate and outcome except ourselves as past 5-10 years nature itself educated us, what was natural and manmade threats and also how we could mitigate with threats”.
- In all community member interviews were strongly expressed now time to negotiate with government and look for organized response to *Prosopis* management and control through potential economic benefits and respectively to reclaim potentials land to regenerate indigenous tree, pastures and water points soon.

- **Community leading role:** demanding of joint community proactive rules for management and control of *Prosopis*, it is unlikely that individuals will invest in proper managing & utilizing *Prosopis* in the communal land tenure such as rangelands, water points, settlements etc
- **Markets and marketing:** many people that met on the study visit remarked that to control *Prosopis* there is only thing that needs to be done, that is to attach a value to *Prosopis* and by extension its products. And this is clearly a function of markets and marketing issues to management and utilization of *Prosopis* in the study areas.
- **Cost-benefit analysis:** charcoal production cost-benefit analysis shows that it is feasible even when the roots are fully extracted to prevent rapid re-growth. The cost benefit ratio is above 1:3 (1 birr invested get above 3 birr return) for all three categories of *Prosopis* invasion.

- **Perception to regulation:** *Prosopis* control and management regulation in the study areas were not aware and known by significant number of people including lower government administration units. Thus regulation not tested and adopted at all level of government structures and community members.
- **Licensing system:** considerable numbers of people were interested charcoal business through a licensing system and piloting in few areas; that people very eager government to lift restriction and emplace helpful *Prosopis* management and utilization regulation and licensing system.
- **Land use & cover:** As natural resources based on land; people are against to land use plan and policy that working haphazardly. This resulted an increasingly illegal charcoal business in the areas and has not adopt land use policy related to natural resource management including charcoal production and *Prosopis* invasion. Charcoal producer has not specific area to make charcoal that created ideal environment for charcoal producer to cut the indigenous tree resource as they want.

RECOMMENDATION

- Since the benefit of *Prosopis* assured as potential charcoal energy source referenced to relevant literatures and this study confirmed assumption to economic viability; its management and utilization mechanism should be established between concerned institutions and community members within Afar region and/or study areas.
- To reduce the negative impacts and control the wide spread of *Prosopis*, business oriented *Prosopis* charcoal should use the species as alternative livelihoods and demanding domestic fuel. It can be achieved through developing encouraging regulation, technical guideline & licensing system. There is high potential to plan for employment opportunities at regionally by assessing *Prosopis* using a remote sensing and GIS.
- There is a need to form regional and woreda *Prosopis* taskforces to discuss the issues including all stakeholders, pastoralist, elected public representatives/pastoralist standing committee, private entrepreneurs, NGO's and research institutions.

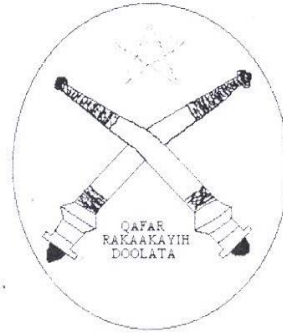
- As *Prosopis* very abundant and potential to charcoal business and economic job opportunities; it has significant advantages of being add value into locally produced charcoals such as formed into briquettes. A formed briquettes easier to transport, store and avoids air pollutions; and suggested further study on feasibility and market chain analysis; and make sure production and trade of charcoal briquettes are successful business investment.
- Growing demand of *Prosopis* charcoal from escalating urban and pre urban population that charcoal business could make it more economically feasible. However, as production of *Prosopis* charcoal scales up; it may suppress charcoal prices as well as depletion of large *Prosopis* areas lead to raw material constraints. Analysing these two elements of charcoal business and *Prosopis* resource base is important for the long-term economic sustainability of *Prosopis* reclamation.
- The regional government should review *Prosopis* control and management regulation to find ways addressing the economic disincentives for individual charcoal producers to properly *Prosopis* dig up (use extraction method). The regulation focused only trade charcoals from *Prosopis*.

- Establish demonstration sites or model *Prosopis* villages and demonstrate *Prosopis* management and utilization techniques. As well as demonstrate and introduce low priced and improved technologies (kilns for charcoal production).
- As *Prosopis* management and products are part and mechanism of natural resource management; rely upon forestry education and land use plan and management is vital to *Prosopis* management and utilization.
- Nature of *Prosopis* weed and rate of distribution very high and complex; largely political commitment, coordination and resource mobilizations are elements to manage and control through utilization.
- Whenever *Prosopis* charcoal production proposed; determining factors should always considers such as commercial viability, control techniques, policy/regulation, land use plan, *Prosopis* mapping, value adding, market chain and technical capacity.

- There should be very strong and applicable criteria and requirements for *Prosopis* commercial charcoal production & transportation and trade; such as to be a charcoal producer and trader, to obtain a licence, restructuring trade, land cover and map, define tree species/number/volume, harvesting of plantation, charcoal production harvesting and methods of charcoal production
- Local people should learn methods of charcoal production and are able to cope with recurring drought conditions prevailing in the study areas.
- The Afar people's opinion about charcoal is that for the future there would be a huge demand for the charcoal and in the last two years there is a great increase to charcoal makers and also charcoal price.

- Finally study proposes one year pilot project on management, marketing and utilisation of *Prosopis* products of charcoal etc that will focus on few woredas as a pilot area. The objectives of the project will be: evaluating techniques of management (regulation & licensing system), evaluating the relative contribution of *Prosopis* to the charcoal market, the merits/demerits of *Prosopis* charcoal (livelihood, availability, regularity, calorific values), training on best carbonisation techniques, introduction of technologies, strengthening the capacity of production groups in marketing of *Prosopis* products, as well as assisting the stakeholders in the business to come up with viable market led programs on *Prosopis* management and utilisation.

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AFAR REGION *DINKARA GAZZETA*

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A Regulation Issued to Control, Manage
and Eradicate the invasion of *Prosopis* in
the Afar National Regional State

























