



# Total Economic Value of Prosopis Invasion: An economic assessment of the impact of Prosopis invasion and participative management approaches in Afar region, Ethiopia

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(agro-)pastoral Livelihoods in the Horn of Africa



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# Introduction

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- The Prosopis dilemma
  - Utilize/control or Eradicate
  - Cost effective management
- What are the benefits and costs?
  - Utilization or control
  - Eradication
  - Inaction
- Total Economic value
  - Primary and secondary



# Materials and Methods: Techniques used

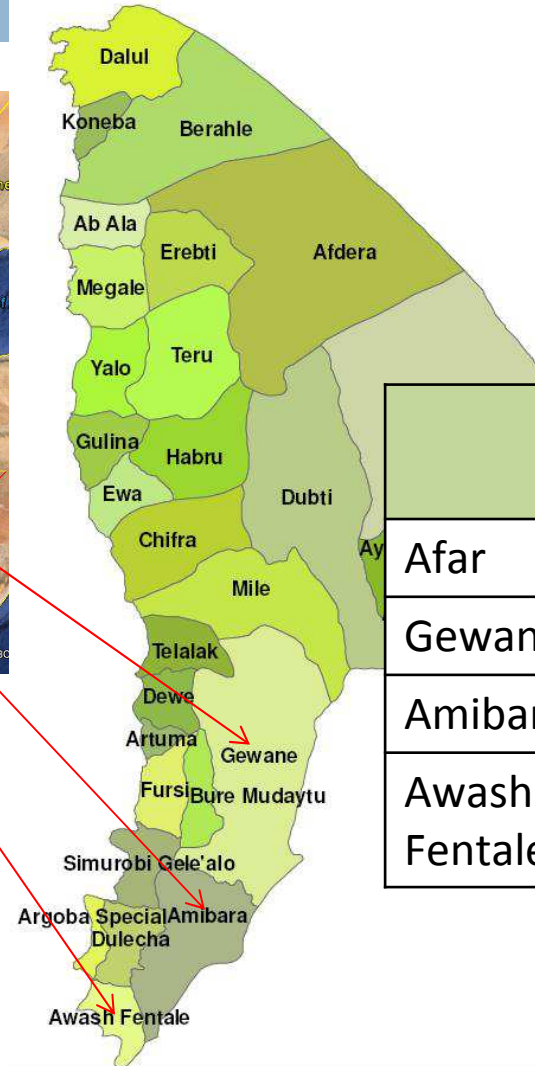
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- The total economic value (TEV)
  - use values
  - non-use or existence values
- Valuation techniques
  - Stated preference- non use values
  - Revealed & stated preference-use values
  - “Dose response function” or “production function”



# Materials and Methods: Study area

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	Sample size	Kebeles
Afar	490	490
Gewane	177	177
Amibara	213	213
Awash Fentale	100	100

# Materials and Methods: Study tools

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# Economic Benefits

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- ▣ Environmental income:
  - Afar region -4 billion birr
- ▣ Desalinization
  - More than 60million birr
- ▣ Carbon sequestration:
  - 200 million birr
- ▣ Crop production:
  - Crop income 182 million birr



# Negative impacts

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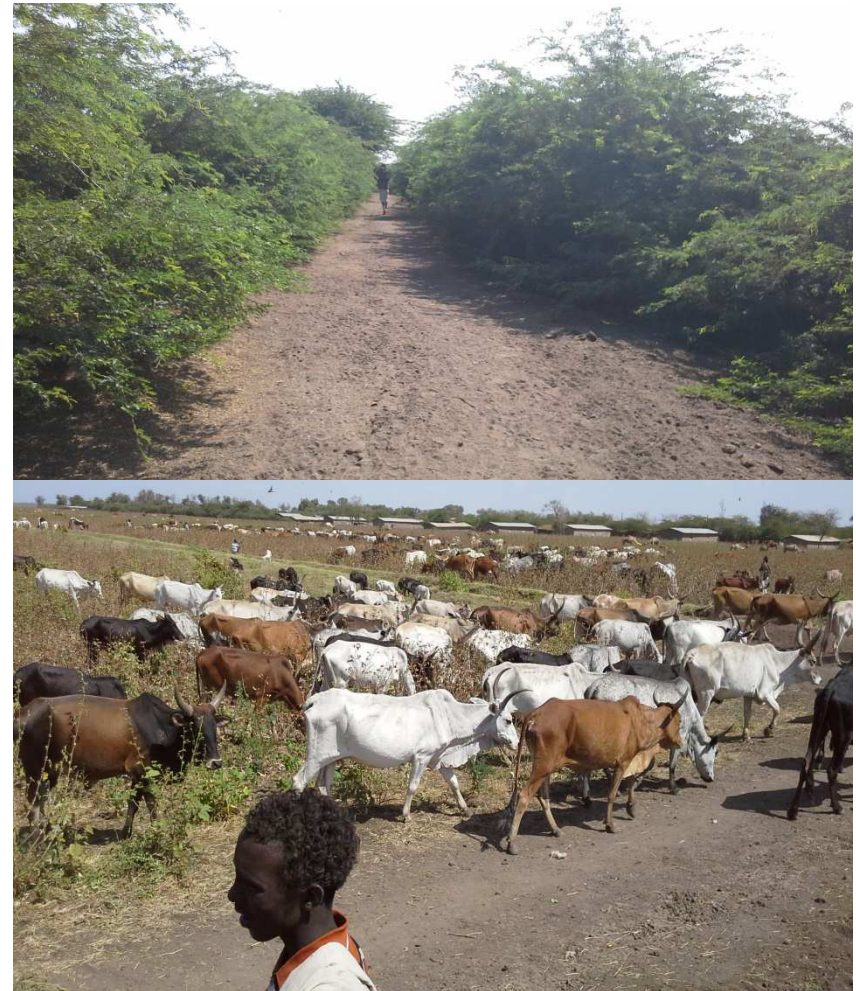
- Negative impact on animal production :
  - Milk loss-1 4million birr
  - Weight loss 546 million birr
- Negative impact on animal health:
  - A bout 182 million birr
- Negative impact on Human health:
  - Total loss per household per year is \$189
  - 470 million birr-Afar
- Biodiversity
  - Pasture-1.04 billion birr



# Total Benefits and costs

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- ▣ Benefits 4.4 billion and costs 2.2 billion
- ▣ OECD guidelines on weighting
  - ▣ UNDP definition of pastoralists
- ▣ If we do not control
  - ▣ TEV = -37 trillion in 30 years
- ▣ If we control
  - ▣ TEV = 92 billion in 30 years
- ▣ Action is needed





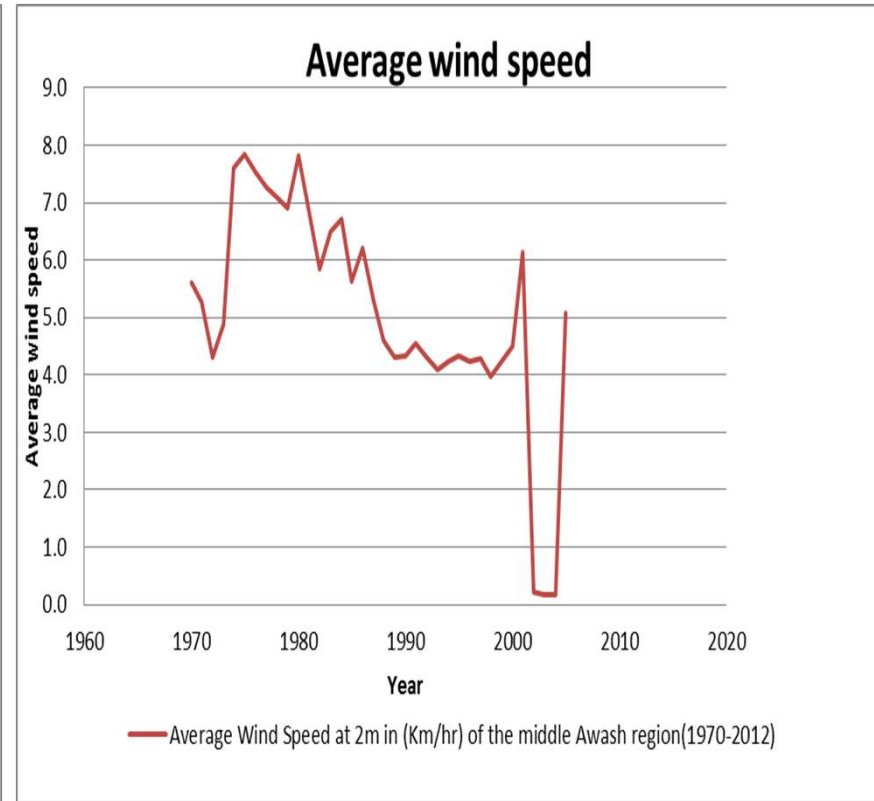
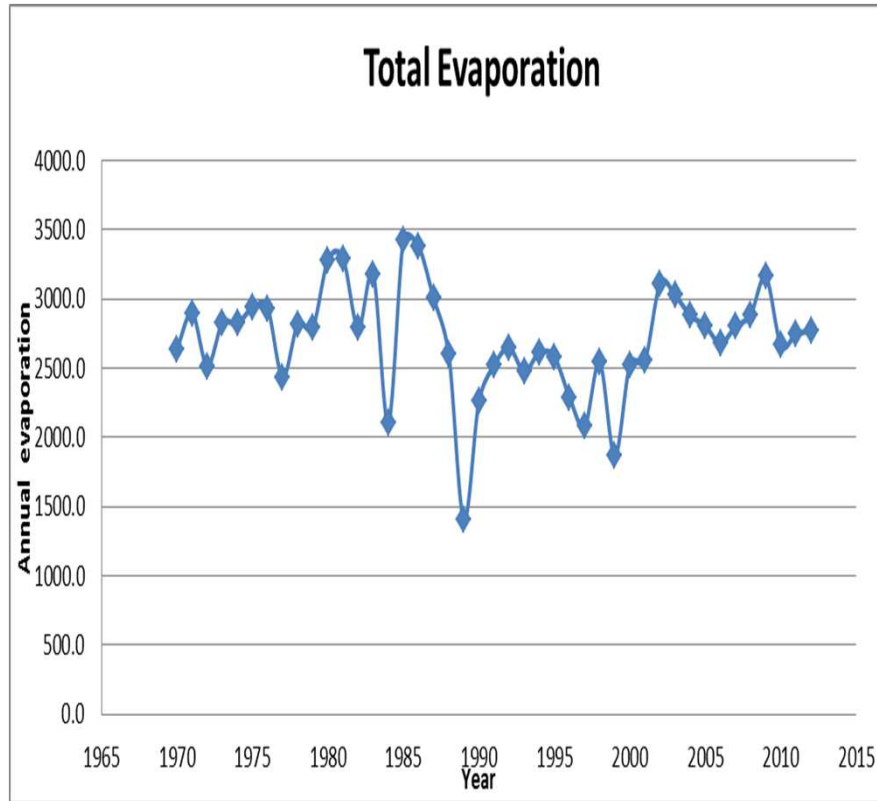
# Prosopis impact on climate variables

Complete eradication may result to loss of ecological benefits and environmental income

	Temperature	Rainfall	ARH	SR	Evapour	Wind
$r_{xy}$	0.79***	0.0085	0.58***	-0.30*	-0.44*	-0.7604***
$R^2_{xy}$	0.63***	0.0001	0.34***	0.09*	0.19*	0.5782***
Slope	0.0002**	0.0003	0.0005***	-0.04*	-0.01*	-0.011**

- Solar radiation, evaporation, and wind (-)
- Relative humidity and temperature
  - ▣ absorption/trapping of solar radiation (Cao et al., 2010)
- Control use but eradication

# Total Evaporation and Average Wind Speed



# Management of prosopis

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## ▣ Utilization Pod crashing

- Pod crashing (NB =-785 birr/yr)
- Charcoal burning (NB =7985 birr/yr)



## ▣ Mechanical clearing – costs effectiveness

- Clearing without using wood (NB =-2826 birr/ha)
- Clearing & using wood (NB =30 birr)
- Clearing, using wood & digging roots (NB =-2116 birr)

# Management of prosopis

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- ▣ Mechanical clearing charcoal burning
  - Clearing without digging roots (NB =1630 birr)
  - Clearing & digging roots (NB =-516 birr)
  - Clearing, digging roots & crop production (NB =9484 birr)
  - Clearing, digging roots & hay (NB =775 birr)
  
- ▣ Implications for sustainable management
  - Mechanical is economical feasible with use
  - Continued utilization either for fodder or crop production

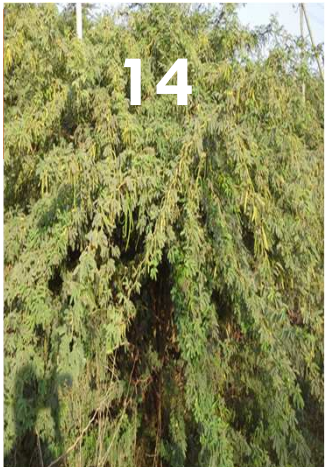


# Requirements for sustainable management

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- ▣ Involve pastoralists
  - Communal land rights
  - Empower clan institutions
  - Rethink the mass clearing
- ▣ Provide high powered generators
  - Those are willing
  - And are along the river and water canals
- ▣ Seek pastoralists opinion
  - Cutting equipment Vs generators





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END OF THE PRESENTATION COMMENTS AND QUESTION ARE WELCOME

**GEDEGA**

