HOUSEHOLD PERCEPTION ABOUT *PROSOPIS* AND ITS EFFECT ON PASTORAL LIVELIHOOD DIVERSIFICATION STRATEGY

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Outline of the Presentation

❖ **Introduction**

❖ **Methodology**

❖ **Results and discussion**

❖ **Summary, Conclusion and Recommendations**

1. INTRODUCTION

1.1 Background of the Study

★ In Ethiopia, Pastoralists constitute **11 percent** of the total population.

★ Pastoralists raise 50-70 % of their livelihood from livestock. However, 1.5 million (27 %) earn good revenue from livestock (CSA, 2007).

★ Pastoralists are exposed to climate changes including drought and dwindling pasture land by **invasive alien species** (IAS).

★ The aggressive invasion of *Prosopis juliflora* in pastoral areas is **displacing native trees**, and **reducing grazing potential** (Pasiecznik *et. al.*, 2001).

1.2 Statement of the Problem

✴ Afar Region is one of food insecure regions. The area is pastoral region with 90% people depending on subsistence livestock production (CSA, 2007).

✴ Over 700,000 hec. of land is either invaded or at risk of invasion in the Afar Region, (US FS, 2006).

✴ **Eradication** of the weed has been one of the means of controlling the devastating effects of the weed. **But for how long??**

✴ The Afar community realize that productive utilization of *Prosopis* has a dual purpose

✴ According to a survey conducted in Gewane and Amibara districts; 87 % of the interviewed agro-pastoralists were engaged in other activities such as selling labor, charcoal prod'n and trade (US FS, 2006).

Statement of the Problem (cont'd)

⭐ A DFID project (R7295) recommend eradication was **not only impossible but also unnecessary** if the knowledge contained therein was applied effectively, while also effectively controlling further spread (Pasiecznik *et al*., 2001).

⭐ On the other hand, Barrett *et al*. (2001) suggest that reasons can be classified as "**push**" and "**pull**" factors where Diver/n by poor HH in developing countries is usually a response to "push" factors.

⭐ However, the studies carried out in the area either rarely consider the **likely effect** of the invasive weed on pastoral livelihood and **perception related issues** or sufficient information is not available concerning *prosopis*.

⭐ Therefore, this study was designed to highlight the facts underlying pastoralist's perception about *prosopis* and pastoral livelihood diversification strategies in Gewane district of Afar regional state.

1.3 Objectives of the study

➡ **Objectives :**
- To assess the determinants of livelihood diversification strategies of pastoralists
- To identify factors affecting community perception concerning *Prosopis juliflora*.
- To assess the effect of pastoralists perception regarding *Prosopis* on their livelihood diversification strategies.

2. RESEARCH METHODOLOGY

2.1 The study area

Location of Afar Region in Ethiopia
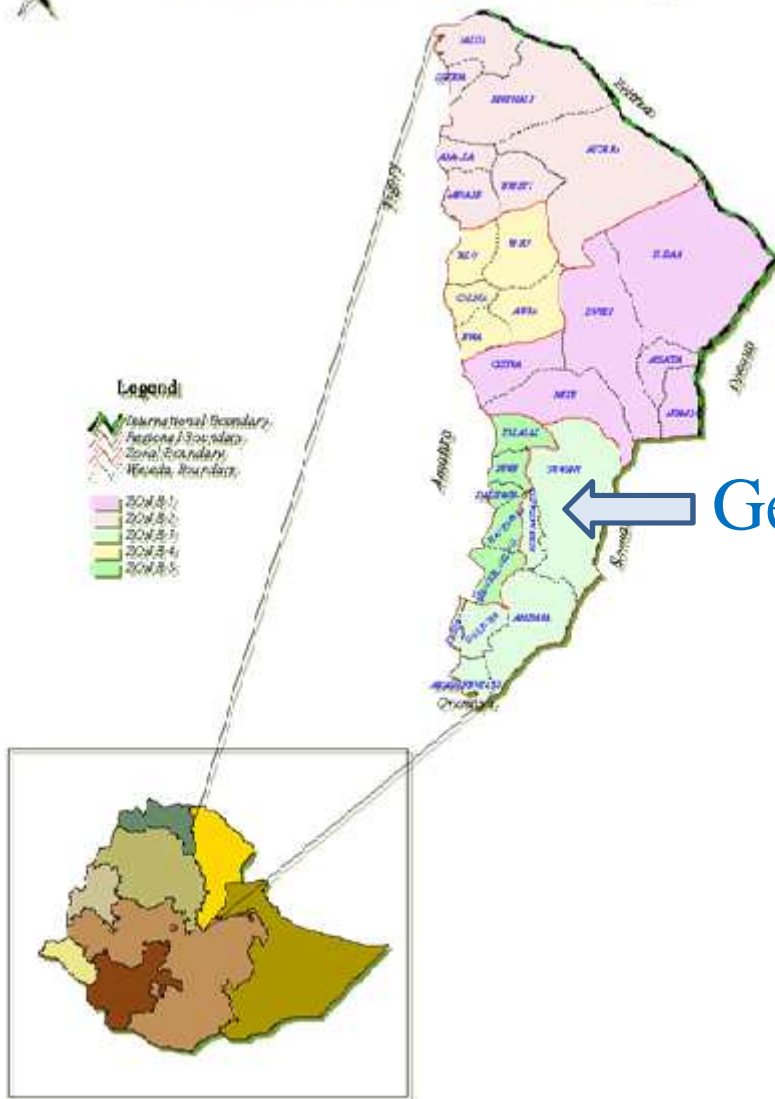
Location: South Afar
Area: 86,796 square kilometers
Population: 25331/31,313 =81%, rural
Livelihood: Pastoral in 2 kebeles
Agro-pastoral in 8 kebeles

Gewane

2.2 Sampling, and Data Collection

⭐ A **three-stage** sampling procedure was followed. **First**, Gewane was selected purposively. **Second**, 5 *kebeles* (Gebeyaborra, Amassabure, Urrafita, Gelilladora and Bereiforra) were selected randomly. **Finally**, a total of 150 respondents were randomly selected based on proportion to size

⭐ Primary data was collected through **pre-tested structured questionnaire** and **Informal interview**.

⭐ Secondary data was collected from **written documents** and **recent research works.**

2.4 Data Analysis

1 Tabular analysis using means, SD, percentages, SDI, X^2 and t-test

2 Multinomial logit model and two-step instrumental variable Tobit (ivtobit) model were used

To identify the perception of the farmers a likert scale items, which had a different grade used to calculate perception index, then the result was classified into bad/disfavor, neutral, and good/favor category.

2.4.1 Multinomial logit model construction

✵ According to McFadden (1973), the multinomial logit model is derived from random utility function.

✵ Supposing that for the ith individual that is faced with j alternatives (the perception categories) indexed as j = 1, 2,…, n, then the individual's utility (U_{ij}) from the choice alternatives as

$$U_{ij} = \sum_{i=1}^{n} \beta_{ij} X_{ij} + \varepsilon_{ij}$$

✵ Where X_{ij} is a vector of factors that explain the decision made (in this case, the perception categories) by individual respondents, β_{ij} is a set of parameters that reflect the impact of changes in X_{ij} on U_{ij}, and ε_{ij} is an unobservable error term.

✵ If Y_i is a random variable that indicates the choice made, then the probability that alternative j is chosen is given by

Continued

$$prob(Y_{i=j}) = \frac{e^{\beta_{ij} X_{ij}}}{\sum_{j=1}^{j} e^{\beta_{ij} Y_{ij}}} , j = 0,1,2, \dots, n$$

The equation can be **normalized** by assuming $\beta_{ij} = 0$, in which case the probabilities can be estimated as:

$$\boldsymbol{prob}(Y_i = 0) = \frac{1}{1 + \sum_{j=1}^{j} e^{\beta'_j X_{ij}}}$$

This observation is the usual basis for **Hausnan's specification test**. The statistic is

$$X^2 = (\hat{\beta}_s - \hat{\beta}_f)'[\hat{V}_s - \hat{V}_f]^{-1}(\hat{\beta}_s - \hat{\beta}_f),$$

The marginal effect on the probability that Pr(y=1) implied by the marginal increase in a given explanatory variable is computed by:

$$\frac{\partial Pr\ y=1|x}{\partial xj} = \frac{\partial Pr\ y=1|x}{\partial x\beta} \frac{\partial x\beta}{\partial xj} = \Psi'\ x\beta\ \beta j = \Psi\ x\beta\ \beta j$$

The Hausman test of (IIA) was also employed to check whether independence of irrelevant alternatives assumption is violated.

2.4.2 ivtobit model

To assess the factors influencing pastoral livelihood diversification, two step instrumental variable tobit regression model was employed on the different means of livelihood defined by Simpson's diversification index (Patil and Taillie, 1982) as dependent variables.

$$SDI = 1 - \sum_{i=1}^{n} \left[\frac{M_i}{M_T}\right]^2 \quad i = 1,2,\ldots,n$$

Two-step Tobit model (ivtobit)

The Tobit model involving **endogenous regressor**, can be explained

$$Y_1^* = \alpha_1 \beta_1 + X_1' \beta_1 + \varepsilon_1$$

$$Y_2 = x' \pi + v$$

Continued

For joint normal errors $= \gamma v + \xi$, where ξ is an independent normal error, so

$$Y_1^* = \alpha_1 \beta_1 + X_1' \beta_1 + \gamma v + \xi$$

Whereas, a two-step estimation procedure calculates predicted residuals from OLS regression of on X and then obtains Tobit estimates from the model as follows:

$$Y_1^* = \alpha_1 Y_2 + X_1' \beta_1 + \gamma \hat{v} + e_1$$

Where, the error is normally distributed.

To test whether the applied ivtobit estimator, is consistent and more efficient than an alternative Tobit estimator, Hausman's model specification test and Wald test on exogeneity were also employed.

3. RESULTS AND DISCUSSIONS

3.1 Household and Economic Characteristics

Categorical variables		Household Perception						Total		χ^2 test
		Disfavor		Neutral		Favor				
		Fre.	%	Fre.	%	Fre.	%	Fre.	%	
Sex	Female	19	25.0	17	47.2	21	55.3	57	38.0	11.69***
	Male	57	75.0	19	52.8	17	44.7	93	62.0	
Education level	Illiterate	66	86.8	31	86.1	35	92.1	132	88.0	0.82
	Literate	10	13.2	5	13.9	3	7.9	1	12.0	
Marital status	Single	12	15.8	6	16.7	7	18.4	25	16.7	11.33**
	Married	62	81.6	26	72.2	23	60.5	111	74.0	
	Divorced	1	1.3	2	5.6	3	7.9	6	4.0	
	Widowed	1	1.3	2	5.6	5	13.2	8	5.3	
Ext. service	No	6	7.9	6	16.7	10	26.3	22	14.7	7.02**
	Yes	70	92.1	30	83.3	28	73.7	128	85.3	
Technology	No	53	69.7	21	58.3	22	57.9	96	64.0	2.202
	Yes	23	30.3	15	41.7	16	42.1	54	36.0	
Total		76	50.2	36	24.5	38	25.5	150	100	

Household Characteristics (continued)

| Continuous variables | Household Perception | | | | | | t-test |
| | Favor | | Neutral | | Disfavor | | |
	mean	SD	mean	SD	mean	SD	
SDI	0. 24	0.232	0.27	0.23	0.363	0.220	2.66***
Age	36.51	7.965	37.89	7.551	38.71	9.684	-1.3
Year lived	35.69	7.687	38.11	7.577	35.74	11.413	0.84
Adult equivalence	4.13	1.729	4.68	1.796	3.89	1.506	2.07**
Market distance	26.34	27.495	24.14	9.577	28.50	57.868	0.08
TLU per adult	9.64	7.97	7.56	7.34	7.27	7.22	-1.79*
Ha of land cul.	1.04	1.10	1.11	1.06	.93	1.18	2**
Total land own	11.76	6.46	14.42	8.48	10.39	6.73	2.27*
Exp. Livestock	27.46	10.26	24.39	9.92	28.08	11.17	-0.69
Exp. Farming	1.63	2.13	1.89	2.13	1.58	2.02	0.286
Exp. Prosopis	0.04	0.34	0.64	2.59	1.34	1.98	5.6***
Exp. on irri.	1.05	2.09	1.33	2.18	1.76	2.34	1.4

3.2 Determinants of HH perception..multinomial logit output

Option	Variables	B	Odd ratio	Wald	P value
Not Good (Disfavor)	Age of household head	2.21	9.15	2.65	0.118
	sex	1.04**	2.83	4.88	0.039
	education	0.529	1.69	1.33	0.314
	Year	-0.145	0.865	-2.09	0.172
	adultequi	0.154	1.17	1.29	0.326
	tluperadequ	0.078**	1.08	4.30	0.050
	Divern	-3.09**	0.045	-6.12	0.026
	Conflict	0.199	1.22	0.45	0.695
	Drought	0.074	1.08	0.23	0.838
	mktdistance	0.016*	1.02	3.02	0.094
	exservice	0.774*	2.17	3.08	0.091
	landccprad	1.67*	5.31	2.95	0.098
	expecc	0.036	1.04	0.62	0.600
	expepp	-0.836	0.434	-2.61	0.121
	technology	1.64	5.13	2.71	0.113
	landowner	0.014	1.01	0.43	0.711
	totaly	-0.001**	0.999	-5.95	0.027

Option	Variables	B	Odd ratio	Wald	P value
Good (Favor)	Age of household	1.897*	6.67	3.10	0.090
	sex	-0.733**	0.480	-4.37	0.049
	education	-0.725	0.484	-1.55	0.262
	Year	-0.114	0.892	-1.80	0.214
	adultequi	-0.317	0.728	-0.98	0.432
	tluperadequ	0.078***	1.08	11.57	0.000
	Divern	0.262	1.29	0.48	0.680
	Conflict	3.114***	22.5	13.01	0.006
	Drought	1.179	3.25	0.52	0.652
	mktdistance	0.015	1.01	2.08	0.173
	exservice	-0.661	0.516	-1.01	0.418
	landccprad	-0.960	0.383	-0.59	0.614
	expecc	-0.219*	0.803	-3.23	0.084
	expepp	0.629*	1.87	3.43	0.075
	technology	1.092	2.98	1.39	0.300
	landowner	-0.184**	0.832	-4.53	0.045
	totaly	-6.05e-06*	0.999	-3.64	0.068
LR chi2(34)		126.48		No. observ/n	150
Prob > chi2		0.000			
Pseudo R2		0.384			
Log pseudo likelihood		-101.554			

3.3 Marginal effects Estimation after mlogit model

Dependent variable == Pastoralists' Perception on prosopis							X
	Disfavor (0)		Neutral (1)		Favor (2)		
Variables	dy/dx	SE	dy/dx	SE	dy/dx	SE	
ageHH	.398***	.153	-.463***	.162	.066	.072	1.87
sex	.312**	.134	-.119	.130	-.193*	.103	.62
eduHH	.172	.177	-.068	.159	-.104	.076	.12
year	-.027***	.011	.030***	.011	-.003	.006	36.29
adultequi	.064	.055	-.012	.048	-.053	.037	4.21
tluperadu	.013	.010	-.017*	.010	.004***	.006	8.54
Divern	-.622***	.124	.403**	.115	.220***	.085	.67
Conflict	-.126	.155	-.143	.148	.269	.085	.73
Drought	-.050	.213	-.055	.209	.105	.101	.92
mktdst	.003	.002	-.004	.003	.001	.001	26.36
exservice	.247*	.136	-.067	.137	-.180	.125	.85
landccpad	.493	.325	-.235	.275	-.259	.231	.26
expecc	.027	.047	.004	.038	-.031	.038	1.68
expepp	-.259**	.113	.110	.076	.149***	.054	.51
landowner	.296*	.175	-.295**	.151	-.001	.100	.36
total	.019*	.011	.006	.009	-.025***	.008	12.05

3.4 Determinants of livelihood diversification
(Two-step tobit with endogenous regressors)

SDI= Dependent Variable		Wald chi2(10) == 135.48
Instrumented: callperc		Prob > chi2 == 0.0000
Variables	**Coefficient**	**SE**
age2	-.001*	.001
adultequi	.056***	.014
tluperadequ	.014***	.003
ltfarmy	.004	.023
landccpradt	.302***	.100
technology	.110*	.061
training	-.011	.064
expli	.003	.002
expecc	.0059	.014
callperc	.202***	.053
_cons	-.481**	.210
Wald test of exogeneity:	chi2(2) = 5.44	Prob > chi2 = 0.0196
Hausman Specification Test		
H$_0$: difference in coefficients not systematic		
Chi2(10) = 32.28 p-value = 0.0004		▶ ivtobit superior to OLS and tobit

4. Summary, Conclusion and Policy Recommendation

4.1 Summary

★ Results of descriptive analysis showed that household perception about *prosopis juliflora* accounted 50.7% unlikely perceive, 24% neutral and 25.3% likely perceive.

★ Results of multinomial logit on household perception about *prosopis* showed that s**ex (male-headship), TLU per adult equivalent, market distance, extension service, and hectare of land cultivated** had a **significant** and **positive** influence on bad perception option.

★ Results of instrumental variable tobit on SDI showed that **age** and **training** were negatively influence SDI. But **positive** and **significant** sign was observed for the determinants; **adult equivalent, TLU per adult equivalent, access for technology, household perception,** and **Hectare of land cultivated**. The latter factors increase the levels of household diversification.

4.2 Conclusion and Policy Recommendation

1. Although crop and livestock were currently the main income sources of households in the area, pastoralists are disadvantaged by provision of **physical infrastructure, credit, and improved seed.** Policy makers, therefore, must concentrate on measures to increase income from these activities.

2. The result shows that diversification strategy and household perception are largely determined by the same variables. By removing those barriers like the provision of **training and education programs**, households would improve their perception and be able to participate in diversification. Consequently, participation in different livelihood activities will have a likely effect on the income distribution and pastoralist livelihood improvement.

Conclusion and Policy Recommendation (continued)

3. **Livelihood diversification**, was crucially affected by household perception. Policies aimed at promoting farm-level productivity and self sufficiency need to emphasize this interdependency.

4. The fact that **male-headed** households had bad perception about *prosopis* and that were less likely to diversify using *prosopis* product confirms that they were neglected by other service providers. The concerned entities need to implement policies that farmer easily access **training, market,** and **technology support.**

5. **Cultivated farm size** was found to positive and significant coefficient. Thus, to increase gain and farm productivity, concerned governmental and non-governmental entities need to support pastoralists through fertilizer, **improved seed, credit union (cooperatives) and target extension service**.

Conclusion and Policy Recommendation (continued)

6. Productive utilization of *prosopis,* which was one of a decisive controlling mechanism for further invasion, might be associated with food security and animal nutrition since income had more favorable nutrition effects among pastoralists. It is important that promotion of such activity is incorporated into policy efforts aimed at reducing food insecurity and *prosopis* invasion. Therefore, policy designers need to focus on policies that can facilitate participation in such activity and enhance profitability of existing off-farm activities.

7. Finally, even though the survey findings show a positive association between the **household perception and degree of livelihood diversification**, and complementarities between farm and off-farm income in the study area, further empirical research addressing different scenarios of the pastoralists and rural residents elsewhere should be made before proposition of more widely applicable statements and policy recommendations.

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http://www.tjprc.org/view_archives.php?year=2012_2...

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MANY
THANKS !!