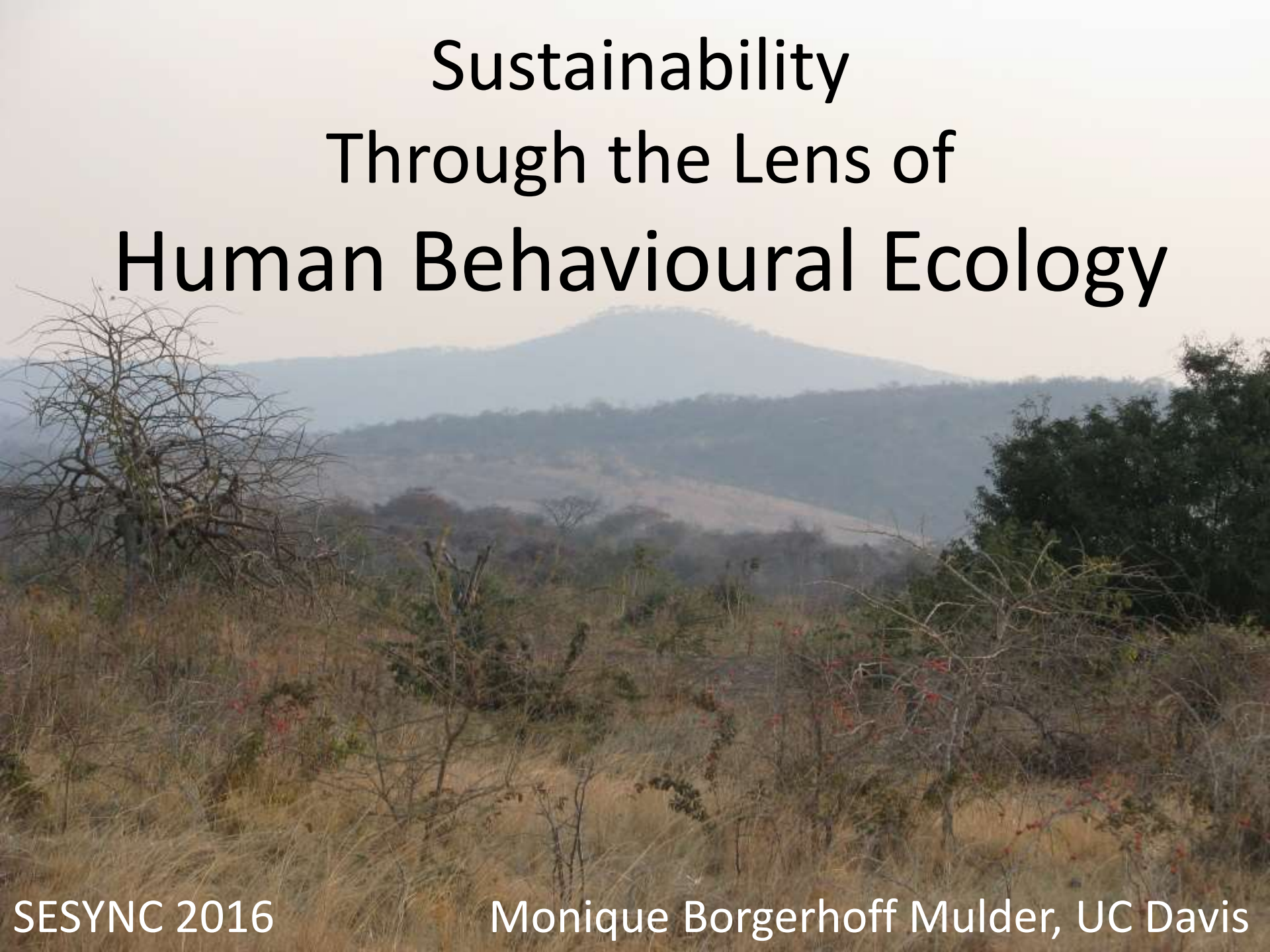


Sustainability Through the Lens of Human Behavioural Ecology





1. Definition: Human Behavioural Ecology

2. “Darwinian Ecology” reading

3. Conservation as Restraint

- Early tests
- When, where and how might conservation arise

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5. Conclusion

Human Behavioural Ecology / Darwinian Anthropology / Sociobiology / Evolutionary Anthropology / Evolutionary Social Science

- Apply **evolutionary & behavioural ecological models and concepts** to the study of human behavioural diversity
- Study human **behaviour** from the functional perspective of maximizing biological fitness
- Focus on **adaptive decisions**, specifically **costs and benefits** of different strategies arising from ecological and social constraints
 - Conditional strategies: If X do α , if Y do β
- Relation to other disciplines
 - Phenotypic gambit (biology)
 - Theoretical grounding (anthropology)

Tools: Optimality models; game theory models; simulation; empiricism

Natural selection can operate not just on physiological traits but behavioural “traits”, including culturally transmitted traits

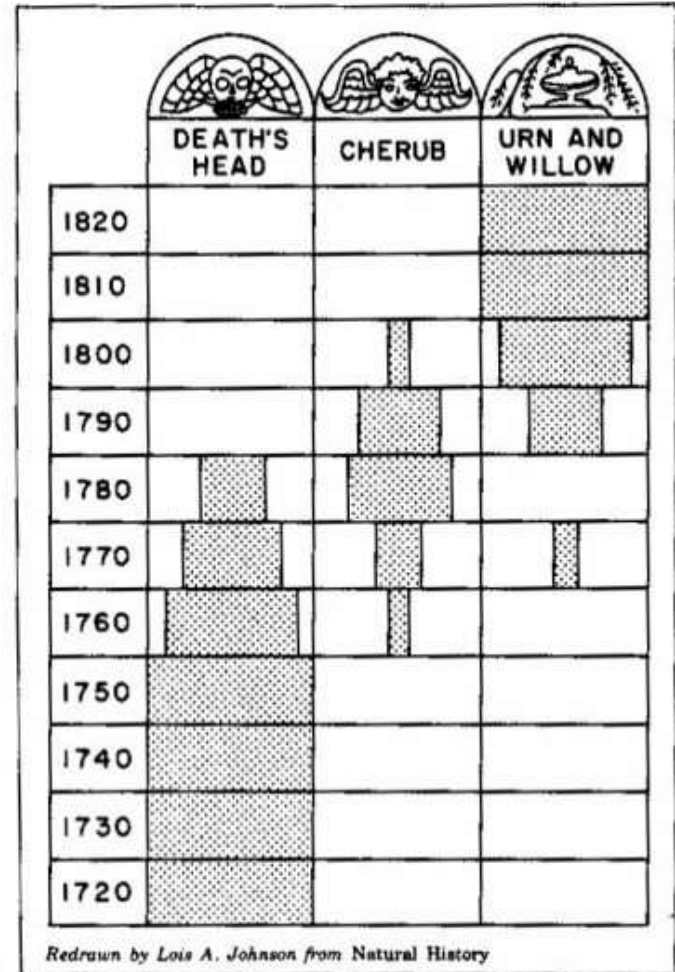
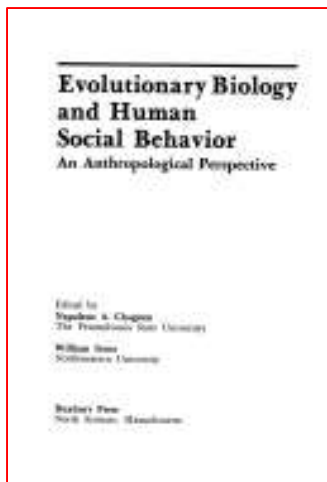
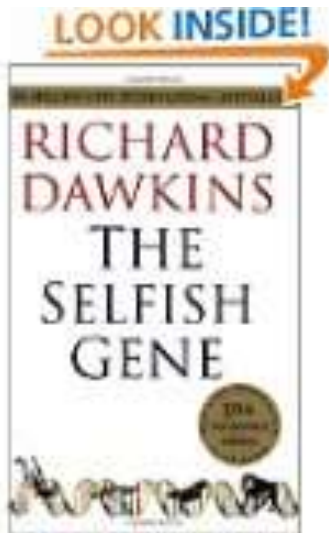


FIGURE 1. Stylistic Sequence from a Cemetery in Stoneham, Massachusetts.



Early objections

- Genetic determinism
- Eugenicism ...isms
- Crass functionalism – “Just so” stories
- Prioritizing functional questions
- Intellectual imperialism
- Human universals





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Evolutionary
Perspectives
on Environmental
Problems

SEPTEMBER 2003

QUARTERLY REVIEW of BIOLOGY



EVOLUTIONARY ROOTS OF OUR ENVIRONMENTAL
PROBLEMS: TOWARD A DARWINIAN ECOLOGY



Dustin J. Penn
& Iver Myerud, editors
Foreword by E.O. Wilson

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KEYWORDS

evolutionary psychology, human conservation behavior, aboriginal overkill,
demographic transition, conspicuous consumption, discounting, tragedy of the
commons, environmental aesthetics, environmental education, social pressure

Over-population, Over-consumption,
Pollution



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Restraint (or stinting) that entails short term costs for longer term benefits)



Testing for conservation (Hames 1987)

Efficiency Hypothesis : foragers' prey choice decisions maximize the rate at which resources are taken per unit time spent foraging (e.g., hunters chose according to profitability of prey)

Conservation Hypothesis: foragers' prey choice minimize effects on the reproductive rate of the species

<i>Hypothesis: Intra-specific prey choice</i>	AGE	SEX
CONSERVATION (CH)	Kill animals of low reproductive value (young and very old)	Kill males because they don't produce the young
EFFICIENCY/ FORAGING (E/FH)	Kill prime aged individuals (those with the most meat on them)	Kill the largest sex (usually this is males)

Manu
National
Park, Peru



Piro
hunters



Comparison of age profiles of Piro kills and censused populations.

Species	Piru Kill Sample			Censused population			X ² adj	Sig.
	Immat- ure	Adult	N	Immat- ure	Adult	Source		
Collared peccary	.27	.73	141	.31	.69	Kiltie and Terborgh (1983)	0.37	NS
				.24	.76	Bissonette (1982)	.19	NS
				.45	.55	Sowls (1984)	9.15	.0025
				.44	.56	Castellanos (1983)	8.17	.0043
				.26	.74	Arizona Game and Fish in Sowls (1984)	0.01	NS
Deer	.18	.82	27	.39	.61	McCullough (1984)	1.85	NS
Capy-bara	.46	.54	13	.30	.70	Ojasti (1973)	0.19	NS
				.42	.58	Herrera and MacDonald (1987)	0.14	NS
Spider monkey	.14	.86	29	.47	.54	Symington (1988)	5.84	.0157
				.34	.66	Klein (1972)	2.18	NS
Howler monkey	.14	.86	44	.51	.49	Nedville (1972)	12.09	.0005
				.54	.46	Rudran (1979)	13.95	.0002

Alvard M (1995) Intra-specific prey choice by Amazonian hunters. *Current Anthropology* 36:789-818.

Strengths

- Clear methodology, empirically replicable
- Consistent findings
- Avoids definitions based on outcomes “epiphenomenal conservation” (Hunn 1982, Smith & Winshie 2003)
- Avoid definitions based on intentions or beliefs



Problems

- Sessile resources, plants?
- Problem with definition?
- Restraint may allow more efficient harvests, e.g., *sasi* (Ruttan 1998 Hum. Nat.; Cohen and Steenbergen Env. Cons. 2015)
- Conservation costs are neither necessary nor sufficient
- Epiphenomenal outcomes may be important for finding a solution





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Where, when and how might sustainable behaviour arise?

1. Intrinsic character of the resource (does it have stable and predictable value in the future?)
2. Time discounting (how an individual's evaluation of the benefits of a conserved resource decay over time)
3. Property rights (how sure an individual can be that someone else will not “steal” the resource in the interim)

1. Intrinsic character of the resource (does it have stable and predictable value in the future?)

Collaborations with environmental psychologists needed!

Stochastic environments
favour opportunistic
strategies and systems
closer to equilibrium
favour restraint



Generally high

2. Time discounting

Hyperbolic not exponential
(Rogers 1994 AER)

Individual differences (sex,
age)

Subject to priming (e.g. van
der Wal 2014 Proc B.)

Vulnerable to alternatives
(Clark 1973 Science)

Property rights (Rogers 2011
Hum. Nat.)

Vary by community



Discount rate of Ache of Paraguay (see Box 5.4)

HIGH DISCOUNT RATE

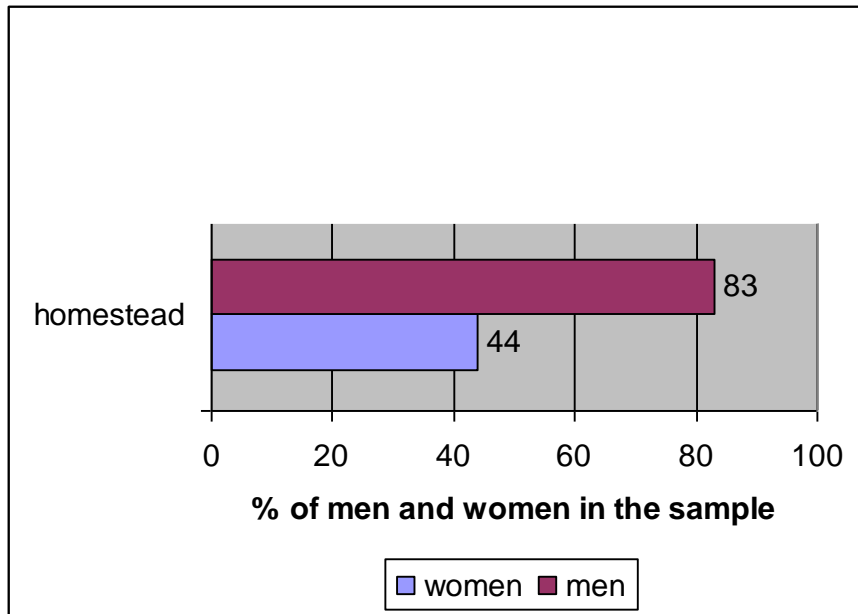
In 1987 Chupa Pou sold of all valuable hardwood for lumber. By mid 1988 there was no evidence of the communities new-found wealth



LOW DISCOUNT RATE

In a nearby Aché settlement called Arroyo Bandera a limited number of trees were sold, and the proceeds funded a schoolhouse

3. Property rights (how sure is an individual that no-one will “steal” the resource in the interim)



Women's tree planting in Zimbabwe

The percentage of men and women who plant trees on homestead land and community woodlots.

Based on interviews with 154 respondents (48 men and 106 women) in two villages (from Fortmann et al., 1997).

Where, when a

1. Intrinsic characteristics and predictable

2. Time discounting benefits of a cost

3. Property rights someone else violate

Focus on stable/predictable resources, but remember complexities of perception

Recognize and try to manipulate time discounting

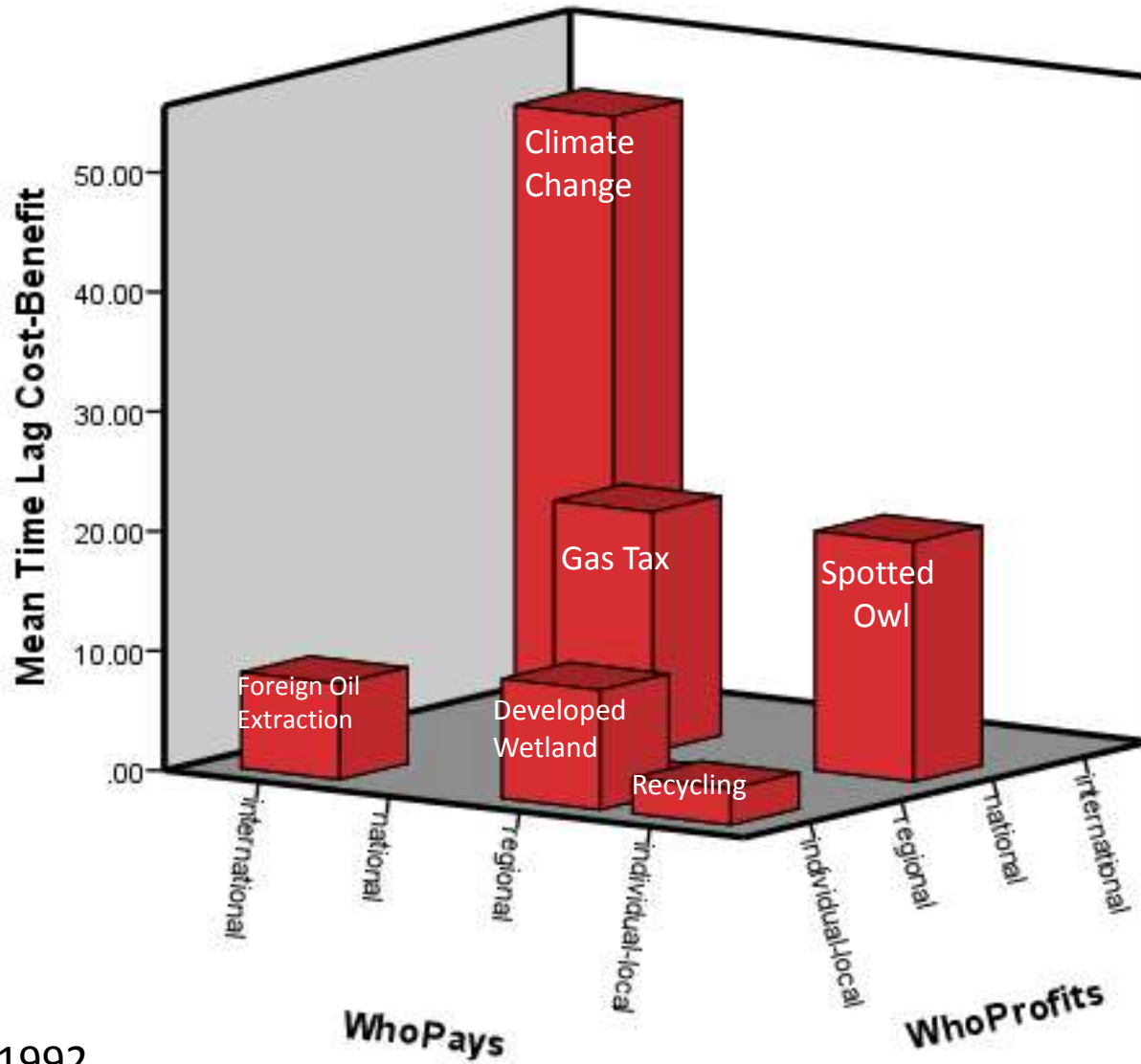
Question how security of tenure can help

What behaviour arise?

Does it have stable

(evaluation of the over time)

It can be that (force in the interim)



Low and Heinen 1992
Environmental Conservation



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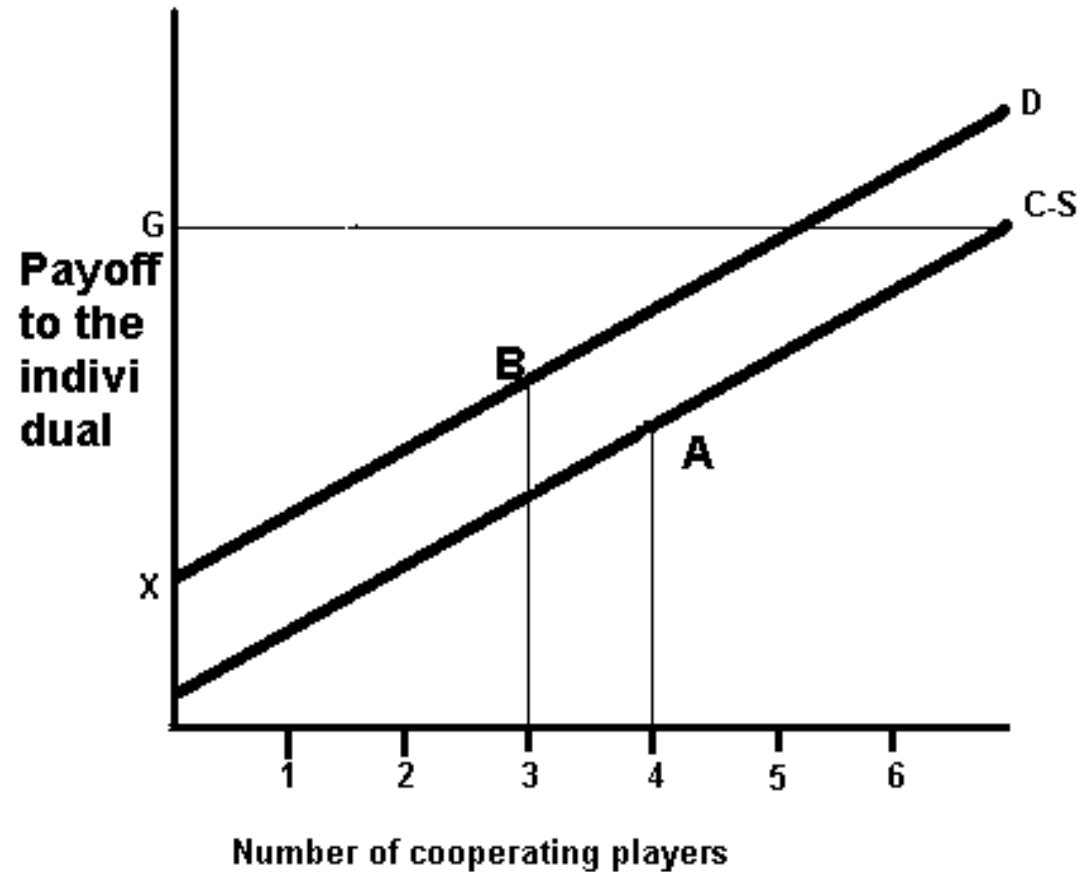
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Conservation as cooperation with others including the unborn

Protecting or managing common pool resource (grasslands, fisheries, protected areas) raises the problem of collective action



Relatedness, repeated interactions, groups of relatively small size, **homogeneity**, communication/trust/reputation, **opportunities for cheap punishment**



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A “managed commons”, no “free for all”

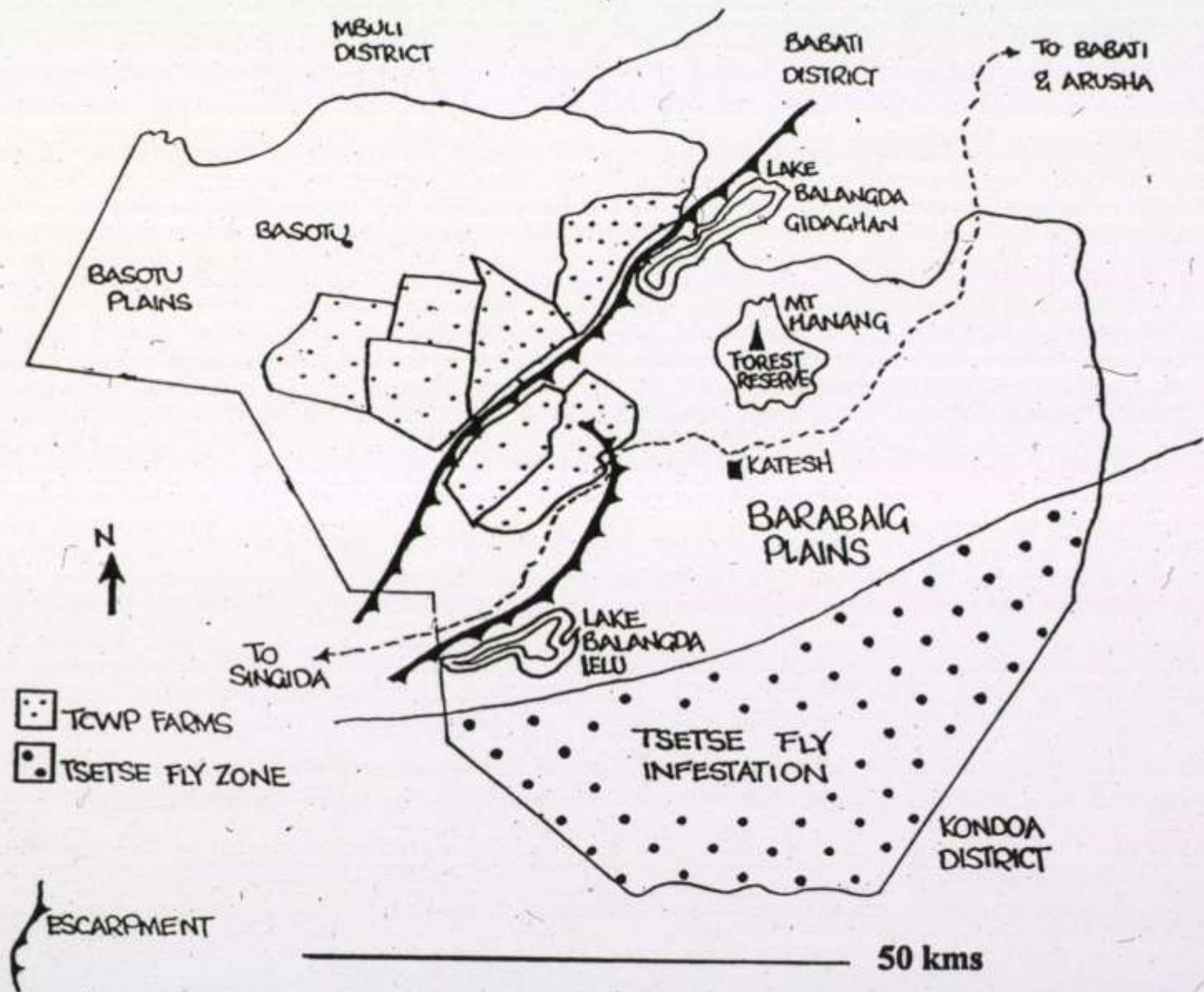
- Mobility based on grazing rotations and protected pastures
- Nested levels of users’ rights to wells etc., as members of clan
- Elders councils with fines, oaths, curses and excommunication



Datoga, Tanzania

Heterogeneity in wealth maintains the transhumance system that renders pastoralism sustainable

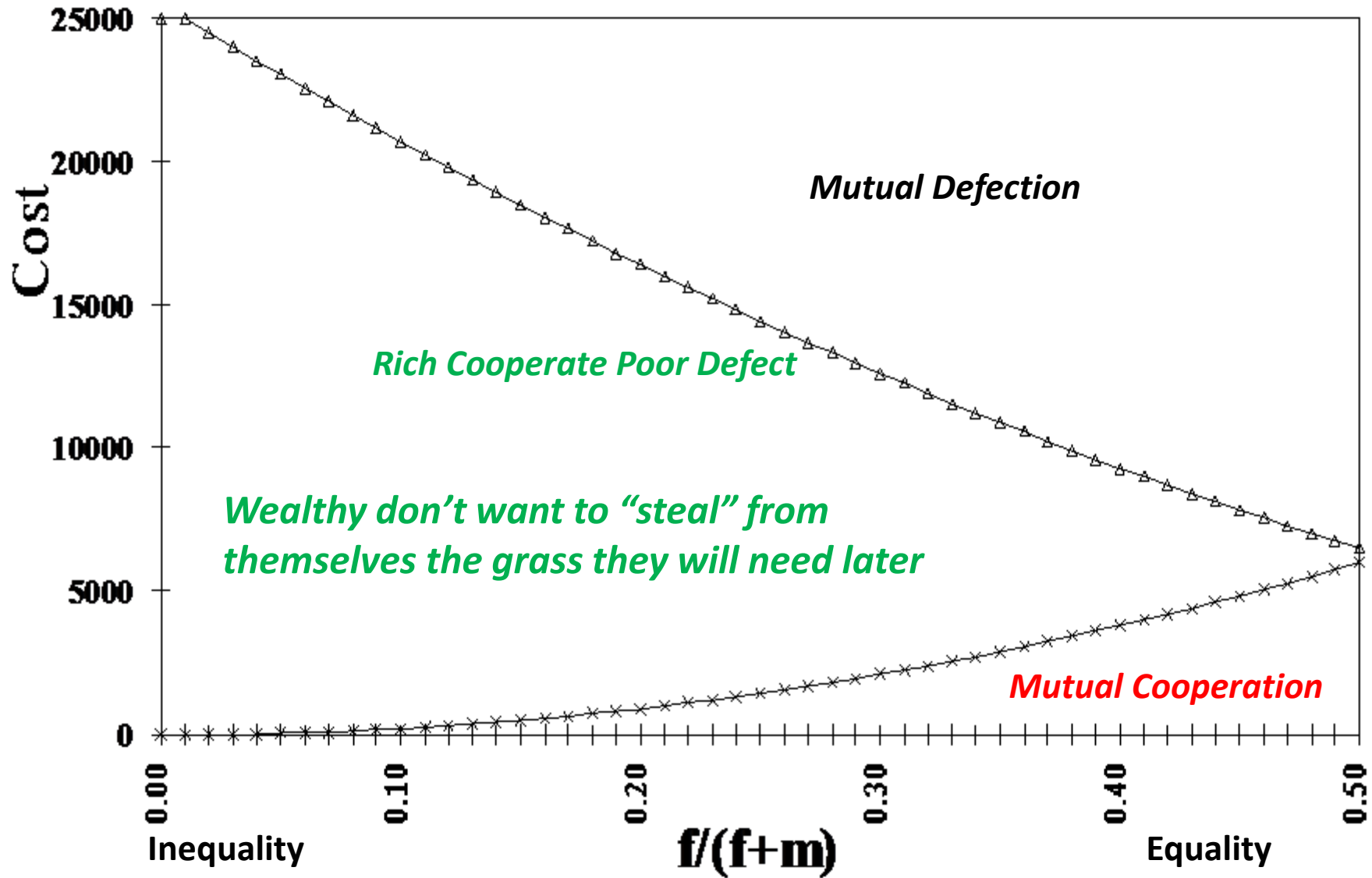
Ruttan & Borgerhoff
Mulder 1999 Are East African pastoralists truly conservationists? Curr. Ant.



Lane, C. (1996). Paradise Lost. Initiatives Publishers, Nairobi, Kenya

		Rich Cooperates	Rich Defects
Poor Cooperates		$\alpha md + A * m / (f + m) - C$	$\alpha md + (A - \alpha md) * m / (f + m)$
		$\alpha fd + A * f / (f + m) - C$	$\alpha fd + (A - \alpha md) * f / (f + m) - C$
Poor Defects		$\alpha md + (A - \alpha fd) * m / (f + m) - C$	$A * m / (f + m)$
		$\alpha fd + (A - \alpha fd) * f / (f + m)$	$A * f / (f + m)$

FIG. 1. Payoff matrix for a game between two herders, one rich and one poor. Payoffs to the poor herder are in the lower left corner of each cell while payoffs to the rich herder are in the upper right.





Apparently cooperative common-pool resource systems of pastoralist may conceal private interests

Distinct preferences of rich motivate a system of fining

Sustainable management can result from asymmetric payoffs (Olson1967)

Sustainable management can arise from purely self interested strategies



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Sukuma men kill lions to protect livestock and “dance” to receive rewards from neighbours for their bravery

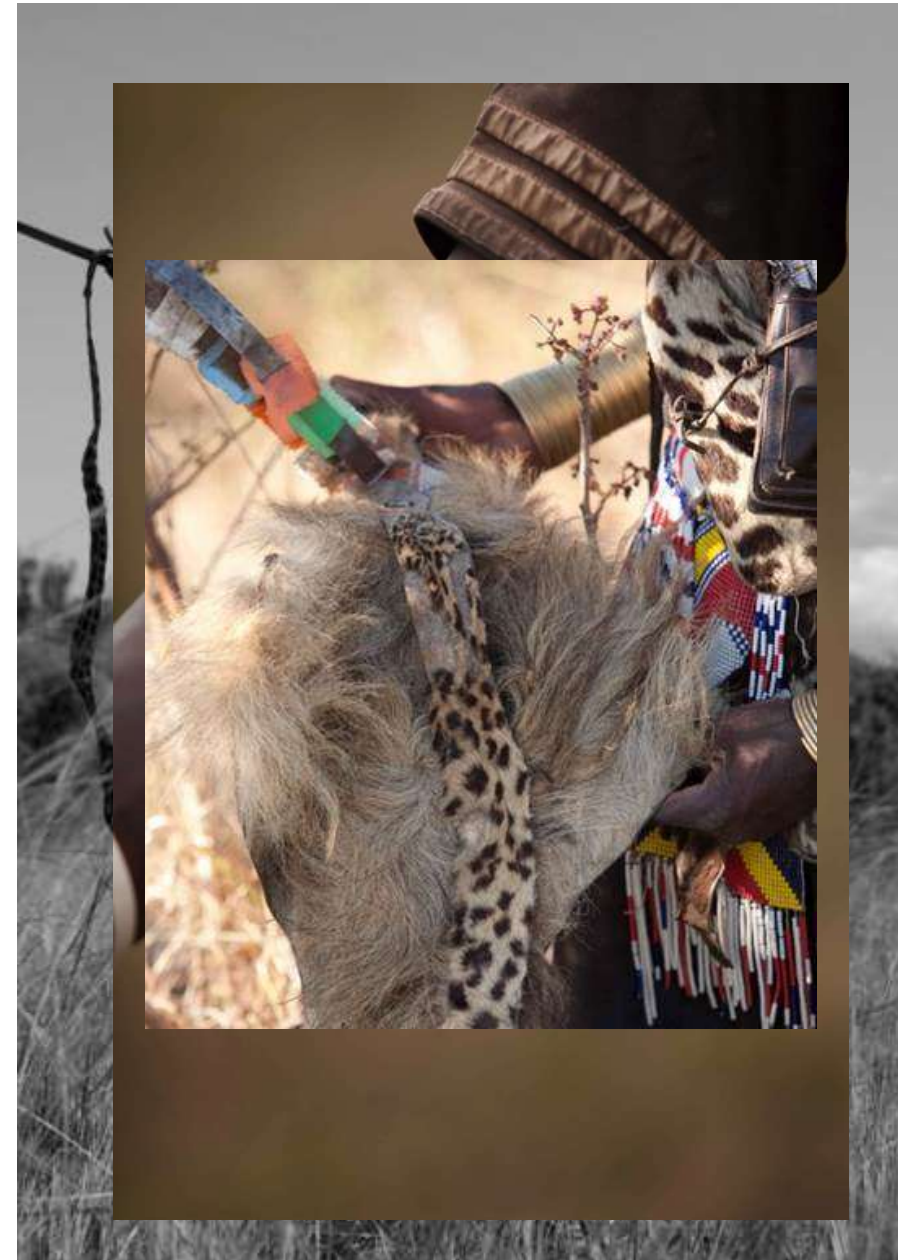
Emergence of endogenous punishment



Economic rewards, prestige and fame awarded the killer for providing a collective good

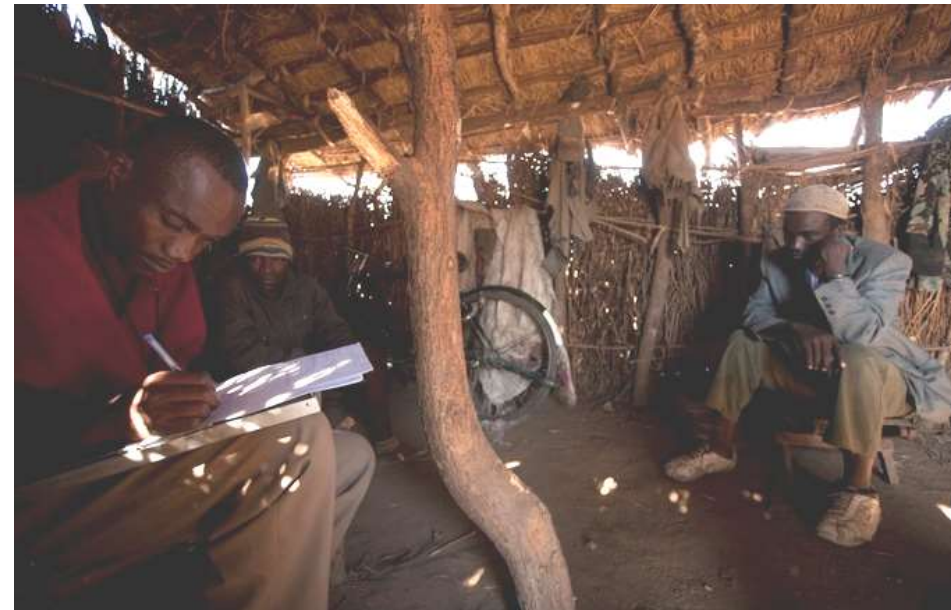
...successful lion killers '*return in triumph and **dance their lion dance** from village to village. The hero with the trophy [the body of the lion] carries it and the women dress up and flock to hang beads round his neck and tuck handfuls of grass into his body cloth*' (Spencer 1988, on Samburu)

Barabaig, Datoga, Maasai, Sukuma



Rewarding is directly responsible for continued lion killing

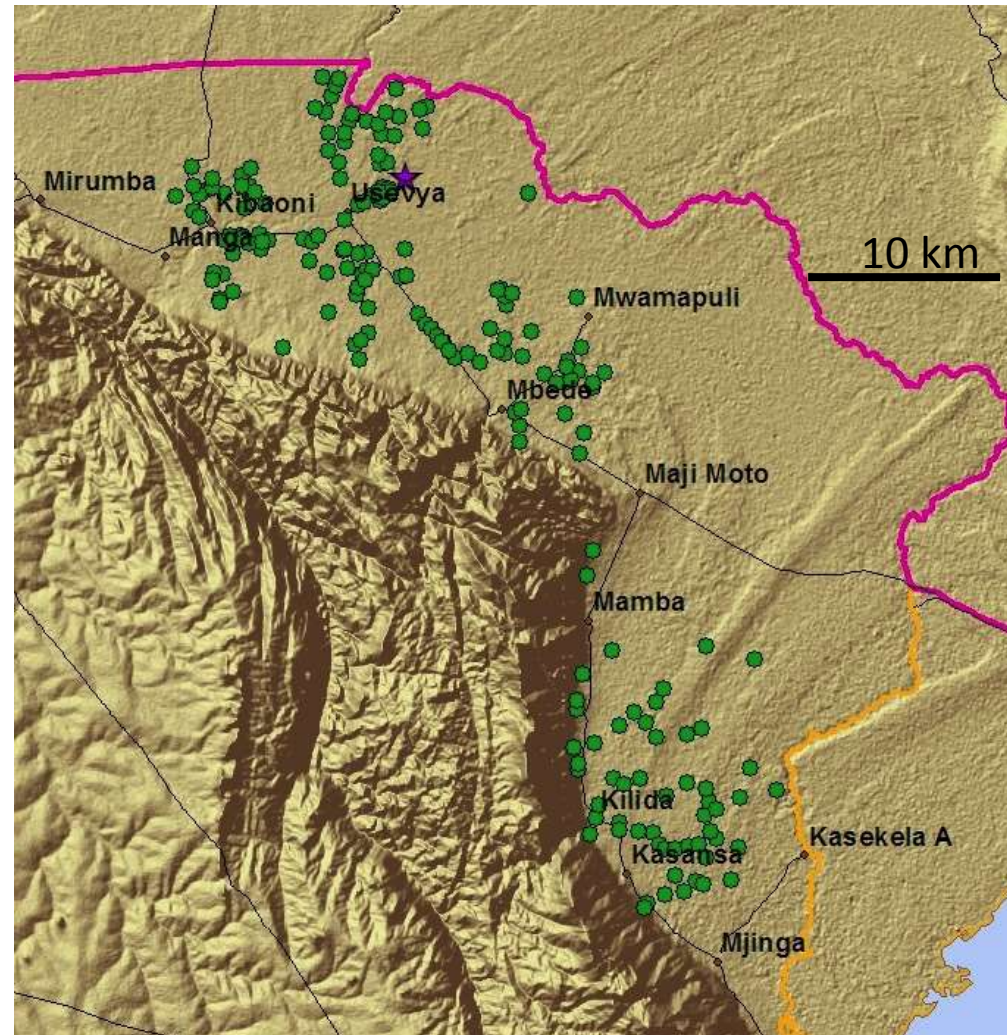
Rewarding is a form of collective action – who should bear the cost?



Random sample across Mpimbwe: 214 households (7 of 14 villages)

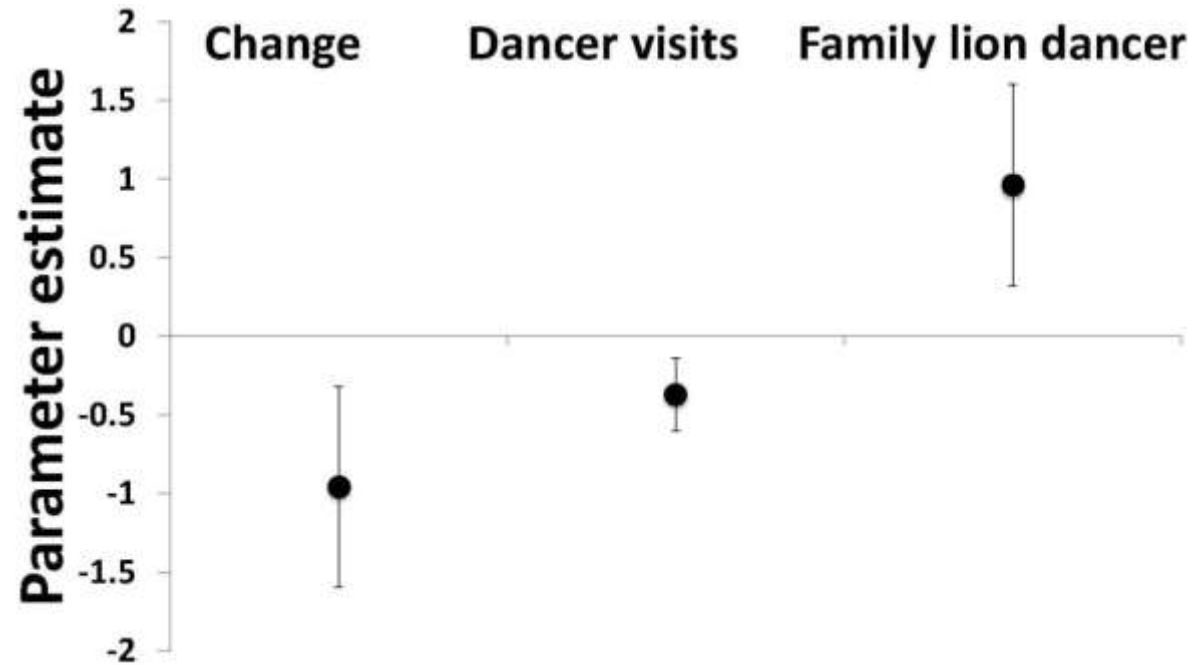
- Distance from protected area
- Residency time
- Family lion dancer
- Household wealth (size, area farmed, cattle, shoats)
- Livestock predation & loss
- Dancer visits frequency
- Reward given (at each visit)

- **Change (recognition of “wakfeki”)**



What characteristics of households determine whether or not they reward a dancer? (128 visits to 81 households of which 96 visits were rewarded)

- Wealth (+)
- Family dancer (+)
- Distance to PA (-)
- Livestock predation (+)
- Dancer visit frequency (-)
- Change (-)



Emerging refusal to reward “wafeki”

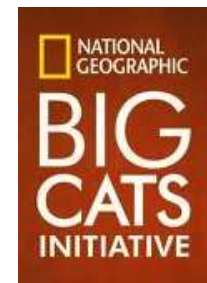
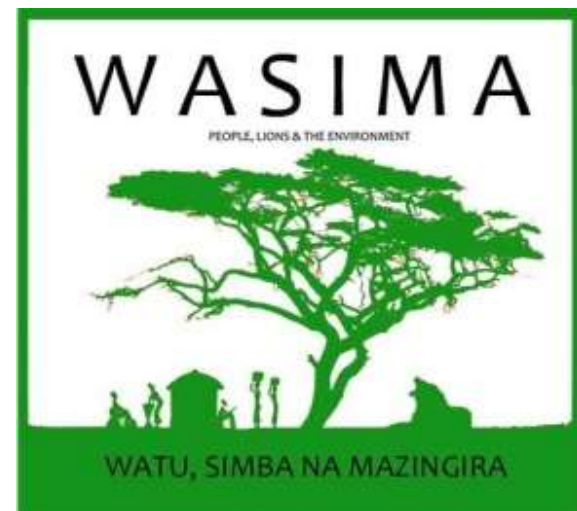


Implementation campaign

Raise awareness of manipulation of custom

Empower the households refusing to reward lion killers

Grassroots movement leading to village by-law changes to ban rewards for illegal lion hunters



Summary

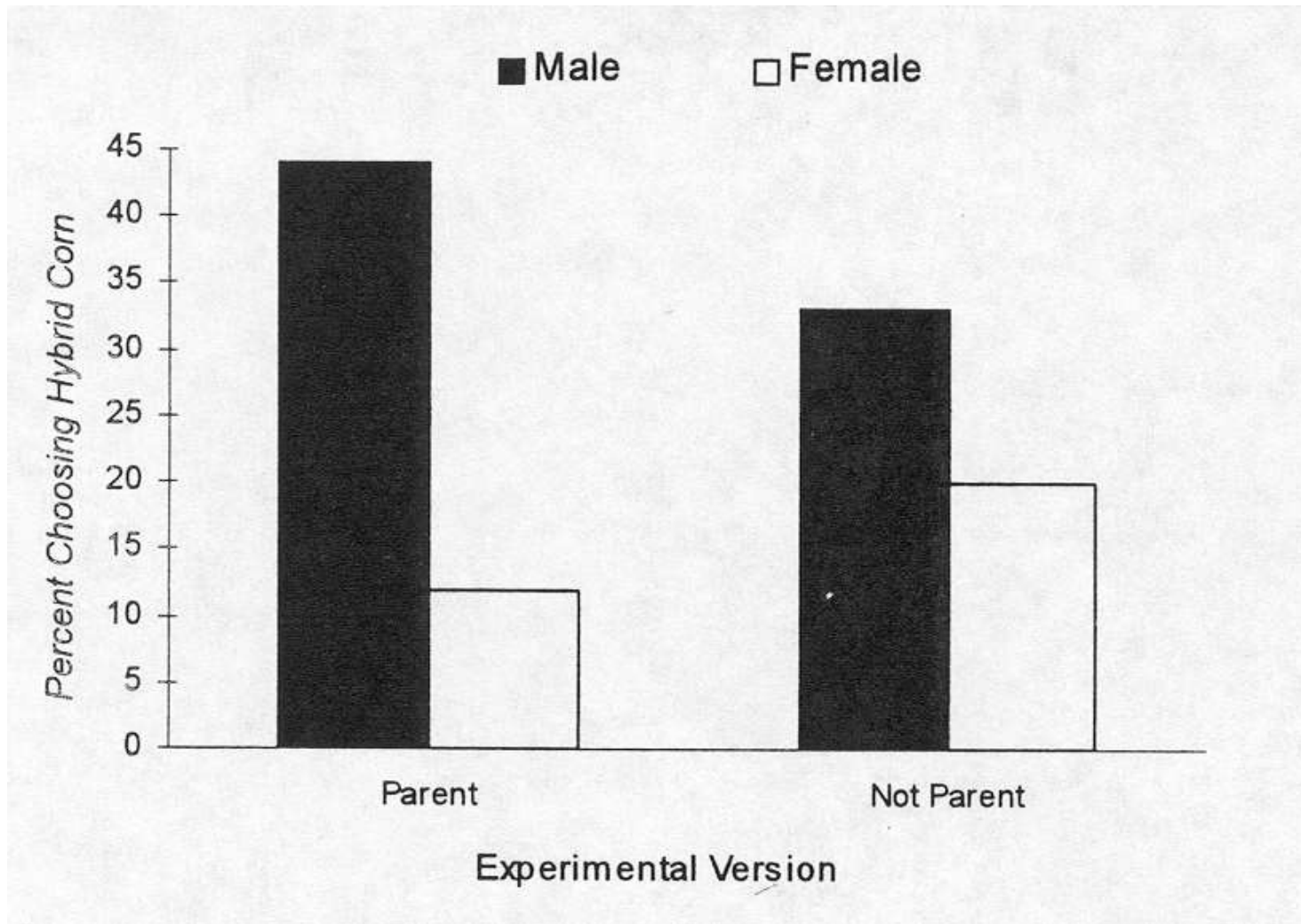
“Darwinian Ecology” (Penn 2003) – no!

Interdisciplinary barriers dissolving

- Political scientists, psychologists, anthropologists, institutional economists, & biologists developing theory building on costs and benefits, evolved preferences, game theory (and experimental economics)

Better understanding of human tendencies, how they vary, and potentially how they can be contained or harnessed





Percentage of subjects choosing the soil degrading option (corn over hay) according to sex and parental status, when posed with a hypothetical dilemma. Men were significantly more likely to choose the soil-degrading option ($\chi^2=6.6$, $p<0.01$) than were women; parental status (which was distinguished in the hypothetical dilemma) was not significant (Wilson et al 1988)