

Decentralization for cost-effective conservation

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Outline of the talk

- Overview of the question.
- Focus on forest degradation: Rigorous examination of the effects of decentralization on the cost and effectiveness of conservation. (Joint work with R. Prabhakar & B. S. Mehta, *PNAS*, 2009)
- Some implications for forest policy

Economics of forest degradation

- The commons problem.
- When I strip a tree, I get the benefit of not going further today, at the cost of having to go further tomorrow. My cutting behavior reflects a tradeoff between these costs.
- But I neglect the fact that I *impose the future costs on all the other users of that forest.*
- So I make a socially sub-optimal tradeoff and cut too much.
- This happens if the multiple users fail to co-ordinate their behavior.
- Nearly all forest degradation in India is due to this problem in one form or another.

Economics of forest degradation - 2

- Better management systems provide better coordination and thus less degradation.
- Centralized way: External agency such as the state forest department regulates extraction.
- Decentralized way: Local self-governance to coordinate extraction. (Elinor Ostrom)
- Which works better? Anecdotal evidence from around the world suggests that it is the latter (Baland and Platteau, 1996).
- But there are confounding factors.

Table 1: Summary Statistics

	State forests		Council forests		Unmanaged village forests	
Polygons	508		240		343	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.
Area (ha.)	98.4	85.5	75.6	103.6	43.3	84.8
Broadleaved % Crown Cover	75.9	22.7	64.9	27.7	49.8	29.3
Pine % Crown Cover	33.9	27.3	42.2	31.8	37.9	30.8
% forest	97.2	7.6	93.2	13.1	83.4	22.2
% Broadleaved	67.9	30.3	75.7	23.2	69.07	25.15
% Pine	29.2	29.6	17.4	21.3	14.3	18.9
Aspect	.499	.234	.487	.219	.494	.223
Altitude (km)	1.68	.47	1.56	.42	1.44	.40
Pop. density	.673	.834	1.41	.93	1.57	1.16
Time to Road	2.13	1.93	1.55	1.68	1.45	1.48
Nearby SF stock	2.93	1.79	.84	1.25	.91	1.38
Nearby CF stock	.211	.549	1.13	1.25	1.21	1.37
Nearby UVF stock	.159	.431	.95	1.06	.71	.98

Note: SF= State Forest, CF = Council Forest, UVF = Unmanaged Village Forest. Aspect ranges from south-facing (0) to north-facing (1), population density is in persons per hectare, round-trip time to road is in hours, and nearby stocks are in square kilometers. 100 ha = 1 sq. km.

Uttarakhand Study (joint with Prabhakar & Mehta)

Question: Which does a better job of solving the commons problem? Van Panchayats (village forest councils) or the state Forest Dept? And which has a lower administrative cost?

Method: Control for confounders using geography & history.







Van Panchayats (village forest councils)

Forests in Kumaun were Reserved early in the twentieth century. In 1930, about a decade later, and in response to widespread unrest, villages were permitted to carve out Council-managed forests both from common lands not nationalized and from nationalized forests. The area under Council management has gradually expanded since then to cover about a third of the forest area in the hill region of what is now Uttarakhand.

Cost comparison

Council forests		State forests	
Watchmen's wages including imputed cost of time for volunteers	46.75 (10.20)	Admin including wages	398
Other expenditure	2.06 (0.58)	Building, plantation, forest protection	130
Govt expenditure on Council Inspectors	6.66		
Total	55.47		528

Effectiveness of conservation: Methods

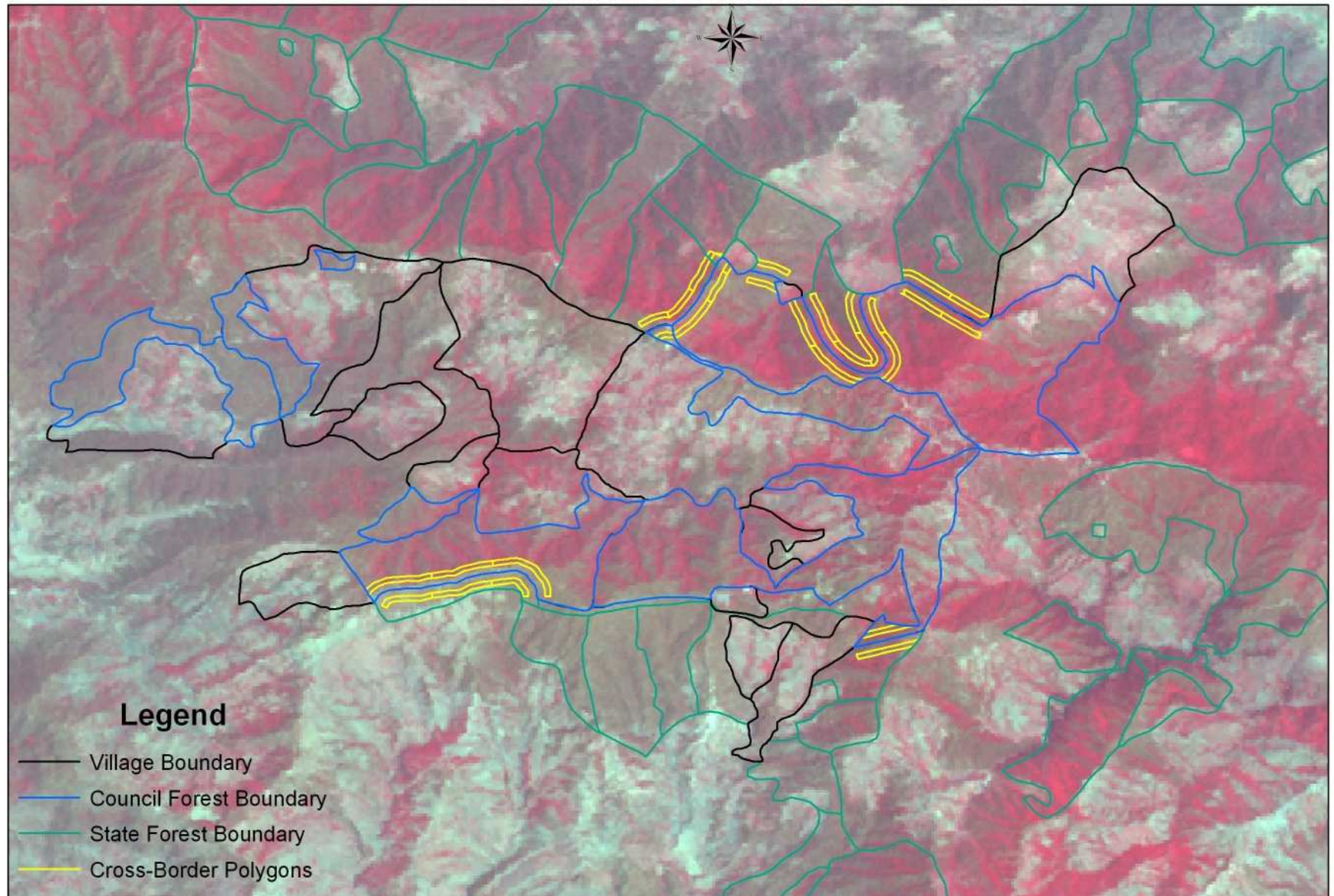
- We show that Councils were at least as effective at conservation as the State.
- Compare crown cover in 1998.
- For this comparison to be valid, we need to show *either* that the State and Council forests being compared were identical in other respects,
- *Or* that State forests were more naturally suited to dense forest than Council forests.
- We establish the latter, thus strengthening the conclusion that Councils were at least as good.

Selection of lands for inclusion in RF's and VP's

- Forest Settlement Reports: Land with better forest was chosen for inclusion in RF's.
- Internal evidence from the data:
 - North-facing aspect raises crown cover by 20-40 percentage points.
 - RF's are statistically significantly more north-facing along the boundary with VP's.
- Conclusion: RF's are likely to have denser forest, other things equal.

Comparing RF & VP crown cover – Method 1

JAGESHWAR VALLEY: FCC of IRS-1D LISS III



Comparing RF & VP crown cover – Method 1

$$dy_i = \alpha_0 + \alpha_1 \cdot dX_i + d\epsilon_i$$

Comparing State forest & Council forest crown cover – Method 1

Dependent variable→	(1) % crown cover (Broadleaved)	(2) % crown cover (Broadleaved)	(3) % crown cover (Pine)	(4) % crown cover (Pine)
Constant (α_0)	1.2 ($p = 0.677$)	-0.7 ($p = 0.772$)	-2.4 ($p = 0.514$)	-4.0 ($p = 0.161$)
Aspect	32.2 ($p = 0.000$)	30.5 ($p = 0.000$)	12.2 ($p = 0.170$)	12.9 ($p = 0.147$)
Population density	-25.2 ($p = 0.335$)		-112.5 ($p = 0.188$)	
Population density sq	0.71 ($p = 0.805$)		16.5 ($p = 0.116$)	
Time to Road	10.3 ($p = 0.107$)		5.7 ($p = 0.631$)	
Nearby forest stock	-0.24 ($p = 0.775$)		-1.7 ($p = 0.424$)	
# pairs	242	242	91	91
# councils	68	68	44	44

Comparing State & Council crown cover – Method 2

	Broadleaved crown cover	Pine crown cover
Nearby VP Stock	-0.91 (<i>p</i> = 0.645)	-0.47 (<i>p</i> = 0.840)
VPDummy*Nearby VP Stock	2.90 (<i>p</i> = 0.162)	-0.70 (<i>p</i> = 0.814)
Nearby RF Stock	2.53 (<i>p</i> = 0.000)	-0.56 (<i>p</i> = 0.605)
VPDummy*Nearby RF Stock	-2.18 (<i>p</i> = 0.164)	0.68 (<i>p</i> = 0.752)
Observations	582	504
Clusters	495	444
R ²	0.50	0.36
Difference in predicted crown cover (VP – RF) at RF means	-4.35 (<i>p</i> = 0.255)	3.00 (<i>p</i> = 0.548)

Comparing State & Council crown cover – Method 3

**Mean difference in crown cover (Council – State) matched by
propensity score**

Matching method	Broadleaved	Pine
Nearest neighbor	1.8 (3.0) 75%	14.6 (4.7) 75%
Radius =0.01	0.5 (2.7) 79%	12.0 (4.0) 74%
Kernel	1.1 (2.2) 75%	9.2 (3.5) 75%
Treated observations	355	318
All observations	582	504

Conclusion

- State forests cost nearly ten times as much per hectare to manage as Council forests.
- They are in no better shape, other things equal.
- We also found (in an earlier working paper) that Council forests had significantly higher crown cover than unmanaged village commons.

Related study

- Baland, Bardhan, Das & Mookherjee (under review)
- Sampled Council & State forests. Use multiple regression.
- Find that Councils have the same crown cover, regeneration, but have 20-30% **less** logging damage, controlling for other factors.

Implications for Forest Policy in India -1

- We saw that there is little hope for reversing deforestation in the next few decades, at any rate.
- However, 19% of the land area of India is said to be “wasteland” (Ministry of Rural Development). A significant part of this is probably degraded forest, now scrub, being used for firewood collection & grazing under **open access**.
- What our results suggest is that such lands, if they were to be put under governance structures similar to VP’s, could come to resemble or look better than, Reserved Forests, on average.

Implications for Forest Policy in India -2

- Devolving Reserved Forests to local communities, on the other hand, may not show large gains. (Although Baland et al's results show that there may be some improvement).
- But it will save money that could be used to subsidize alternatives to firewood such as biogas, LPG, and electricity.

Further issues

- Although on average, crown cover is no worse, possibly better in Van Panchayats than Reserved Forests,
- We haven't said anything about distribution.
- Conservationist VP's may make the poor worse/better off. But there is no evidence for this, one way or the other.

Further issues - 2

- We don't know about biodiversity under different forms of management. This would require more intensive field work.
- Generally speaking, there is no reason to expect that biodiversity will be well preserved by local communities. It may come into conflict with livelihoods.
- Unless communities are paid by the government to maintain biodiversity...there is a case for trying Payments for Ecosystem Services.

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