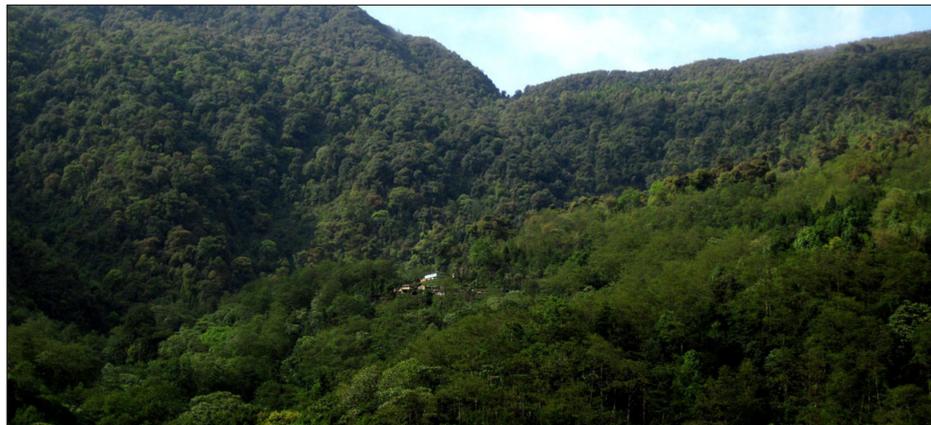


# INDIA'S FOREST COVER

## Change from 2000-2009

Adam Jadhav | American University | ajadhav@gmail.com



### Research Question

In India, change in forest cover — areas with tree canopy density more than 10 percent — varied widely from state to state between 2000 and 2009.

**What variables explain this variation in forest cover growth (or loss)?**

### Hypothesis

Many scholars suggest that agriculture growth and output is a primary culprit in deforestation. Angelsen and Kaimowitz (1999),<sup>1</sup> in particular, find that crop prices and homesteading policies are negatively associated with forest growth, while off-farm wages have a positive relationship.

After an initial test of more than 100 variables, I hypothesized that across Indian states:

**The value of agricultural output should negatively correlate with forest growth, while alternative livelihood opportunities should correlate positively.**

**Observations:** 29 territories with forest area greater than 250 km<sup>2</sup>

**Dependent variable:** Forest cover percent change, 2000-09.

*Source: Forest Survey India*

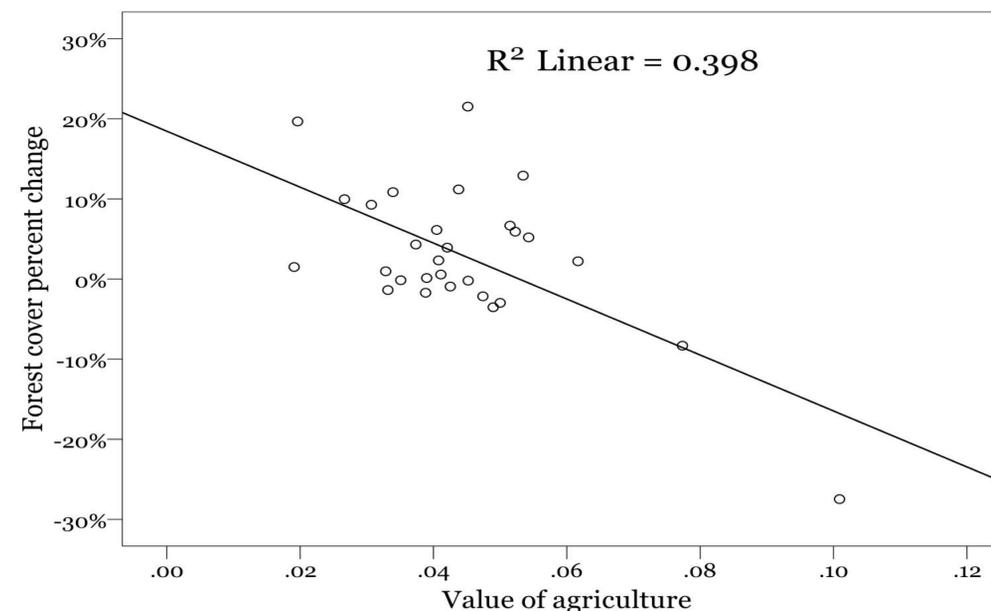
#### Key independent variables:

- **Agriculture crop value** per capita, averaged, 2002-05. *Source: Indian Ministry of Statistics*
- **Urban quality of life** (urban Human Development Index), 2005. *Source: Meghalaya Planning Department*
- Marine and inland **fishing output value**, averaged, 2002-05. *Source: Indian Ministry of Statistics*
- Families per capita earning **poverty benefits** under rural jobs act, 2009. *Source: Indian Ministry of Rural Development*
- Percentage of population that is **marginal caste**, 2001. *Source: Indian Census 2001*
- **Population density** (persons per km<sup>2</sup>), averaged from 2001 and 2011. *Source: Indian Census 2001, 2011*

#### Descriptive statistics of key variables

	N	Min	Max	Mean	S.D.
Forest cover change (%)	29	-27.467	21.528	2.981	8.934
Agriculture value (lakh rupees per capita)	29	.019	.101	.044	.016
Urban quality of life (urban HDI)	29	.618	.877	.757	.072
Fishing value (lakh rupees)	29	86	858078	112919	208476
Poverty benefits (households per capita earning)	29	.005	.182	.069	.050
Marginal caste (%)	26	.500	28.900	13.231	7.646
Pop. density (persons per km <sup>2</sup> )	29	15.000	991.000	328.862	270.270

#### Forest cover change against agriculture value



#### Pearson's r matrix of variables

	F.C	A.V.	U.H.	F.V	P.B.	M.C.	P.D
Forest change	1						
Ag. value	-.631**	1					
Urban HDI	-.016	.261	1				
Fishing value	.367*	-.080	-.137	1			
Pov. benefits	0.198	-.317	.206	-.200	1		
% marg. caste	-.202	.386†	-.313	.260	-.195	1	
Pop. density	.339†	-.007	-.365†	.486**	-.461*	.428*	1

\*\* = significant at the .01 level (2-tailed)  
 \* = significant at the .05 level (2-tailed)  
 † = significant at the .1 level (2-tailed)

#### OLS models of forest cover change, 2000-09

	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Livelihood/Opportunity</b>					
Ag. value	-.629**	-.716**	-.606**		
Urban HDI		.338*			
Fishing value			.319*		
Pov. benefits				.411*	
% marg. caste				-.424*	-.433*
<b>Control</b>					
Pop. density	.334**	.457**	a	.708*	.541*
N	29	29	29	26	26
Adjusted R <sup>2</sup> %	47.2%	55.3%	46.1%	34.1%	21.7%

a = variable not included due to multicollinearity  
 \*\* = significant at the .01 level  
 \* = significant at the .05 level

### Conclusions

- Higher **agricultural crop values** are overwhelmingly, **negatively associated** with forest cover growth.
- Higher **incentives/opportunities for alternative livelihoods** (better urban quality of life, higher fishing values, government poverty supports) have a **positive relationship with forest cover growth**
- **Socially marginalized people** may be particularly **dependent on forest degrading** activities.
- **Population density** interacts with forest cover change in complex ways but has a **positive association**.

<sup>1</sup>Angelsen, Arild, and David Kaimowitz. "Rethinking the causes of deforestation: Lessons from economic models." *The World Bank Research Observer*. 14, no. 1 (1999): 73-98.