

# Environmental Valuation for Economic Development

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# The Valuation-Policy Interface

## *“Valuation of Ecosystem Services is Rare and Disconnected From Policy”*

- Valuation not very rigorous (service–behavior-welfare change)
- Benefits are not linked to costs
- Inter-disciplinary research is rare
- Few studies focus on a particular policy

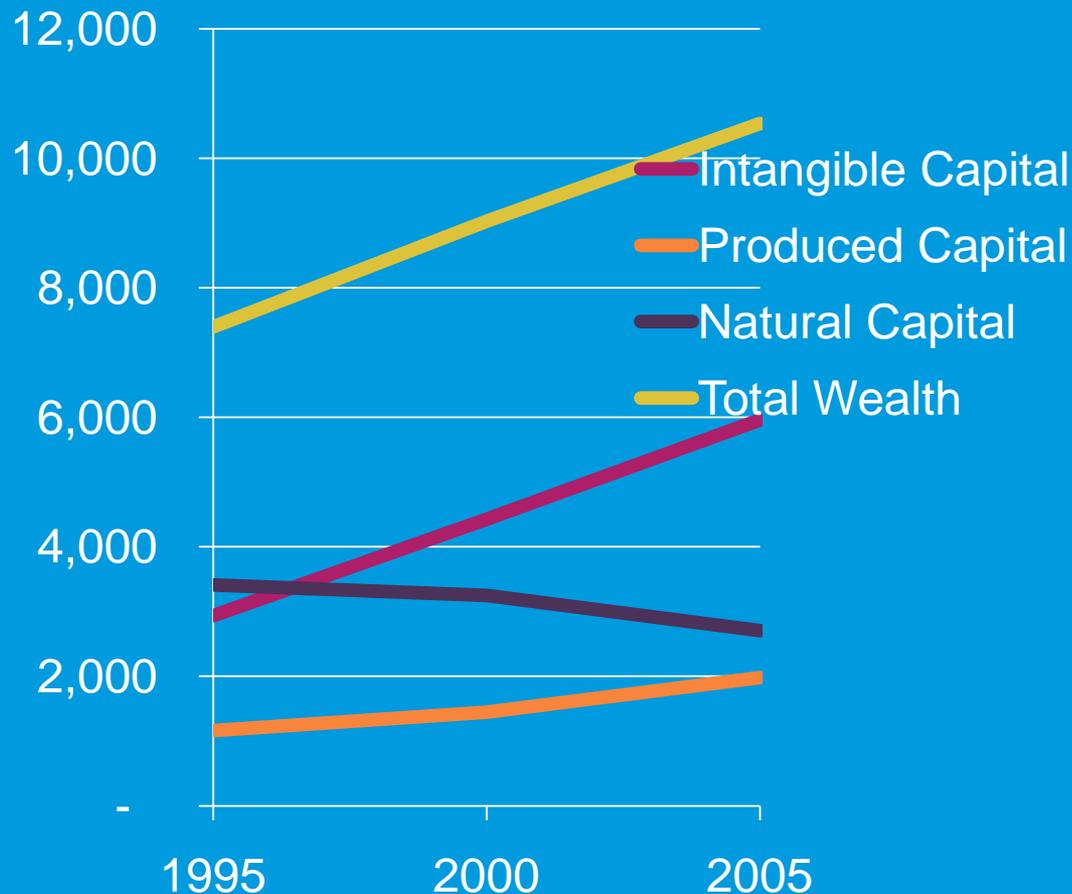
Forest Figures: Ecosystem Services, Valuation and Policy Evaluation in Developing Countries

Paul J. Ferraro, Kathleen Lawlory, Katrina L. Mullan, and Subhrendu K. Pattanayak, REEP, Dec 2011

# Where is the Policy-Valuation Interface?

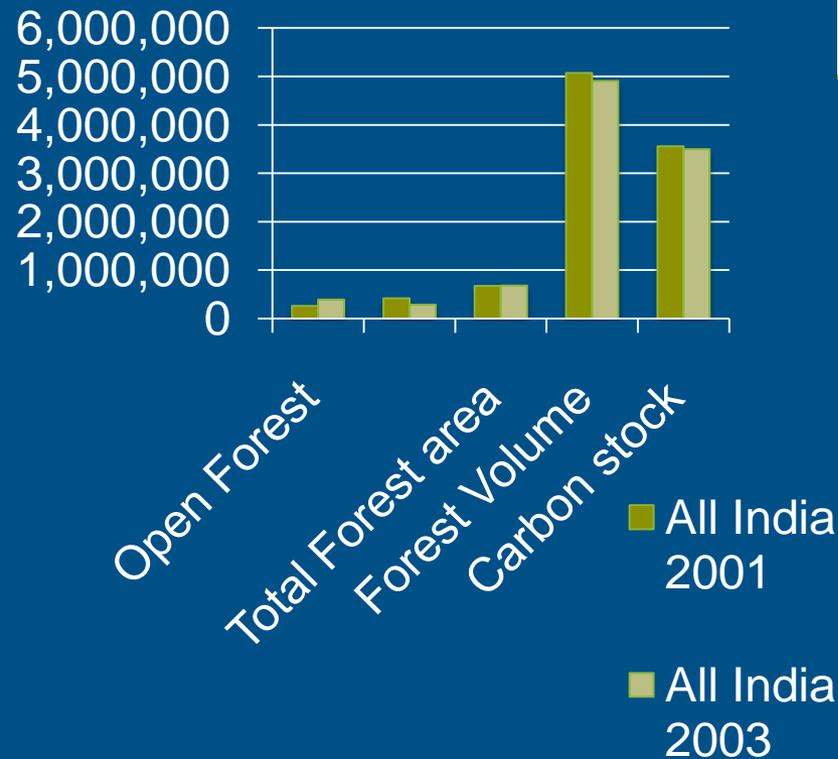
- Greening National Accounts
- Allocating budgets
- Making Investment decisions
- Understanding the scale and distribution of externalities
- Evaluating Instruments or Policies
- Enabling trades
- Financing public goods

# Wealth per capita (USD 2005), India (Mukhopadyay and Shyamsundar 2012)



- Only 3 data points (World Bank)
- Wealth per capita is growing in India
- Decline in natural capital

# Forest Wealth India (Gundimeda et al. 2005, 2006)



Price of timber and fuelwood	Value
Accounting price of NTFPs (Rs/Ha)	7,631
Accounting price of carbon (\$/ton)	20
Accounting price of recreation (Rs/Ha)	65,193
Accounting price of genetic material (Rs/ha)	22,646
<b>Total loss in forest wealth (million Rs)</b>	<b>-325,342 (USD 7 Bill)</b>

# The Policy-Valuation Interface

- Greening National Accounts
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# Investment Decisions

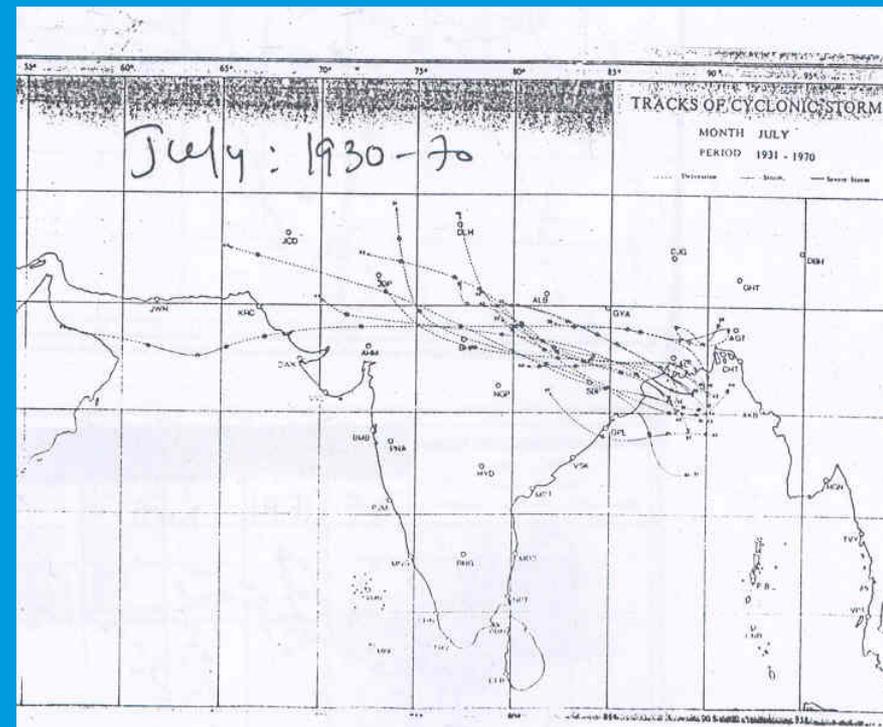
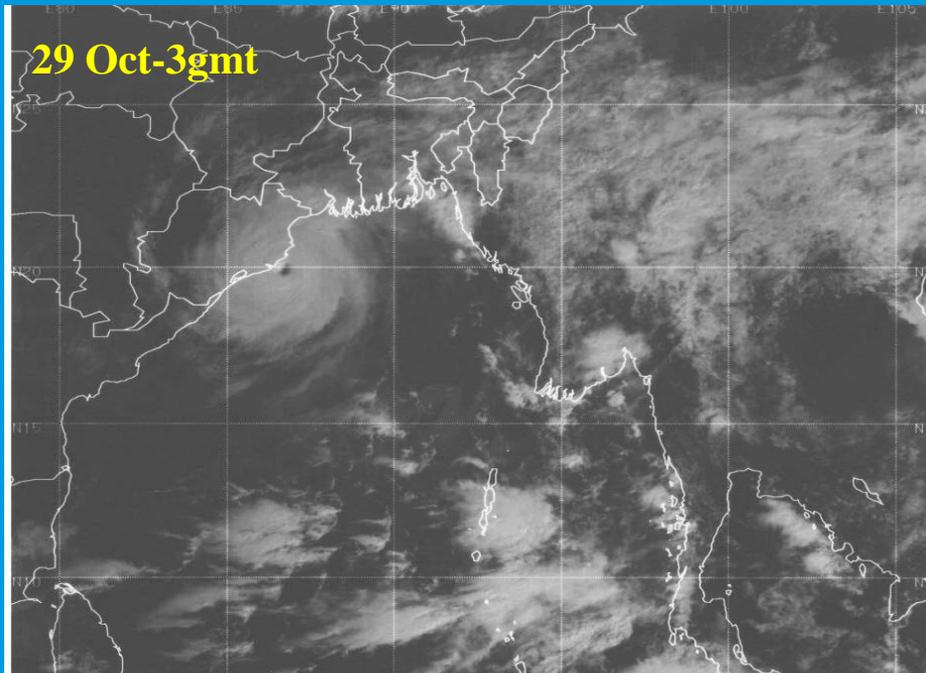
- Cost Benefit Analyses of Investment Projects
  - Understanding Impacts of dams and roads, eg. on biodiversity
  - Should we invest in natural barriers such as mangroves?

# Are Mangroves a good investment in cyclonic areas? (Das 2007, 2011)

- As we encounter climate change should we invest in natural barriers?
- 10,000 killed in Orissa (1999)
- Could more mangroves have provided protection against storm surge?



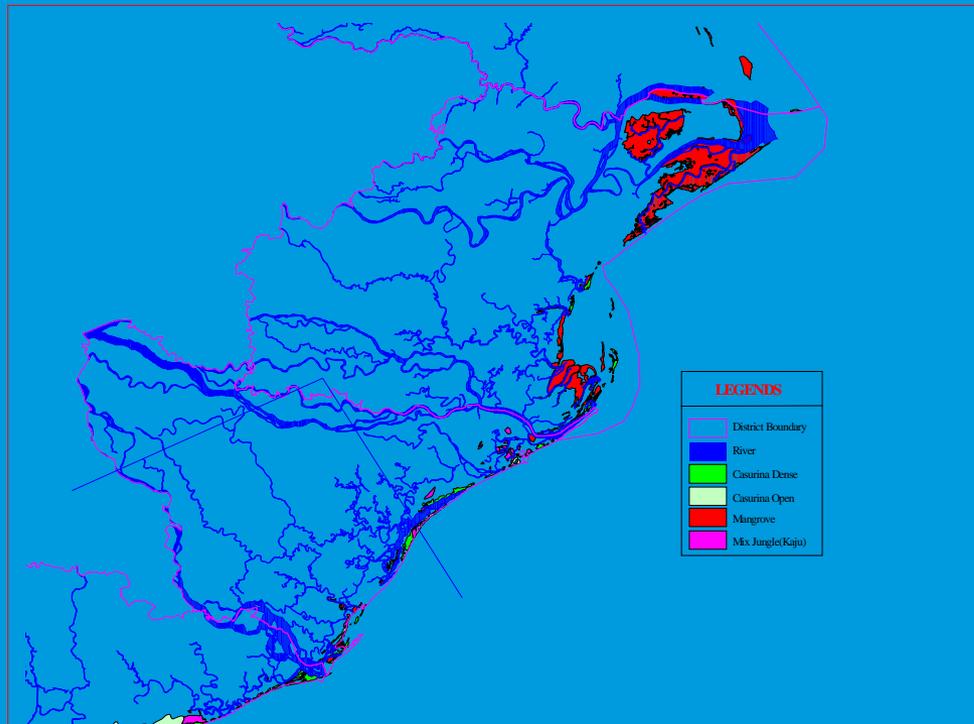
# Study Area – Kendrapada district of Orissa (Das 2007)



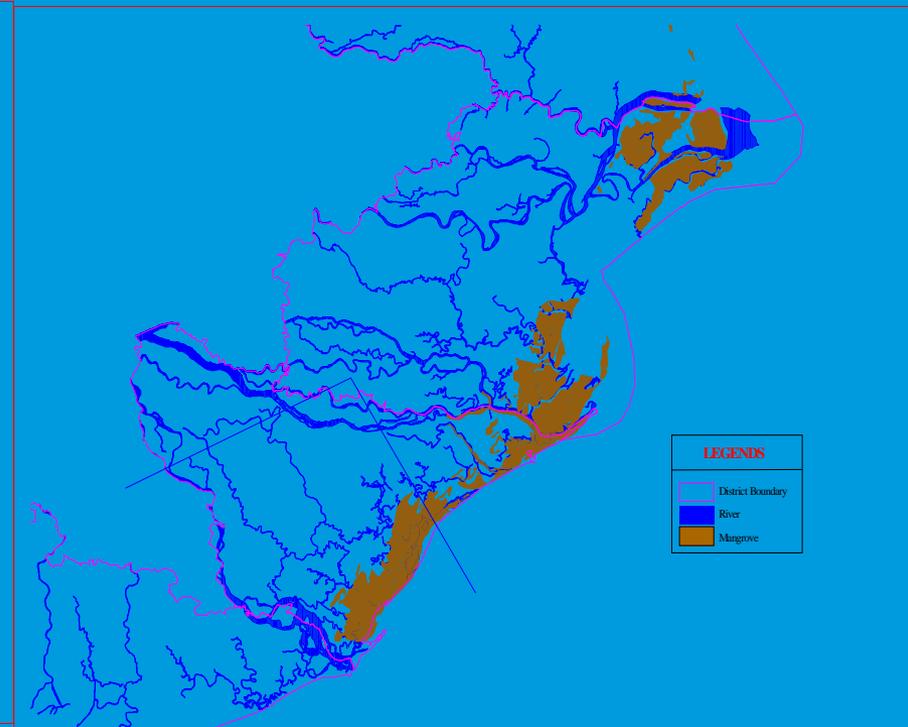
# Historical Mangrove Losses

(Das 2007, 2011)

1999



1950



# Annual Storm Protection Value (Kendrapada, Orissa)

## Death Reduction

- 54% with current mangroves
- 92% with 1950 mangroves

## Annual Storm Protection Values

- USD 694 / Ha/ Year
- Death reduction + Property Loss + Livestock Losses

## Annual Rental Value of Coastal Land

- USD 350 - 450 /Ha/ Year

# The Value of Statistical Life



**Economists do not try to measure the value of life, they measure people's interest in reducing risks to life**

- What are we willing to pay to reduce the risk of death by a small amount?
- VSL is WTP to save 1 statistical life or to reduce the entire population's risk of death by a small amount

# Valuing pre-mature mortality

Study	VSL (USD)
Madeshwaran (2004), India	305,000 -318,000
Rafiq (2011), Pakistan	321,813- 775,193
World Bank (2006), Benefit Transfer, Pakistan	Approx 45,000

# Understanding the costs of Externalities

# Understanding Agrarian Externalities

- Shrimp farming a major industry in multiple South Asian Countries
- In South India
  - shrimp cultivation allowed beyond 500 mts of High Tide Line in *uncultivable* lands.
  - shrimp culture practiced in paddy lands along the tertiary canals.
- Agro-ecosystems affected by land salinity



# Soil salinity and Paddy Productivity (Umamaheshwari 2011)

- Do shrimp farms impose costs on agricultural land?
- What is the marginal impact on paddy yields from salinization?
  - Two villages in varying distance to shrimp farmers
  - Historical and current soil salinity
  - Crop data from 257 plots

# Estimating the value of Shrimp externalities (Umamaheshwari et al 2011)

## SOILS

Both paddy villages had normal soils in pre-shrimp period, 1994-95.

Distant village had normal soils during 2006.

Nearby village had high mean salinity in certain areas. Cultivated lands had lower EC

## YIELDS

Average net returns distant village Rs 5038/ha and nearby village was negative

10% increase in salinity associated with a 0.6% decrease in paddy yields.

Returns of INR 1000 to INR 5000 per ha by reducing salinity to safe levels in affected areas.

# Evaluation of Programs and Instruments

# Evaluating Instruments

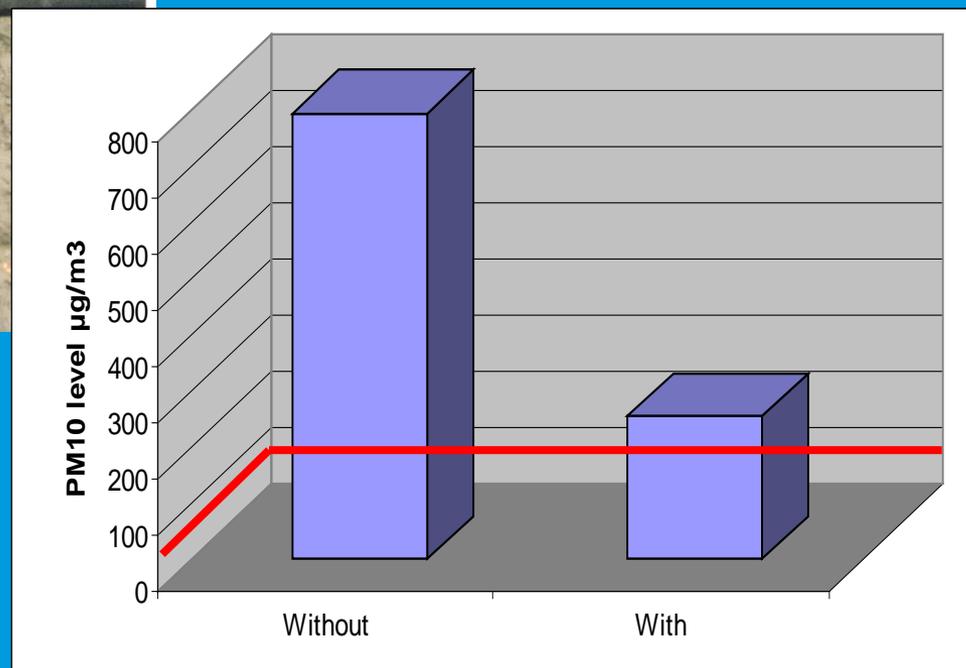
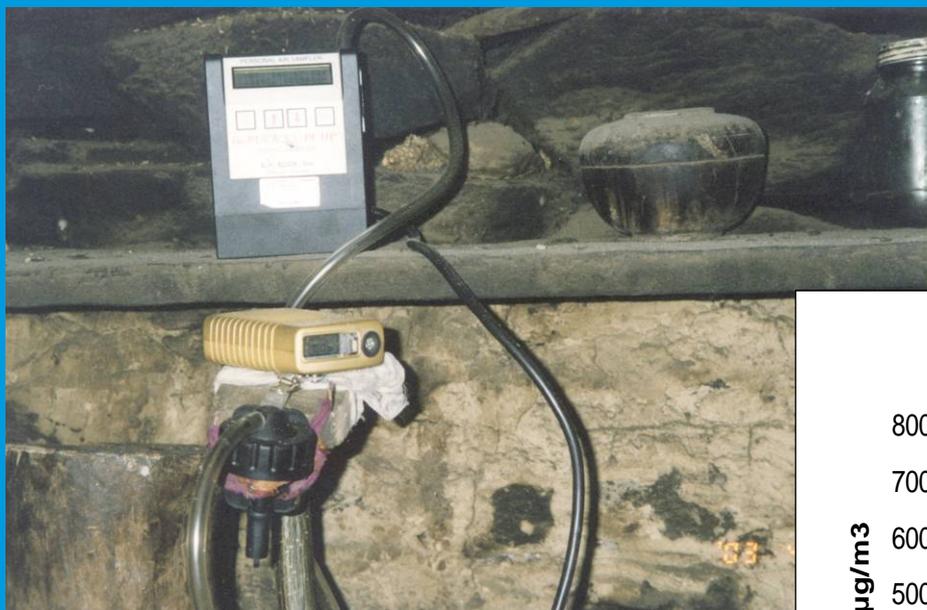
- Indoor Air Pollution 4<sup>th</sup> leading cause of death and disease in poor developing countries.
- Main cause is burning solid fuels in poorly ventilated kitchen with inefficient stoves
- What are the returns to adopting **clean technologies** that have cross sectoral benefits?
  - Improve health
  - resolve local air problems
  - help reduce biomass use and contribute to climate mitigation

# Health Interventions ( Malla 2011 )

- Smoke hoods – GI sheet metal
- Stove improvement – partially surrounding the iron tripod and provision of iron bar to allow air to pass beneath and improve combustion

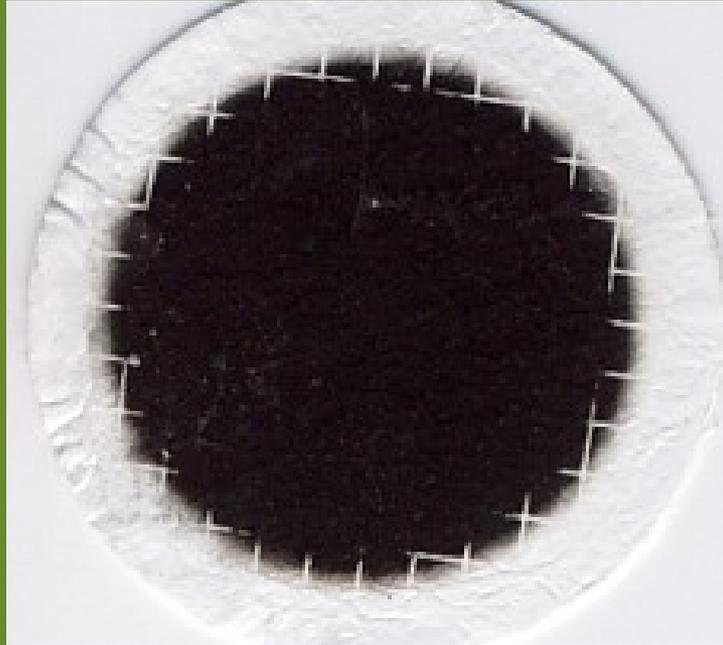


# Kitchen Smoke Monitoring (Malla 2011)



**WHO standard - 50**

# Findings - PM<sub>10</sub> Level in Kitchen (Malla 2011)



**Without Intervention**



**With Intervention**

# Costs and Benefits of the Intervention (Rs) (Malla 2011)

Table 10: Summary of Cost and Benefits (in Rs.)

Headings	Perspectives	
	House hold (in Rs.)	Societal (in Rs.)
<b>Costs</b>		
Cost of a smokehood	5000	$(5000 + 150) \times 640$
Annual maintenance cost	100	$100 \times 640$
Programme cost (excluding support for smokehoods)	-	2,850,870
<b>Benefits</b>		
- Treatment cost saving	987	$(987 + 375) \times 640$
- Day loss due to illness saving	1900 (19 days)	$950 \times 640$
- Annual fuel collection time saving (Rs/Year)	4000 (40 days)	$2000 \times 640$
- Annual cooking hour saving (Rs/Year)	1050 (10.5 days)	$525 \times 640$
- Carbon dioxide (CO <sub>2</sub> ) emission saving (Rs./Year)	-	$962 \times 640$

# Financing Public Goods

# Financing Public Goods in the Maldives

(Bhat, Bhatta and Shumais)

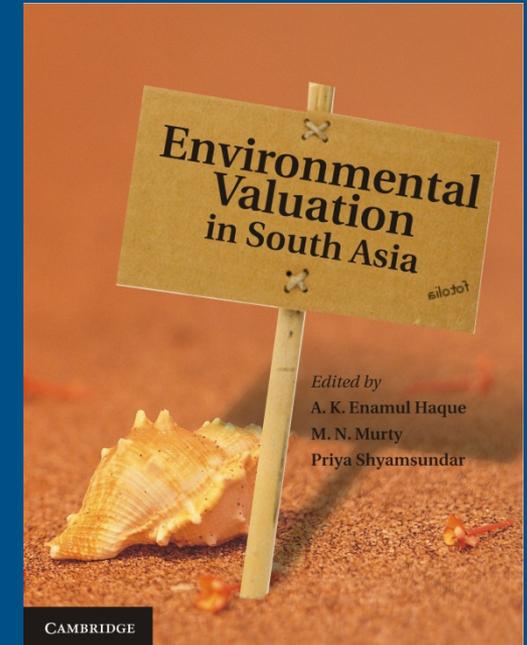
Economic Indicators	Units	Amt	Tax Burden (USD/visit)
Tourist population in 2007	# visitors	675,889	
Annual tourism benefits to all tourists	Million USD	695	
Annual revenue generated by taxing benefits at 2 percent	Million USD	14	20.57
Government expenditure on the environment	Million USD	11.06	
Env expenditure as percent of total	Percent	1.71	
Overseas environmental aid	Million USD	16.30	
Total environmental expenditure	Million USD	27.36	
Environmental expenditure as percent of annual Tourism Benefits	Percent	3.98	

# Valuing Ecosystem Services -- Issues

- Costs
  - Data collection (cost per household): USD 10-15
  - Overall study - Basic: USD 15-20,0000
  - Overall study – International peer review: +50%
- Skills and Data
  - Physical and Economic data
  - Multi-disciplinary analyses – is the science clear?
  - Multi-disciplinary teams?
- The Policy-Valuation interface
  - Evaluating a policy or an instrument
  - Financing a public good
  - National Accounts – building blocks
  - Understanding externalities – understanding connections, advocacy
  - Enabling trades -- experimental

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# Thank you

