

# Small forests **BIG** Ecosystem Services

***The value of ecosystem services provided by a small forest in a global biodiversity hotspot in India.***

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## Ecosystem Services

*'The benefits provided to people from nature'* Daily (1997)

**Provisioning Services** : food & water;

**Regulating services**: flood, climate regulation & disease control;

**Cultural Services**: spiritual & recreational benefits;

**Supporting services**, including nutrient cycling that maintain the ecosystems themselves'. (MEA 2005)





Our very existence and all economic activity depends on ecosystem services

Most traditions and cultures  
safeguard ecosystems providing  
services

## HOWEVER...

Not accounted for in commercial markets or GDP

Given little weight in policy decisions



## Why measure ecosystem services at site scale ?

Makes the **case** for conservation stronger

**Value** is better understood.

Demonstrate **tangible economic benefits** of site conservation

**Set priorities** for programs & policies, to protect or restore ecosystems

**AIM:** To **rapidly assessed ecosystem services** provided by a small reserve forest, in the Western Ghats; a biodiversity hotspot in India;

Determine **change in flows of services** in the event of **counterfactuals**



## Significance of Study

- India has over a **100 million** people living within lands classified as **public forests**,
- 275 million** Indians **directly depend on forest resources** like fuel wood, and medicinal plants for subsistence;
- 70%** of India's population is rural and agrarian (Fisher et al, 1997).



## Study Area

Global biodiversity hotspot (Myers, 1988; Myers, 1990;)

World heritage site home to over 325 globally threatened species of flora and fauna (UNESCO, 2012).



## Sonarwadi Reserve Forest

- Area 5.09 ha;
- Terrain is hilly and is covered with tropical forests (Anderson-Teixeira & De Lucia, 2011).
- Two human settlements, Sonarwadi hamlet and Bailur village rely **on the site for** water provision, and harvested wild goods.



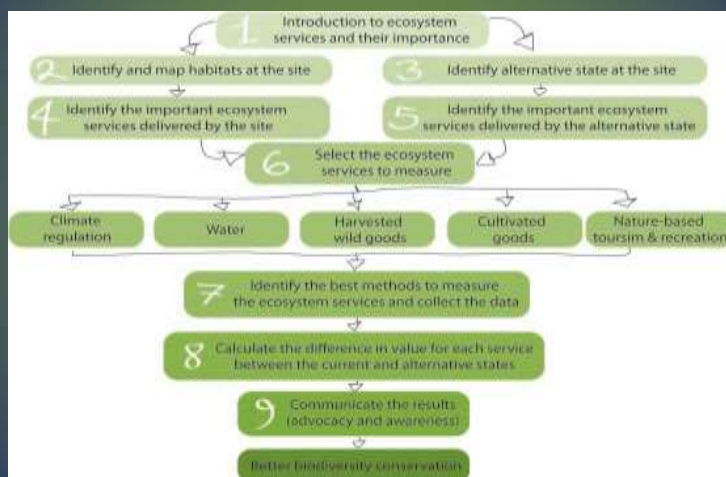


# Community

Community predominantly agrarian and depend on subsistence level farming for their livelihood



## Process: Toolkit for rapidly assessing Ecosystem Services at the site scale



## Two Counterfactuals



- Counterfactual 1 (CF 1)  
Bailur reserve forest which has degraded to a scrub (non forest) reduction in ecosystem services because of the forest degradation and population growth.

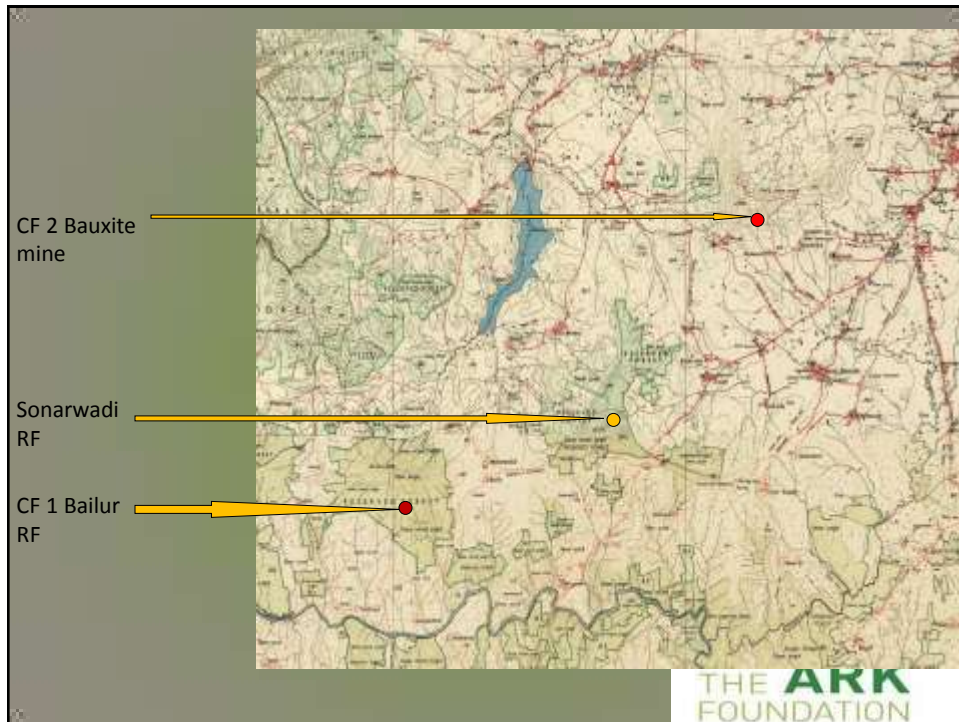
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Counterfactuals  
Counterfactual 2  
(CF 2) is Navge  
bauxite mine and  
the reduction in  
ecosystem services  
because of mining  
activities.



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## Ecosystem services assessed:

### Climate regulation

Carbon stocks estimated  
IPCC tables; 'transfer' values from similar  
sites; simple field surveys

### Water services & Harvested wild goods

Key informant interviews & household  
surveys, field measurements, Water and  
fuel wood retailers



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## ***New Harvested wild goods*** **Peeranwadi goats**



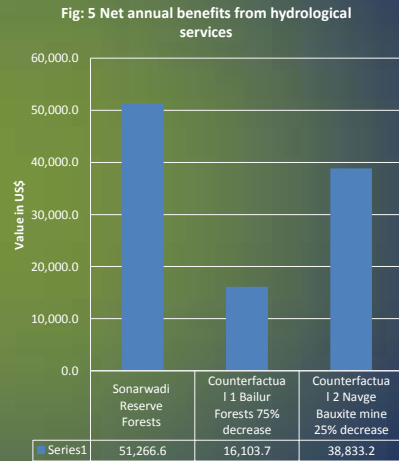
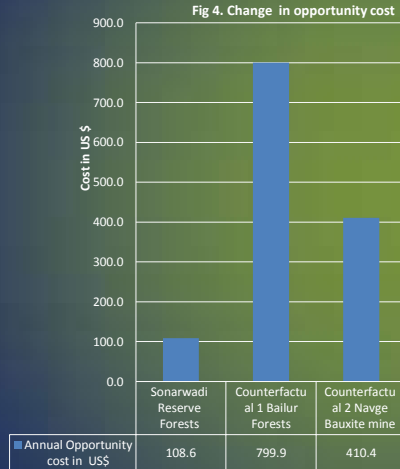
## ***New Harvested wild goods*** **Peeranwadi goats**



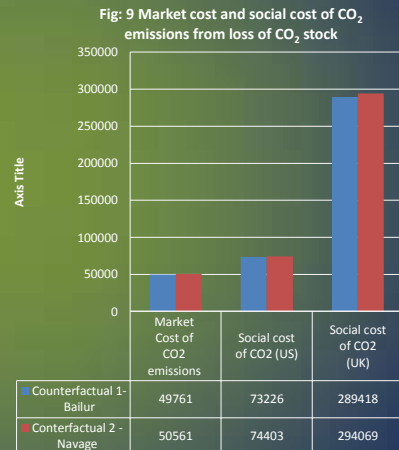
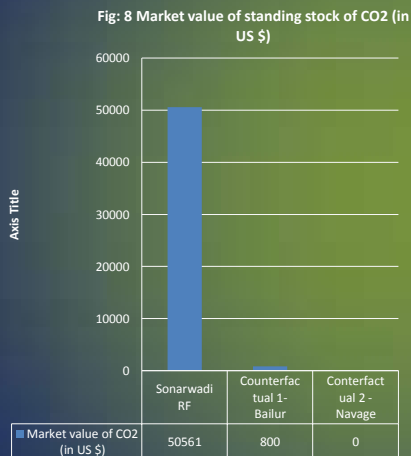
Our study calculated that the fertilisation benefits by the Peeranwadi goats add up to 12,240 US\$ annually



## Results: Hydrological Services



## Global Climate Regulation Standing Stock of Carbon



# Global Climate Regulation

## Annual flux of greenhouse gasses

Fig. 10 Annual capacity to absorb greenhouse gases

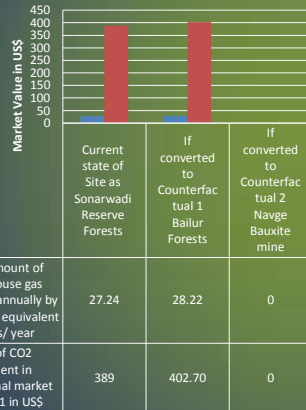
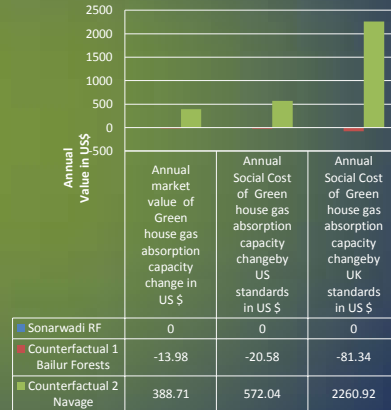


Fig. 11 Social cost of change in annual greenhouse gas absorption capacity



## Results: Harvested wild goods

Fig. 6 Change in benefits from fuelwood

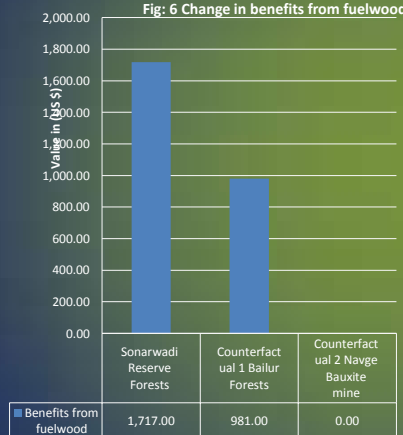
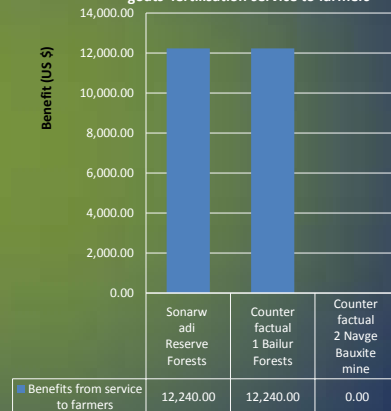


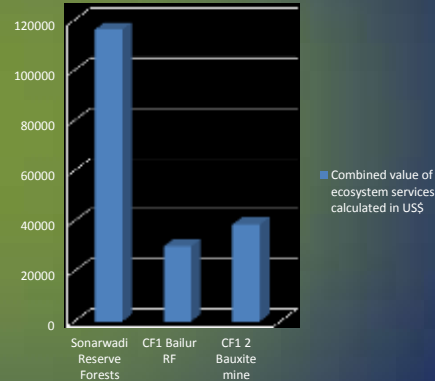
Fig. 7 Change in annual benefit from Peeranwadi goats fertilisation service to farmers



## Summary of Results

Value of Ecosystem Services	Sonarwadi RF	CF1 Bailur RF	CF1 2 Bauxite mine
Value of CO2 stocks in US\$	50561	800	0
Value of Annual CO2 Flux in US\$	389	403	0
Value of annual water supply in US\$	51,375	15413	38531
Value of annual supply of Fuel wood in US\$	1717	981	0
Value of fertilisation by goats in US\$	12240	12240	0
Combined value of ecosystem services calculated in US\$	116282	29837	38531

Fig: 14 Combined value of ecosystem services calculated in US\$



Please note mining values are not incorporated in this table as mining is not an ecosystem service

## Summary of Results

- This study demonstrates to **decision makers** the value and importance of ecosystem services provided by a small forest.
- We have only valued some of the many ecosystem services offered by the forest,
- If other benefits like **sanitation, pollination and cultural benefits** are valued the case for conservation gets stronger



## ***Significance of Results***

- Each **household** is entitled to **310 US \$ per year**, by a national rural employment scheme of the Indian government .
- Sonarwadi has 20 households , if the ecosystem benefits were divided amongst them the annual value would be **3,286 US\$ per household**;
- **10 times higher than the annual rural employment wage guaranteed by the government.**



## ***Further work***

Re-visiting the people of Sonarwadi and Bailur villages to disseminate the results through an outreach programme on valuing ecosystem services

Assessment of other sites and services

Revisiting the conceptual framework of ecosystem services to make it culturally sensitive





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**THANK YOU**



**No ecosystems were harmed during the  
making of this presentation**