



# Forest restoration option: costs and benefits

**Pablo Pacheco, Craig Beatty, Jwalin Patel**

**XV WFC - May 2, 2022**



# Key messages

- **Forest restoration** occurs through **multiple options and modalities** depending on the context. The **overall benefits that forest restoration options deliver often tend to outweigh their costs.**
- **Financial costs and benefits differ across different forest restoration options**, but **cost-benefit analysis** are limited since **capture and quantify the direct costs and direct use benefits only**
- **Trade-offs in forest restoration are** linked to environmental versus economic benefits and short- versus long-term benefits, **and these differ depending on the forest restoration option and context**
- **Achieving a balance** between the different benefits and trade-offs is **more likely to happen when undertaking restoration at wider landscapes** as opposed to specific parcels or restoration sites



# A framework to understand costs and benefits

CONTEXT  
CONDITIONS  
AFFECTING C&B

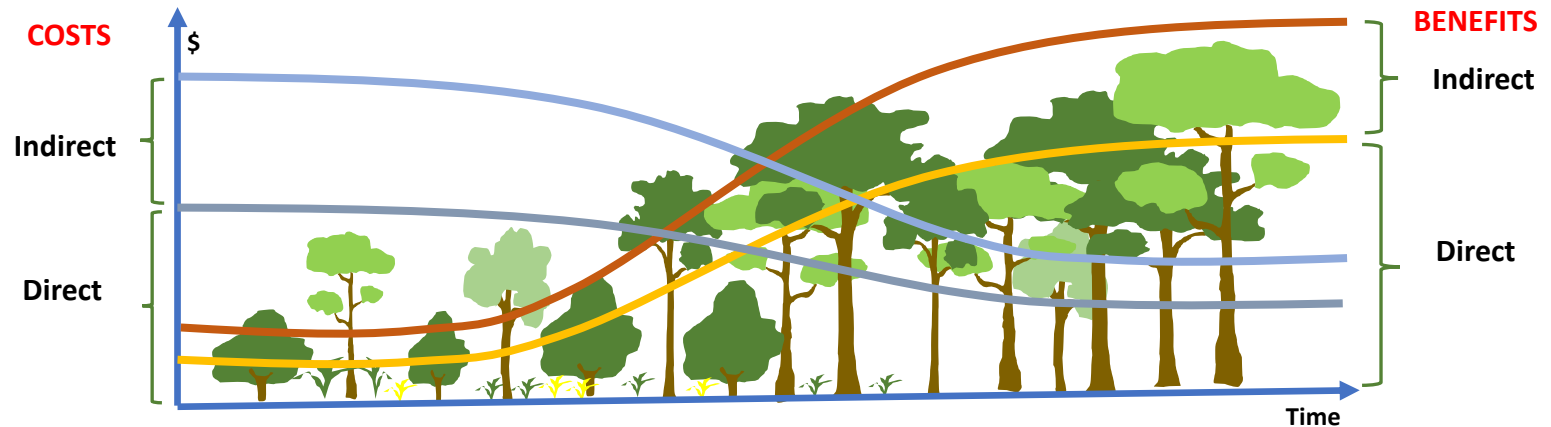
## COSTS

- Initial stage of land/forest degradation
- Scale at which restoration is undertaken

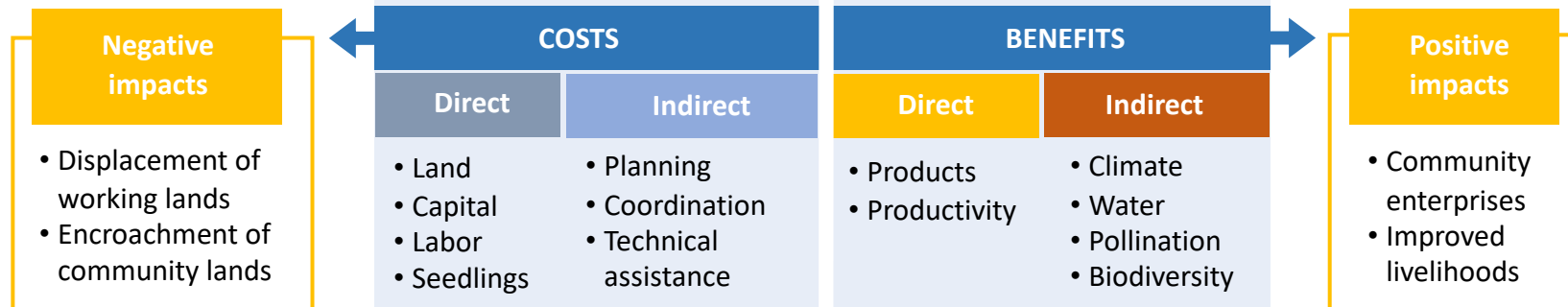
## BENEFITS

- Capacity and speed of land/forest recovery
- Climate stress and biotic agents affecting recovery

SHIFTS OF  
COSTS AND  
BENEFITS (C&B)  
OVER TIME



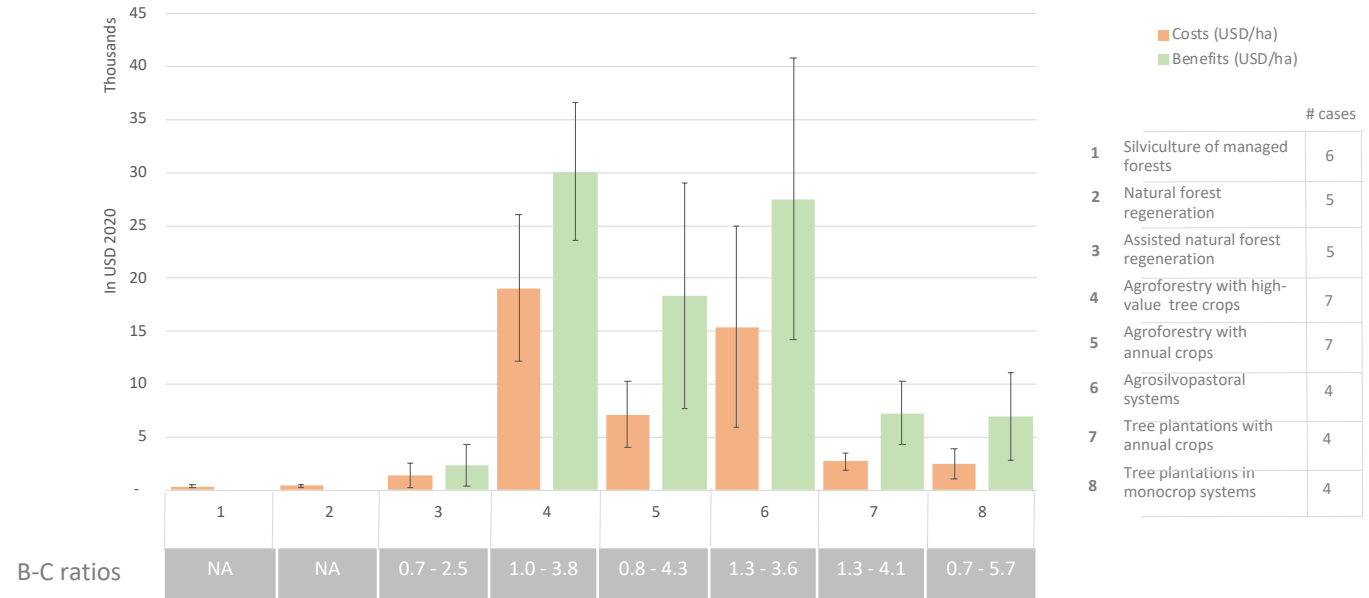
CATEGORIES  
OF C&B



# Financial costs and benefits across options

- Studies on the financial cost-benefits of forest restoration use **cost-benefit analysis (CBA)**
- CBA focuses on **direct use values** from main **provisioning services** (e.g., crops, fruits, timber) as well as their contributions to **job creation** and **income generation**
- Moreover, the estimates tend to **rely on many assumptions adopted in data generation**, as well as on **secondary data**

Compiled costs and benefit across eight forest restoration options, mean values per hectare (+1/-1 S.D.)



*Several limitations constrain the comparative analysis of forest restoration financial cost and benefits based on existing estimates. The main one is that the available estimates are not always comparable, because they use different time frames and discount rates.*



# The multiple benefits from forest restoration

Results from analysis of the benefits of restoration potential from studies conducted in seven countries (1)

	Forest restoration options	Additional jobs (2)	Income diversification	Fuelwood (3)	Erosion reduction	Sediment retention	CO2 removal (4)
1	Silviculture of managed forests	Low	No	High	High	Moderate	Low
2	Natural forest regeneration	NA	No	NA	High	Moderate to High	NA
3	Assisted natural forest regeneration	NA	Yes	NA	High	Moderate to High	Medium
4	Agroforestry with high value tree crops	Medium to High	Yes	Moderate	Moderate to High	Moderate to High	Low to High
5	Agroforestry with annual crops	Low	Yes	High	Moderate to High	Moderate to High	Low to Medium
6	Agrosilvopastoral systems	Low to Medium	Yes	Low	Moderate to High	Moderate	Low
7	Tree plantations with annual crops	Low	No	High	High	Moderate to High	Medium to High
8	Tree plantations in monocrop systems	Low	No	High	High	Moderate	Low to Medium

**Notes:**

- 1) Brazil, El Salvador, Honduras, Kenya, Madagascar, Peru, Uganda
- 2) Low < 0.5 jobs/ha/yr, Medium 0.5 - 7.5 jobs/ha/yr, High > 1 jobs/ha/yr
- 3) Moderate < 5 m3/ha/yr, High > 5 m3/ha/yr
- 4) Low < 25 TCO2/ha/year, Medium 25 - 75 TCO2/ha/year, High > 50 TCO2/ha/year



# Major trade-offs linked to forest restoration

- **Economic versus environmental benefits** – the restoration options with the greatest economic potential may not be the ones that deliver higher environmental and social benefits
- **Short- versus long-term time horizons** - the environmental benefits of forest restoration require longer time frames to materialize, while people may favor short term benefits
- **Monetary versus non-monetary** - The increasing demand for direct uses from nature with monetary value may threaten the longer-term environmental benefits of forest restoration





A scenic landscape featuring a valley with a town, surrounded by mountains. In the foreground, there is a pink flower and some green foliage. The sky is cloudy.

# Thank You