

**We are sharing our results with local, regional and national authorities**



Thanks to the local communities who helped with our research. We also thank the local authorities in Andasibe, Antavandava, Ambodimangavalo, Didy, Morarano Gare, Ambohibary, Maroseranana, Lakato, Anjamana, Mantadia, Ampasipotsy-Gara, Ambatovola, Amporoforo, Miarinarivo, Antenina, Sahambala, Ambalarondra, Fierenana, Anivorano.

Thanks also to our national and international advisory committees.

Thanks to Dwa (Eric Andriantsialonina) and Lisa Rammensee for the cartoons.

Thanks to our partners from Madagascar National Parks, the Ministry of Environment, Ecology Sea and Forests, Association Mitsinjo, GERP and DREF.



For more information please see our website [www.p4ges.org](http://www.p4ges.org). Or contact: Prof Julia Jones School of Environment, Natural Resources and Geography, Bangor University. [julia.jones@bangor.ac.uk](mailto:julia.jones@bangor.ac.uk)



**Can Paying For Global Ecosystem services reduce poverty?**



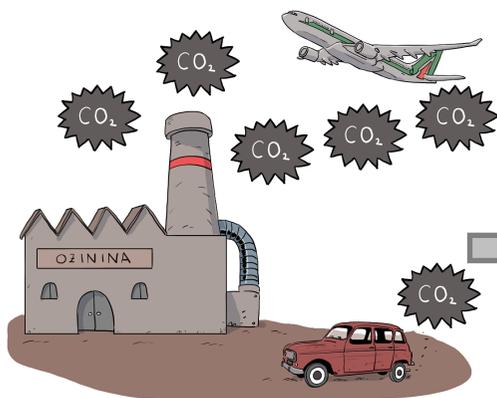
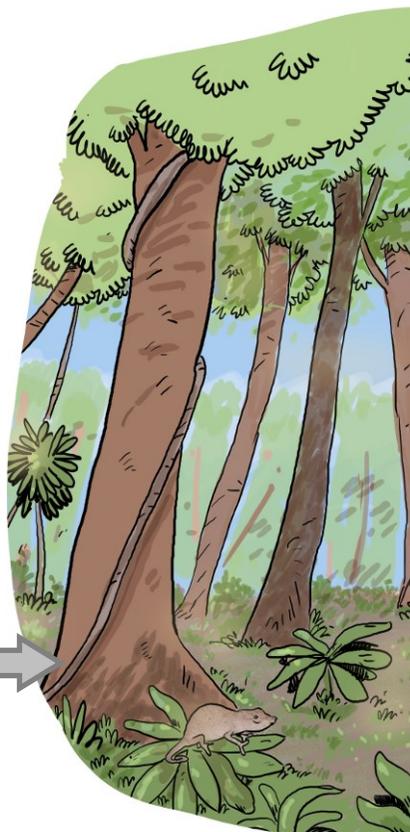
**Results from the p4ges project (2013-2017)**  
[www.p4ges.org](http://www.p4ges.org)



# Madagascar's forests are valuable to local people



The existence of Malagasy biodiversity is valued around the world (see page 12&13)



Forests lock up carbon helping regulate the climate-all people benefit (see page 8&9)

**Conservation of forest in to protect these benefits**



**Those living outside the forest**

See page 17



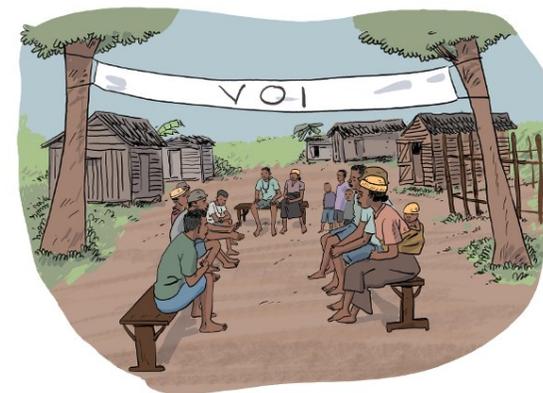
Implementation problems meant that some of the livestock projects didn't bring the anticipated benefits:

*"Many of the chickens died as we did not have money to buy vaccines needed or keep them in good condition"* Resident of Fierenana commune.

Not everyone affected by conservation restrictions received livelihood projects in the past. Work in Ampahitra fokontany showed....



People living in accessible areas were twice as likely to receive benefits from some projects.



People who were members of forest management committees were more than twice as likely to receive benefits.

**In conclusion livelihood projects can increase income and are needed to help people depend less on the forest but there have been challenges with the implementation.**

## We also found...

Of the 600 people we spoke to who had been involved in livelihood projects, nearly everyone believed that they can improve livelihoods and 90% would be keen to be involved in future projects. More than 50% believe the livelihood projects have reduced pressure on the forest.

*"Local people don't destroy forest if they have foods and they are healthy and are able to send their children to school as well"*  
Morarano Gare resident

People would like to participate in future livelihood projects and would also like help to improve social infrastructure such as schools and health clinics, and to be involved in cash crop production.



## But...

In some cases, some beneficiaries of the project felt they didn't have the opportunity to choose the right project for them:

*"I didn't chose a chicken raising project but it was chosen by others, I would have preferred rice cultivation."* Resident of Fito commune.

*"The bee keeping project in our village failed because we lacked knowledge and technical support."* Resident of Morarano Gare commune.

## and to people around the world



Local people need to clear land for farming... (see page 14&15)



...and collect products from the wild (page 15)



Forests can affect water supply and slow erosion (see page 10&11)



**Madagascar is supposed but can have local costs.**



Forest conservation is important BUT we still need forest resources .

**Forest dwellers**

See page 14-19

We are a team of many researchers from Madagascar, UK, America, the Netherlands and Switzerland.

Hydrology team



Livelihood & policy team



Livelihood & institutions team



Social-Economic team



Carbon team



Biodiversity team



We need to support the people who protect the forest.  
Why not to help forest dwellers with developing livelihood projects?

Malagasy government

### We found...

Over the last 10 years, nearly 500 small livelihood projects have been implemented in the CAZ region by Conservation International in partnership with local NGOs. For example....

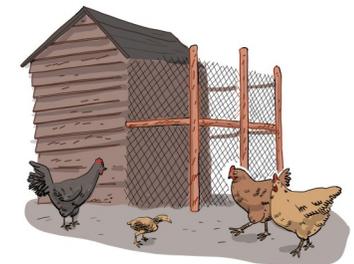
216 projects supported staple crop production.



Some of us have made money thanks to the project and been able to buy zebras, pigs and farming tools.



44 projects supported bee keeping.



107 projects supported livestock rearing.

## But local people do perceive benefits from the forest

*“The forests mean our agricultural lands are not destroyed by sands from soil erosion.”* Resident of Antavandava commune.

*“By protecting forests, we have enough rain for our agriculture.”*  
Resident of a village in Didy commune.

*“The benefit from the forest is .... it provides water. If we cut the forest the land becomes arid and brings sickness because of lack of rain. This is why it is important to manage the forest well.”*  
Resident of Morarano Gare commune.

*“Breathing the pure air inside the forest reminds me of the creator.”* Resident of Ambodimangavalo commune.

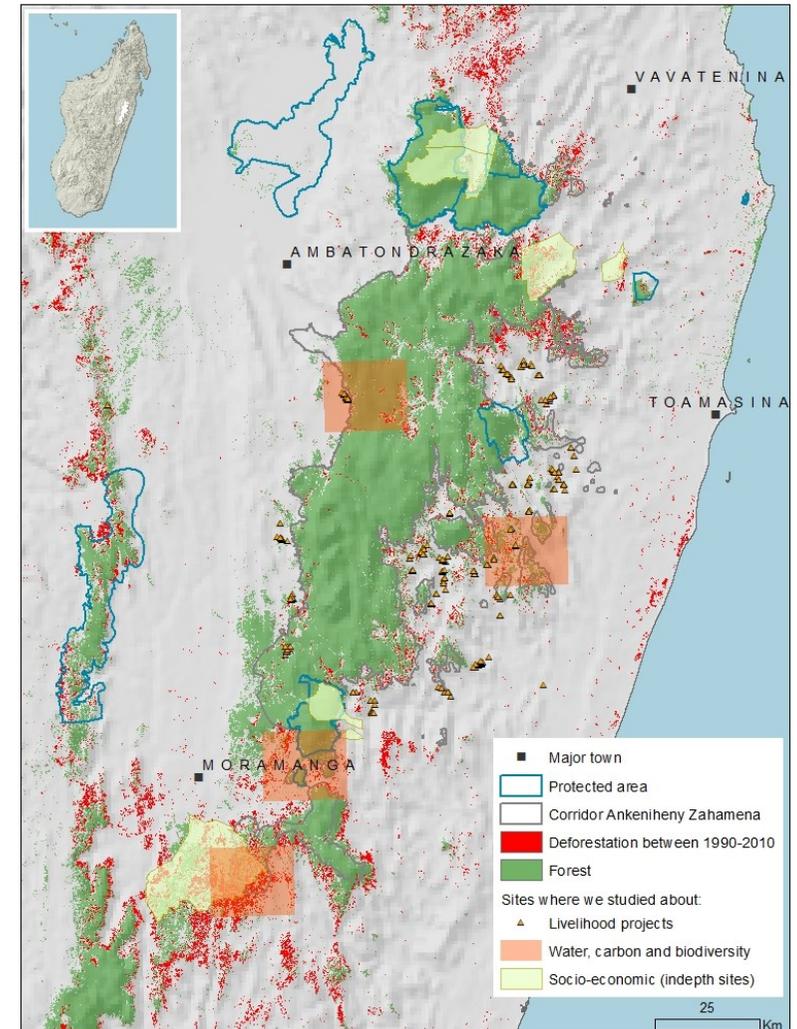
*“Firewood from natural forest are best for providing warmth for women after giving birth.”* Resident of Ambodimangavalo commune.



Forest conservation is important to us  
BUT we still need forest resources for our subsistence and we are very poor.

**Our aim: to explore the costs and benefits of forest conservation globally and locally and whether global values of forest can be captured to help local people bear the cost of forest conservation.**

We have worked in many sites around corridor Ankeniheny Zahamena in eastern Madagascar.



# Our key findings

When forest is converted many of its values are lost.

Forest has more carbon, more biodiversity, is better at reducing soil erosion and allowing water to seep into soil.

BUT other land uses also provide important benefits.

I find things I need & cultivate in fallows



Planting trees can restore some of the ecosystem functions (increasing carbon, biodiversity and water infiltration) and can provide jobs.

However forest conservation represents a big cost to some households which has not been fully compensated.



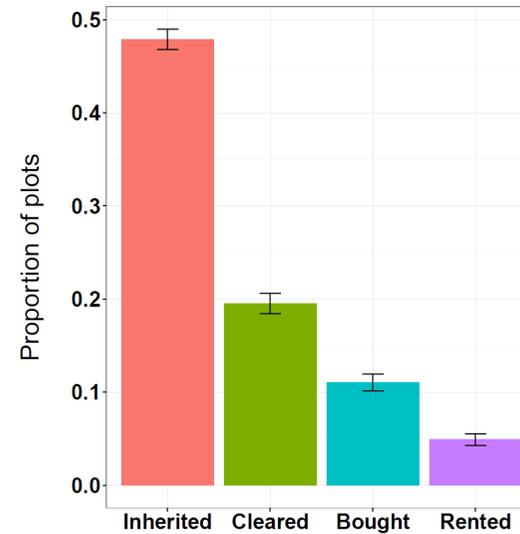
We do value forest but we also need land to grow food.



We like the help with new agriculture methods but many people didn't get this help.

# We found....

People are still dependent on land from clearing forest



"People give birth and get more numerous while the land is getting smaller. Before people used to work the land where they wanted to. Now they can't go anywhere" resident of Maroseranana commune.

The impacts of preventing swidden agriculture may be large compared to local livelihoods. The costs will vary between households is up to 10-50% of household's annual incomes.



Many people depend on collecting products from the wild.

"Firewood is very important because daily life depends on it" Resident of Ambatovola commune.



## BUT conservation can have costs



What are the local costs of conservation?

How effective are livelihood projects?

Who benefits from the livelihood projects?

How are decisions which affect local people made?

### P4ges researchers used



>450 choice experiments to estimate the opportunity cost of forest conservation.



>1200 household interviews to calculating the costs and benefits to farmers of forest conservation and effectiveness of livelihood projects.



>80 Focus Group Discussions to understand how decisions are made that affect local people and who has access to livelihood projects.

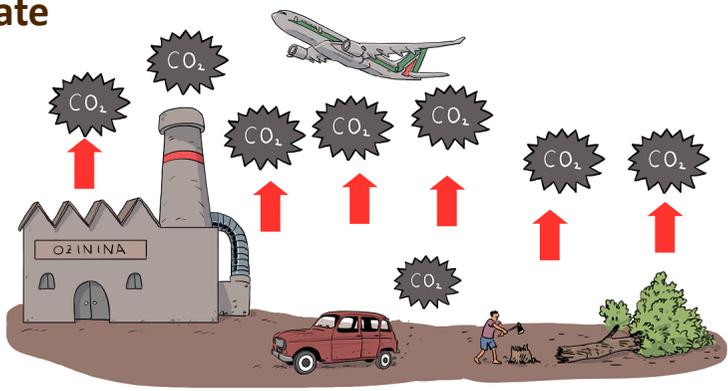
## Our key recommendations

- 1) The Malagasy government should continue to explore opportunities for funding forest conservation and reforestation through capturing international benefits (carbon storage and biodiversity).
- 2) However changes need to be made to ensure that the poorest people don't suffer because of forest conservation.
- 3) Local people should be consulted when livelihood projects are introduced (to ensure they are effective and everyone has the opportunity to benefit).
- 4) The role that forest plays in protecting water flows and soil should be better communicated so local people can use this knowledge improve land management.



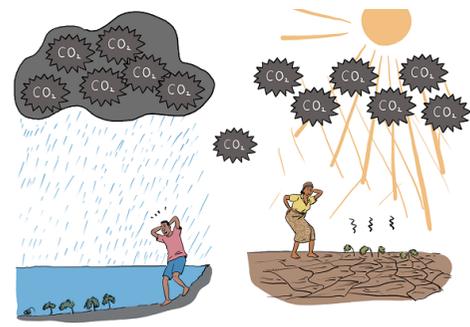
One of our team demonstrating the role that forest cover has on sedimentation.

# Forests lock up carbon $CO_2$ helping regulate the climate

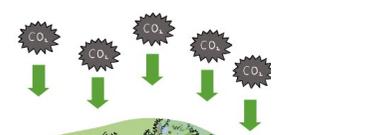


Human activities like industry, transport and forest burning increase carbon in the atmosphere.

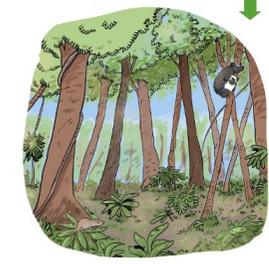
Carbon in the atmosphere warms the climate.



Too much carbon in the atmosphere leads to climate change (floods, droughts and damage to agriculture).



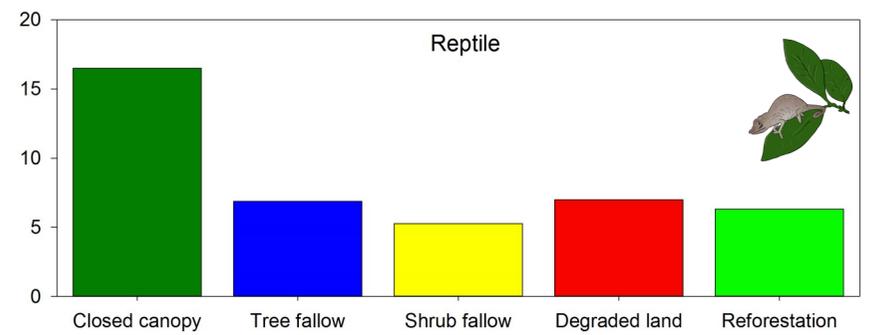
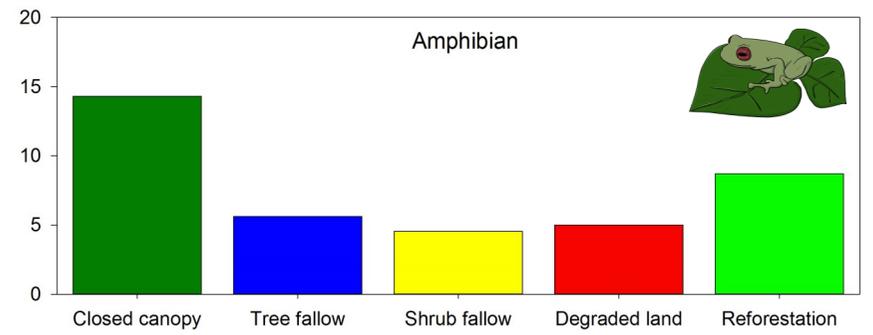
Forest conservation can lock up carbon reducing climate change.



This helps the whole world and is why the international community help fund conservation.



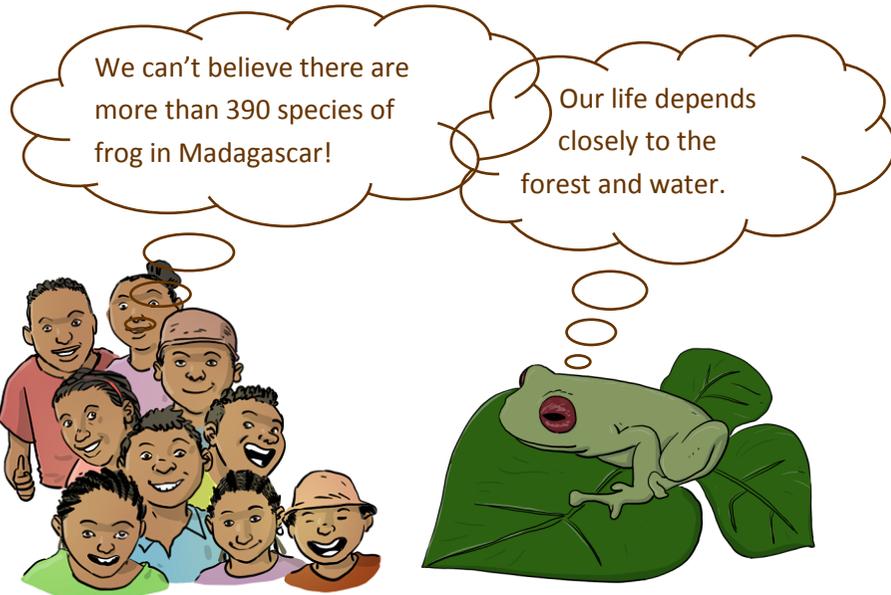
Our biodiversity team surveyed reptiles, amphibians, soil biodiversity and butterflies in different land uses.



We found that most species are found in forest but other land uses (especially reforestation) also contain a diversity of species.

Biodiversity supports carbon storage, soil infiltration and soil fertility.

## Biodiversity is part of our national heritage and brings a variety of benefits



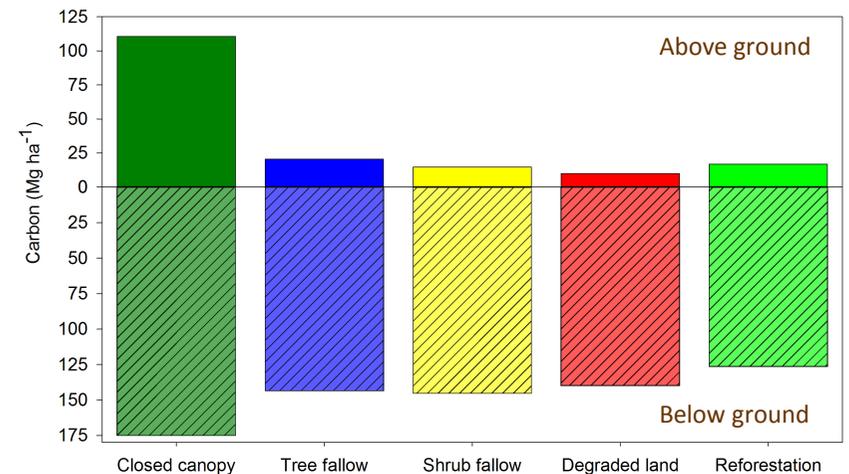
Our aim was to understand the relative amount of carbon stored under different land use (from forest to fallows and highly degraded land).



We used forest inventory, weighing biomass, soil sampling and analysing carbon content in the laboratory.



### What did we find?



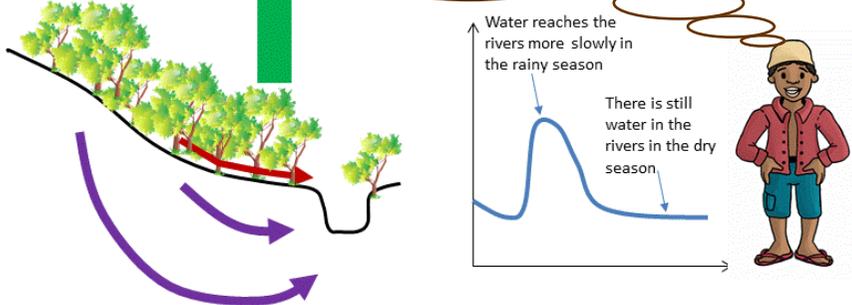
We found that forests store more carbon than fallows and degraded land above ground but that a lot of carbon remains in soils in quite degraded land.

## Forest can affect the water available for agriculture

Land use affects the amount of water that infiltrates into the soil. Where there is forest, lots of water seeps into the soil.

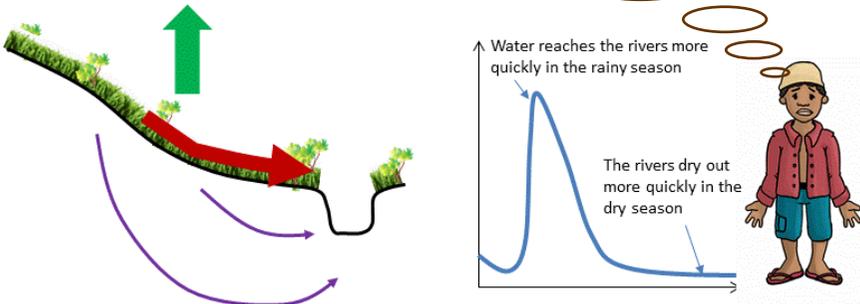


Water seeps into the soil and flows slowly to the stream or can be used by plants. My fields don't flood often.



Where the land has little vegetation, the water runs quickly over the land when it rains.

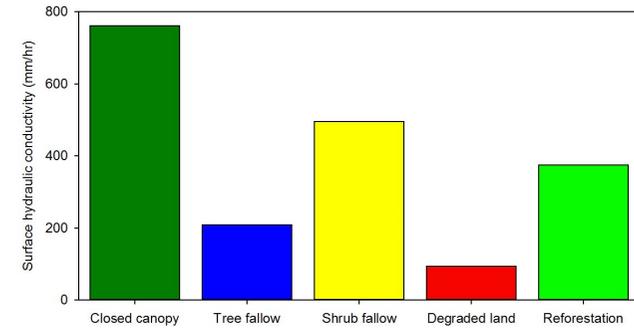
This can cause flooding and takes away fertile soil.



We measured how quickly water seeps into the soil and how much flows over the soil and how much water the trees use.

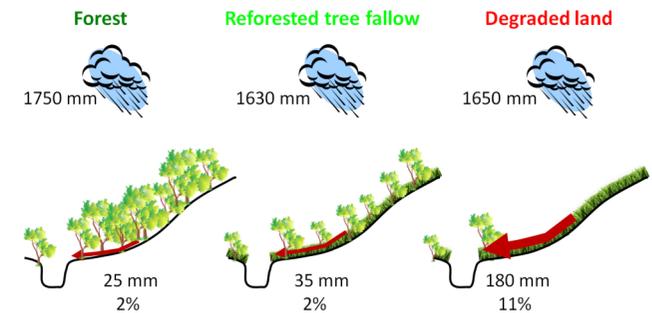


## What did we find?



During heavy rain water flows much faster into the soil under forests than on degraded land. Water in the soil will leak out into the rivers long after the rainfall, perhaps even during the dry season.

However, trees also use more water so less water may be available down stream of forests on an annual basis.



We found that if land is covered by trees this can improve river flows downstream, especially in the dry season, but this effect is only experienced relatively close to the forested (or reforested) land.