

# Where does this water go?

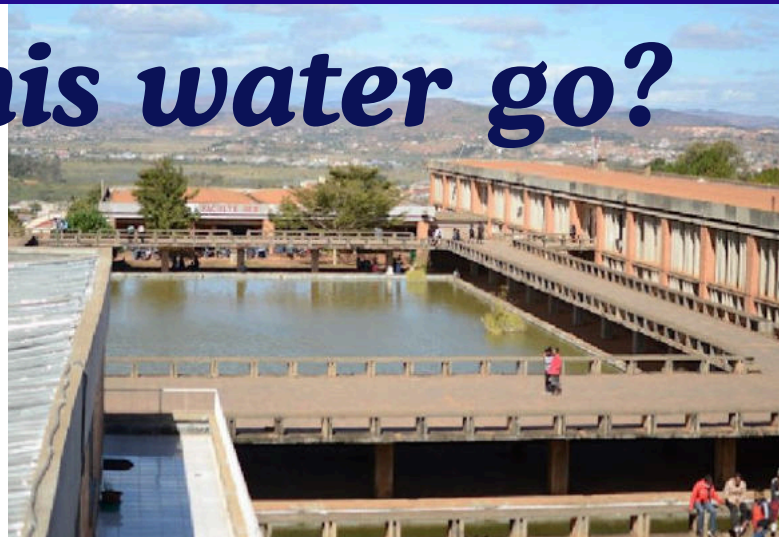


**Figure A:  
Sciences Building**

A cistern located on campus used for storing rainwater. Many efforts have been made to collect rainwater on campus, but more could be done to aid rainwater collection practices.

Please note the concrete gutter located on the building in the background which diverts rain water onto the street below

- What is the volume of water running off of the buildings today?
- Are there Storage Tanks that need to be repaired or replaced?
- Do new Tanks or Cisterns need to be built?
- How many buildings are releasing massive amounts of water to the ground below?
- How many 1000s of liters of drinkable water could be captured and used within the buildings)



**Figure B:  
Courtyard Water  
Capture**

Figure F. As previously mentioned, the University has already taken some measures to collect rainwater which have proven effective in providing some, of the schools needs. Here we see one of two rainwater collection ponds located near the central portion of the school grounds. While measures such as this no doubt provide plenty of water for the schools needs, it has been made clear by the faculty that more radical measures should be taken to ensure all of the needs

of the Horticulture department., and their hundreds of specimens of at-risk plant life.

- Is evaporation a significant loss factor with these shallow structures?
- Can the water quality of this captured water be improved by transporting it to controlled (underground) tanks with continuous circulation?
- Are new tanks needed to increase Storage capacity?
- WHERE could new Storage be safely and efficiently constructed?



**Figure C:  
Mossy Vertical  
Riverbed**

Many buildings on the campus show clear signs of lost opportunities to gather rainwater. The facade of this particular building not only shows the concrete water diverters on the roof that deliver rainwater uselessly to the ground, but also shows signs of wasted water where water flows down the side of the building actively enough to facilitate the growth of green moss.)

- Water going to the Gardens is good, in fact. But we could try to save some water back for those dry months of winter.
- We will need photovoltaic for circulation pumps.
- Filtrations will still be needed to have potable water after months of storage.



**Figure D:  
Cathedral Sciences de  
la Societe**

The University features several structures, such as the "Cathedral sciences de la societe " which have cylindrical structures which could gather large amounts of water with the addition of rain retention technologies.

- Larger structures are more efficient for gathering rainwater
- Where can Storage be located?
- How much Storage exists or can be repaired?

The installation of water retention on just these structures alone would drastically increase the amount of water available to the University



Nathan R. Coman   
**Finding Water  
for the Trees**

# The Botanical Gardens of Antananarivo



The botanical garden located at the University of Antananarivo features some of the most unique plant species on the planet, as approximately 80 percent of the flora native to Madagascar can be found growing naturally only on the island.

These unique plant specimens have been carefully cultivated by qualified University staff for study by the students attending the University, as well as scientists conducting botanical research. Our team was privileged enough to be given a tour of the garden by none other than the president of the university himself, Professor Ravelomanana.

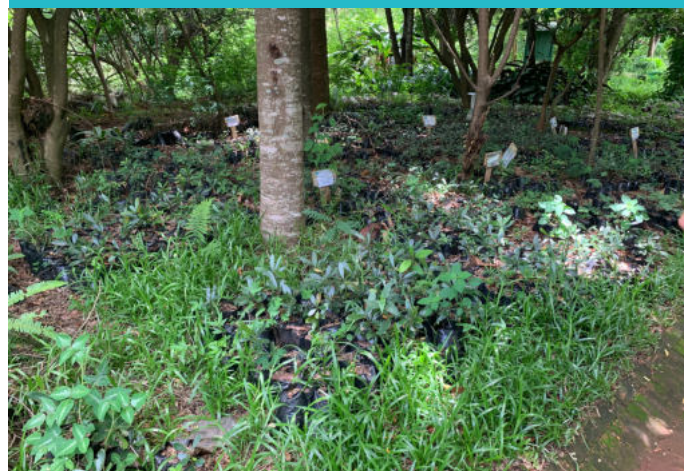
In this well maintained, and professionally kept garden are important specimens of many different native plant species. This includes Ebony trees, Rosewoods, and even orchideen, and even two immature Baobabs.

These specimens are no doubt a great benefit to the students pursuing botanical degrees, who no doubt gain priceless knowledge about the plant species unique to their homeland.

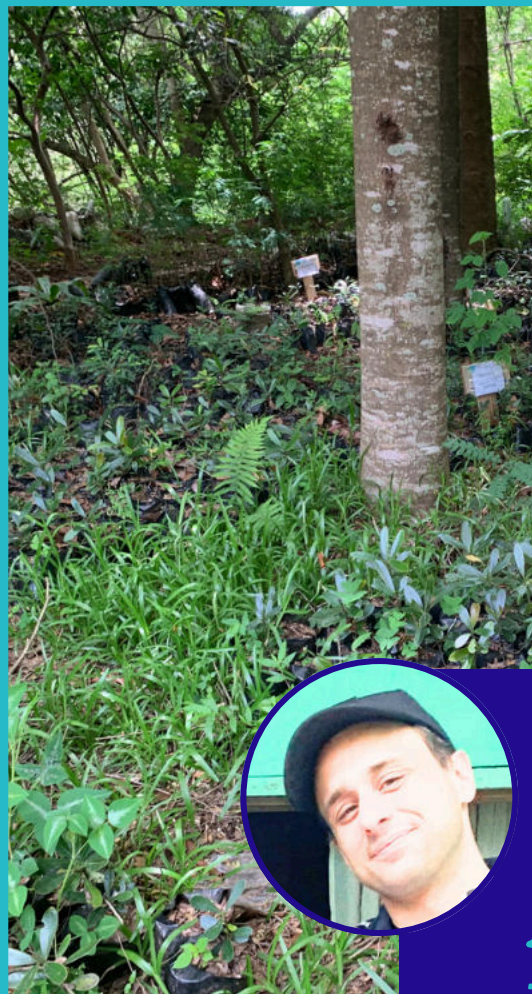
Featured in the botanical garden are several dedicated cloning labs and numerous green houses. Currently planned is construction of water treatment facilities which would allow the garden to survive the dry winter without needing to use grey water for irrigation. There is no other way for the program to continue to expand in the future without a water solution for the University.

A short walk from the botanical research facilities were well over 1,500 larger tree specimens which have been planted approximately densely (a meter apart.) We were informed by Dr. Professor Vonjy (Botanical Director) that this spacing helps to create a more natural forest with its own biomass. This biomass in turn provides natural fertilizer that helps to encourage the natural proliferation of smaller plants and beneficial animals throughout the garden.

Foundation Lead, Ken Coman surprised Dr. Vonjy with the view that a large area of the Gardens is being managed in a permaculture fashion. The underbrush that has been embraced is, in fact helping with water retention .. and is adding significant biome diversity. They were in agreement on the profit from allowing nature to be free in this space.



It is interesting to note that the Government of Madagascar has turned to the University's Agricultural department on many occasions in the past, for advice on the proliferation and preservation of the unique endemic plant species that make the Island of Madagascar a treasure trove of unique ecology. Cooperation from the Malagasy Government is a welcomed benefit, and It was interesting to note that many plants seized by the Government from entities engaged in the illegal exportation of rare plant species, have been relinquished to the University's Agricultural department, so that scientific research can be conducted on plants that would otherwise have been illegally exported.



Unfortunately, we were informed that there is a thriving market for the illegal exportation of the rare species being studied within the University, and our team noted that several of the structures specializing in the study of unique vanilla species, and valuable rosewood specimens were securely locked, to dissuade thieves from attempting to steal invaluable specimens.



The University's Agricultural Department became so successful in growing and maintaining plant species, that many residents of Madagascar have been known to collect fruits and vegetables from the botanical garden, an unforeseen benefit rendered to the community from a well maintained and cultivated forest. In conclusion, it is clear that the Botanical Garden located within the University of Antananarivo is a treasure trove of unique plant species. Carefully cultivated, and professionally maintained, there is no doubt that the numerous samples being studied here represent a great benefit to both the students pursuing botanical degrees at the university, and 4 the scientific community in general. Surely such a well maintained garden represents a great scientific resource that will benefit the community for generations to come.

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