



Cultural Adaptation Caused by Biodiversity Loss in Malagasy Society



**Tabita Randrianarivony, Nivo Rakotoarivelo,
Fortunat Rakotoarivony and Armand Randrianasolo**



Context

- Madagascar biodiversity richness
- Importance of the cultural identity in 18 ethnic group
- Poverty of local people
- Rapid loss of forest cover : estimated at 200,000 ha annually





Context

- Types of vegetation in Madagascar: coastal forest evergreen humid forest, sclerophyllous woodland, deciduous dry forest, mangrove
- $\frac{1}{4}$ plants inventoried for their uses
- 83% of Malagasy rely to a greater or lesser extent on plant resources



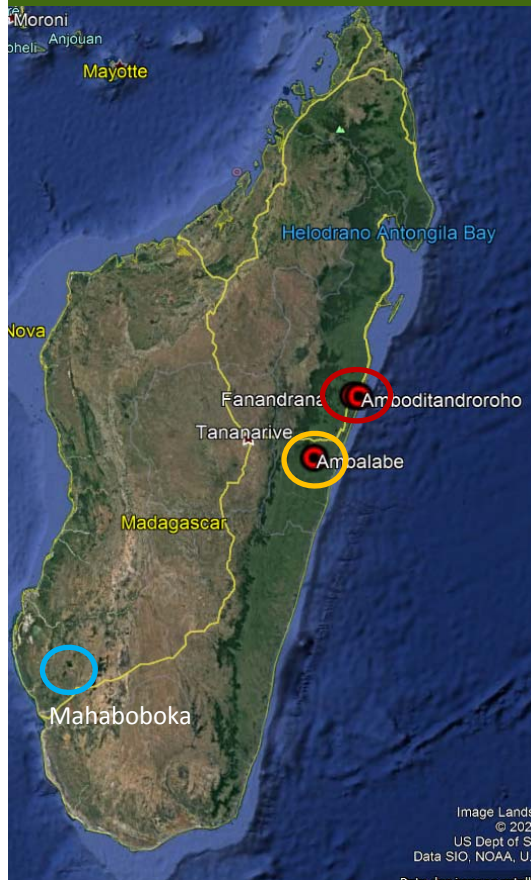
Research questions

Can Malagasy retain their culture and traditional botanical knowledge in the face of biodiversity loss?

If they can, then how do they do ?



Methods



➤ Eastern part in Vohibe Protected Area (Vatomandry)



➤ Southwestern part in Alandraza-Agnalavelo Protected Area (Sakaraka)



Methods



- Focus group
- Semi –structured interviews
- Collecting data through the Catalogue of Plants of Madagascar



Catalogue of the Plants of Madagascar

TROPICOS Names Specimens References Projects Images More Tools

Welcome to the Homepage of the Madagascar Catalogue

The **Vahinala Project** aims to assimilate information on all native and naturalized plant species in Madagascar, evaluating the available taxonomic literature and specimen base for each taxon. The primary result of the project is the **Catalogue of the Plants of Madagascar**, an online database. The **Missouri Botanical Garden** leads the Project in collaboration with numerous institutional and individual partners. We completed a synonymized list of accepted species in 2008 and in 2012 we have completed the taxonomic evaluation of the majority of all genera and compiled distributional, ecological, and conservation status information for most well-circumscribed accepted species (*View Project Milestones*). In 2017 we added a preliminary checklist of bryophyte species, and changed the name of the website from the **Catalogue of Vascular Plants of Madagascar** to its current name.

Data in the Catalogue as of May 2017 indicate that a total of 249 vascular plant families are represented, comprising a total of 1698 genera and 11,262 native species of vascular plants (angiosperms, gymnosperms, and ferns) known from the island, 8,182 (82%) of which are endemic. In addition, ca. 920 new species, all endemic, have been identified in 162 of the 587 genera that have been evaluated, and projections based on this and the rate of discovery of new species over the last three decades indicate that the total flora will ultimately come to at least **14,000 species**. When all species are taken into account, including those that remain to be described, about **87% of the Malagasy flora will be endemic** [source: Lowry, P. P., II, P. B. Phillipson, L. Andriamahelanjro, G. E. Schatz, F. Rajonary and S. Andriambololona. 2018. Flora, pp. 243–255 in S. M. Goodman, M. J. Raherilalao and S. Winklhauser (eds.), *The terrestrial protected areas of Madagascar: Their history, description, and biota*. Association Vahatra, Antananarivo]. Subsequently data in the Madagascar Catalogue have accumulated as work on various plant groups has advanced, and as of **November 2020** the data are as follows: 253 vascular plant families and 1,747 genera currently recognized, and 11,399 native species of vascular plants (angiosperms, gymnosperms, and ferns) known from the island, 9,294 (82%) of which are endemic.

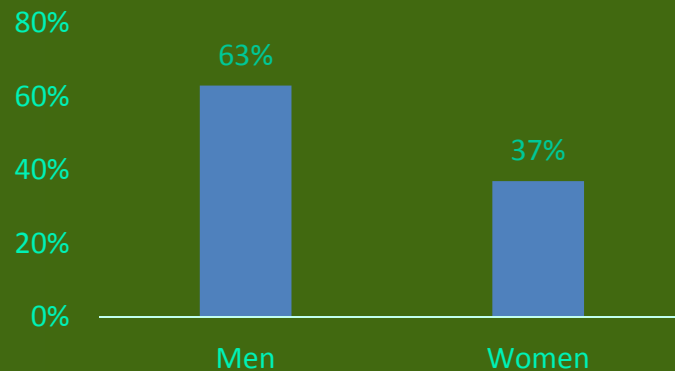
Using the Madagascar Catalogue (**MadCat**) - The pale green horizontal **Menu Bar** provides access to basic search functions and standard TROPICOS links, while links on the pale green vertical **Navigation Bar** provides links to data **browsing options**, and to **advance search options**. A quick search for any plant name can most conveniently be made from the **Taxon Name** box on the Navigation Bar. The **Search Builder** generates species lists based on multiple project attributes including a keyword search on a taxon name, thus generating a list restricted to a certain family or genus by specifying this name in the Keyword search box. **Image Search** accesses all images on TROPICOS, while the **Project Query Builder** is available only to logged-in users (Project Login access is normally



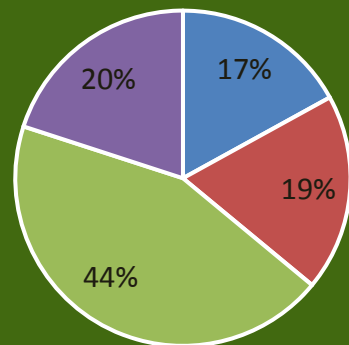
Results

Informants

Percentage of informant gender

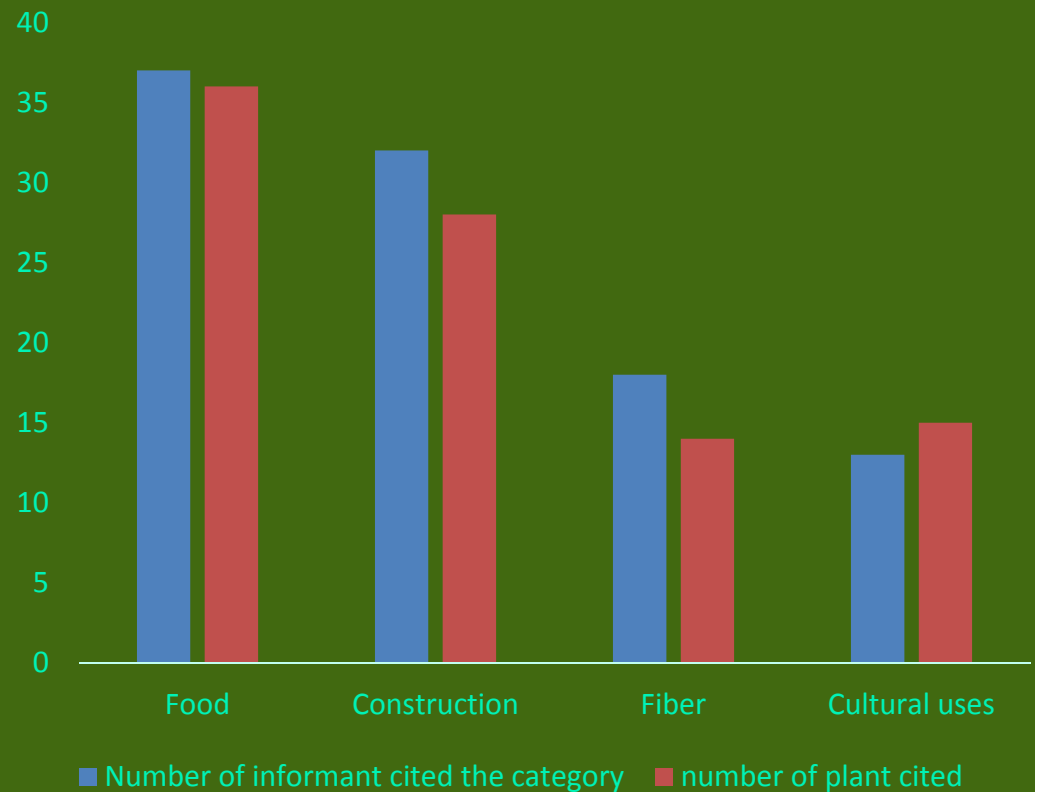


Percentage of informant age class







■ [15-30[■ [30-45[■ [45-60[■ > 60



Classification of plants according to reported changes in use





Reported changes in use : Food

Type of food	Changes	Adaptation of people
Ferment: <i>Melicope bakeri</i> <i>Grisollea myriantha</i>	Only found in forest far from villages and increasingly rare	Use other available species : <i>Breonia decaryana</i> , <i>Campylospermum anceps</i> , <i>Syzygium</i> spp
Main food: <i>Oryza sativa</i> , <i>Manihot utilissima</i> , <i>Ipomea batatas</i> , <i>Colocasia esculenta</i>	Reduction in harvests 	Eat wild tubers like yam species (<i>Dioscorea sansibarensis</i> , <i>D. maciba</i> , <i>D. antaly</i> , <i>D. soso</i>), cook unripe fruit (Madagascar melon, banana, mango), eat wild fruit (<i>Pithecellobium dulce</i>), cook palm hearts like <i>Raphia farinifera</i>
Fruit: <i>Artocarpus heterophyllus</i> , <i>Musa</i> spp, <i>Mangifera indica</i> .	Treatment and role	Cooked with salt as main food partly replacing rice, sweet potatoes...
Tubers: <i>Manihot utilissima</i> , <i>Colocasia esculenta</i>	Way of cooking	Transform to powder and cooked with much water 
Use of Parcel: <i>Oryza sativa</i> , <i>Manihot utilissima</i> , <i>Ipomea batatas</i> , <i>Colocasia esculenta</i>	Type of plant cultivated 	<i>Allium cepa</i> , <i>A. sativum</i> , <i>Arachis hypogaea</i> (require less rain) 





Reported changes in use : Wood for construction

Type of use	Changes	Adaptation of people
<p>House construction in eastern Madagascar : <i>Brachylaena merana</i> <i>Faucherea laciniata</i> <i>Symphonia</i> sp <i>Uapaca thouarsii</i> <i>Streblus dimepate</i> <i>Ocotea corethroides</i> <i>Dalbergia orientalis</i></p>	<p>Found only in far-away forest and increasingly rare in unprotected forest</p> 	<p>Use non-native species and pioneer <i>Grevillea banksii</i>, <i>Litsea glutinosa</i>, <i>Harungana madagascariensis</i>.</p> <p>Establish plantations: <i>Eucalyptus camaldulensis</i></p> <p>Use cultivated species: <i>Artocarpus heterophyllus</i></p>
<p>House construction in southwestern Madagascar : <i>Dalbergia spp</i> <i>Cedreolopsis grevei</i> <i>Alantsilendron humbertii</i> <i>Erythroxylum firmum</i> <i>Neobeguea mahafaliensis</i></p>	<p>Increasingly rare in unprotected forest</p> 	<p>Use of no-native species: <i>Melia azedarach</i></p> <p>Use alternative species still present in landscape: <i>Bivinia jalbertii</i>, <i>Cordia monoica</i>, <i>Salvadora angustifolia</i>, <i>Syzygium sakalavarum</i></p>

Reported changes in use : Wood for construction




Type of use	Changes	Adaptation of people
<p>Boat construction in eastern Madagascar : <i>Faucherea laciniata</i>, <i>Ocotea cryptocaryoides</i>, <i>Canarium lamianum</i></p>	 <p>Increasingly rare in unprotected forest</p>	<p>Use alien species <i>Melia azedarach</i>, <i>Eucalyptus camaldulensis</i></p> 

Reported changes in use : Fiber

Plant species	Changes	Adaptation of people
<p><i>Cyperus latifolius</i>, <i>Raphia farinifera</i>, <i>Eleocharis dulcis</i>, <i>Lepironia articulata</i>, <i>Typha angustifolia</i>, <i>Cyperus alternifolius</i>, <i>Typha angustifolia</i></p> 	<p>Marshes increasingly rare – conversion to rice fields (now shifting cultivation forbidden)</p>  	<ul style="list-style-type: none"> • Use alternatives: <i>Pandanus</i> spp. or <i>Agave sisalana</i> • Cultivate fiber species • Use synthetic fiber 



Reported changes in use : Culture

Type of use	Changes	Adaptation of people
<p>Fisokina: <i>Phylloxylon xylophyloides</i></p> 	<p>Very rare only 3 individuals known in Vohibe Forest</p>	<p>Use other hard wood forest species (and replace more frequently): <i>Brachylaena merana</i> <i>Sideroxylon betsimisarakum</i> <i>Weinmannia rutenbergii</i>, <i>W. bojeriana</i> <i>Macaranga obovata</i>, <i>Dracaena reflexa</i></p>
<p>Coffin <i>Albizia tulearensis</i> <i>Dalbergia hirticalyx</i>, <i>D. purpurascens</i>, <i>D. mollis</i>, <i>D. emirnensis</i></p> 	<p>Big trees of these species very rare outside of protected area</p> 	<p>Use other “inferior” species: <i>Syzygium sakalavarum</i></p>



Conclusion

- **Biodiversity loss = loss traditional knowledge of useful plants of Malagasy people.**
- **But people adapting by substitution but sometimes replacement plants inferior.**
- **Under appreciated potential of PAs to maintain traditional relationship between people and plants.**



Thank you for your attention

We acknowledge the Vohibe and Analavelona communities



XXII AETFAT Congress - Livingstone 2022

Cultural adaptation in some Malagasy Societies about useful plants