



# Sustainable futures for artisanal and small-scale gold mining communities: Mapping the socio-economic, environmental, and geological baseline for Peixoto de Azevedo, Mato Grosso, Brazil.



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## INTRODUCTION

Researchers from the Universities of Campinas (Brazil) and Cardiff (UK) held a five-day stakeholder engagement workshop in Peixoto de Azevedo, MT, funded by the Global Challenges Research Fund (GCRF). The aim was to build a working relationship with stakeholders involved in the region's artisanal and small-scale gold mining (ASGM) to co-produce research targets to enable more sustainable mining practices. The Workshop engaged stakeholders through thematic group discussions (geology, environment, economy, social science, and education).

## PROJECT 1

The dynamic was group discussions, interspersed with field trips and plenary sessions to allow interdisciplinary aligned ideas to be discussed by the whole group. "garimpeiros" linked to cooperatives, Ministry of Mines and Energy representatives, junior mining companies, indigenous communities, state and local governments members, farmers, social organizations, and academics from local institutions.



Figure 1: 1º Workshop Sustainable Mining in Peixoto de Azevedo-MT 2019, May 20-24

The stakeholders collectively articulated the following key points as central to sustainable livelihoods on artisanal gold mining in Peixoto and to develop the GCRF 2º project:

- (1) Whether it is possible to farm and produce contaminant-free products in former gold mining areas with land use change and what the environmental impacts of ASGM on soil and water are?
- (2) What model of gold mining certification is the most appropriate for the Peixoto cooperatives?
- (3) Can new technology replace Hg-amalgamation and improve other aspects of gold beneficiation through translational research?
- (4) How can workplace safety practices be implemented in small-scale mines to increase well-being and future prosperity?

## PROJECT 2

The goal is to produce and implement new models for sustainability in ASGM that are appropriate to Brazil but also relevant to global ASGM sustainability challenges.

To achieve this, we are establishing a baseline for Peixoto through the following objectives:

- (a) map stakeholder interactions within and around mining in Peixoto;
- (b) explore stakeholders' attitudes toward sustainability and the requirements for gold certification. The Alliance for Responsible Mining from Peru started the diagnosis for two small mines (garimpos) from COOGAVEPE;
- (c) phytoremediation is part of the so-called phytotechnologies, an umbrella term that includes plant-based techniques to extract, volatilize, or immobilize in the contaminated areas, and test feasibility of Hg-substitution (Figure 3);
- (d) mercury substitution in the gold amalgamation. We are starting to test the *Ochroma pyramidale* already use in the Chocó ethnics in Colombia (Figure 4).

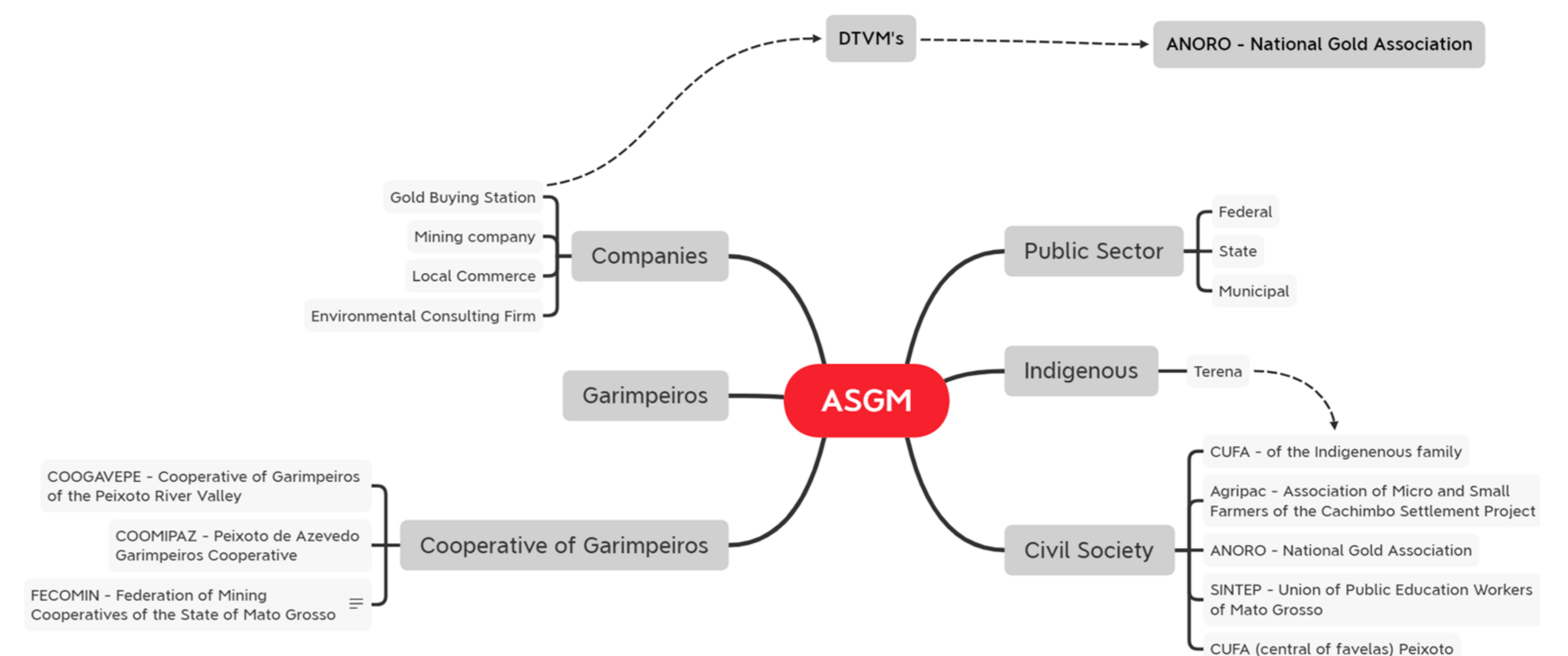


Figure 2: Peixoto de Azevedo ASGM Relationship Map.

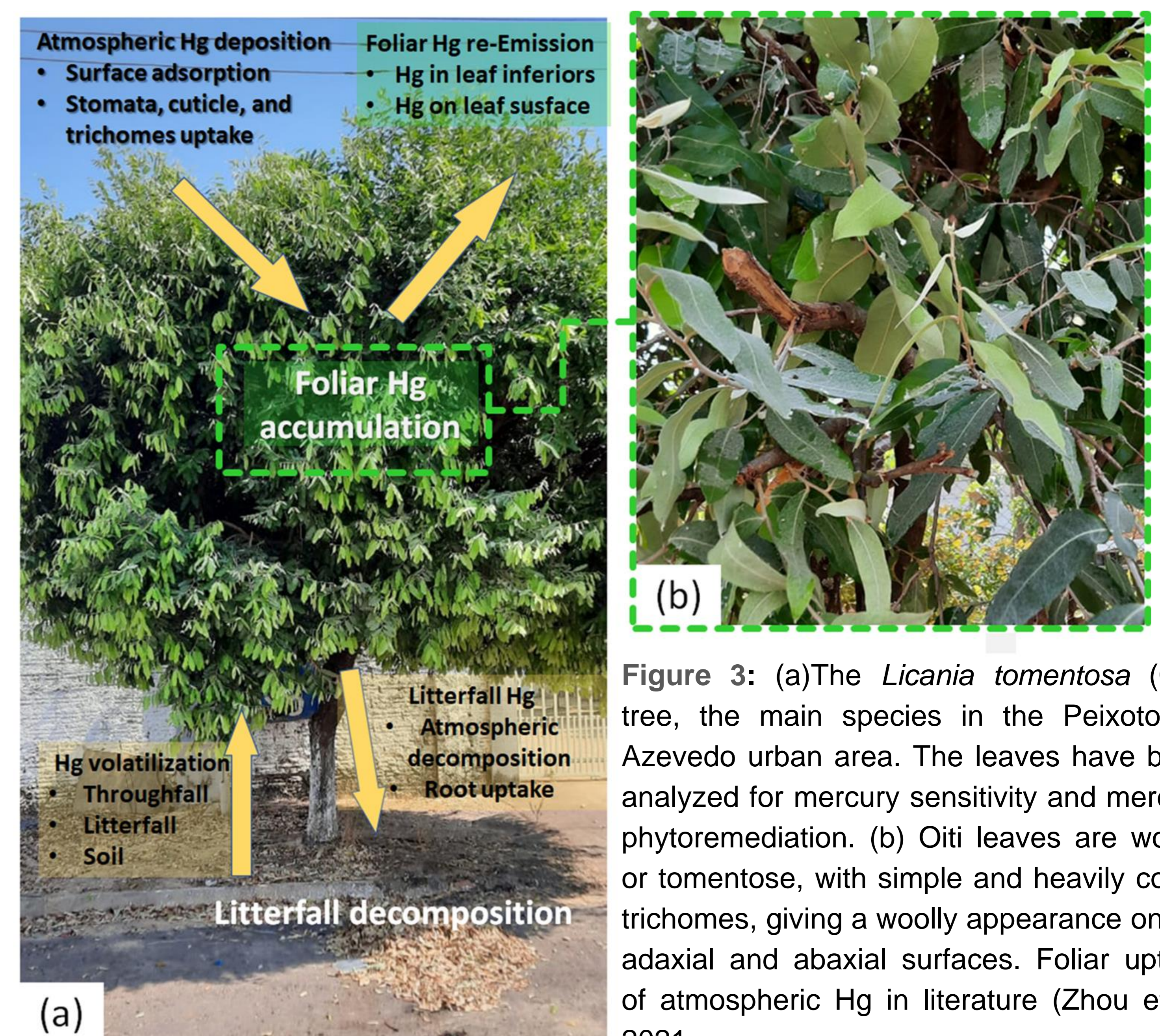


Figure 3: (a) The *Licania tomentosa* (Oiti) tree, the main species in the Peixoto de Azevedo urban area. The leaves have been analyzed for mercury sensitivity and mercury phytoremediation. (b) Oiti leaves are woolly or tomentose, with simple and heavily coiled trichomes, giving a woolly appearance on the adaxial and abaxial surfaces. Foliar uptake of atmospheric Hg in literature (Zhou et al. 2021)

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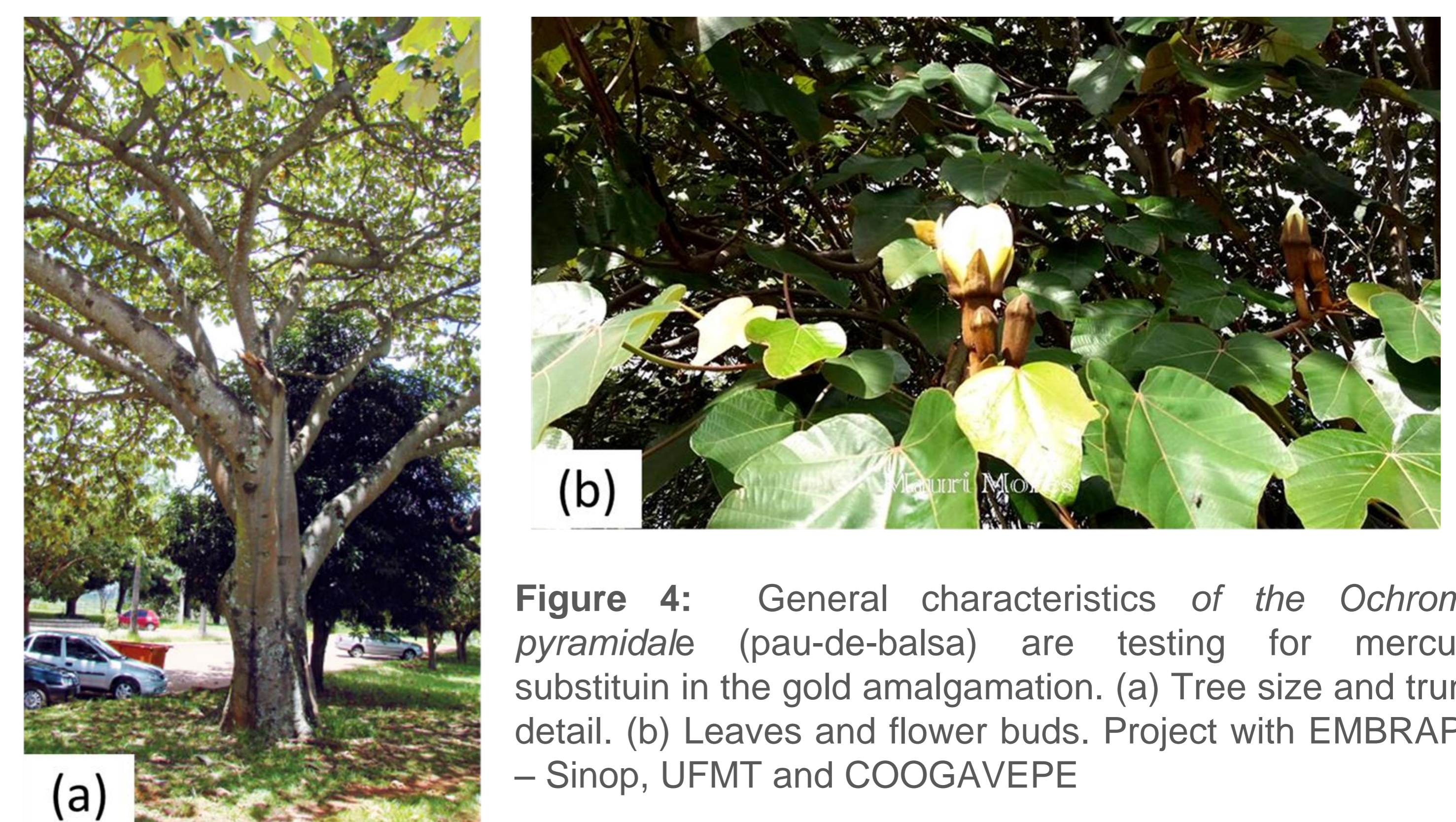


Figure 4: General characteristics of the *Ochroma pyramidale* (pau-de-balsa) are testing for mercury substitution in the gold amalgamation. (a) Tree size and trunk detail. (b) Leaves and flower buds. Project with EMBRAPA – Sinop, UFMT and COOGAVEPE

Source: Laboratório de Manejo Florestal and <https://ainfo.cnptia.embrapa.br/digital/bitstream/item/231805/1/Especies-Arboreas-Brasileiras-vol-4-Pau-de-Balsa.pdf>

## Final thoughts

We believe that only community-company-university co-creation programs will effectively meet the community's real needs for sustainable mining in Brazil and elsewhere.