

## Innov'Earth

### Innovative agricultural nature-based solutions to reduce climate change, land degradation and food insecurity: the potential of earthworms and vermicompost in small tropical farms

#### ABSTRACT

Food and agriculture are at the crossroad of multiple issues impacting the sustainable development: food and nutritional security, climate change mitigation and adaptation, biodiversity loss, land degradation, human health and well-being. The agroecological transition is a way to propose nature-based solutions leading to more desirable socio systems. Ecological intensification can transform agricultural production systems by improving resource-use efficiency and minimizing impacts on the environment. It is likely that agroecology can increase ecosystem resilience against climate change, food production and nutritional quality of grains by strengthening biodiversity, soil health, and building on traditions and sharing knowledge. These claims need scientific evidence. The overall objective of the Innov'Earth project is to analyse the possibility to co-design agriculture-based solutions, focused on soil biodiversity and good fertilization practices, under constrained contexts, and that this may improve environmental, social and health issues. This objective is totally in line with the objectives and the three axes of the Call: soil biodiversity, climate change, responsible production and consumption.

Small family farms in the Highlands of Madagascar are characterized by great poverty, making them very dependent on natural resources. Correcting the fertility of multi- deficient Ferralsols requires the use of organic and biological resources. Recent studies demonstrated the importance of earthworms in improving the nutrition, growth and resistance to diseases of cultivated plants. In addition, farmers have a very high perception of organic fertilizers such as vermicompost but do not know how to obtain them or how to prepare them themselves.

The Innov'Earth project is based on a multi-disciplinary and multi-actor approach with a wide range of disciplines and institutions, including civil society, and farmers, working with the same objective to co-design sustainable practices. Surveys and participatory workshops (WP1) will permit peasant and scientific knowledge exchanges on soil fertility, earthworms and vermicompost, climate change, nutritional quality, between researchers, farmers (men and women), agricultural technicians, local policy-makers and NGOs. WP1 will also aim to teach farmers to produce vermicomposts based on their raw resources and to collect earthworms for biofertilization and to select innovations matching their situations. Volunteer farmers will be able to test innovations on their farms, with the help of scientists. In parallel, field and laboratory experiments will aim to improve scientific knowledge on the impact of earthworms and vermicomposts on soil health, nutritional quality of rice and on climate mitigation and adaptation so as to complete our knowledge on their known effects on crop growth (WP2). Different deliverables will be shared with different stakeholders: capacity building, training, reports and publications, booklets.

**Keywords :** Agroecological transition, Sustainability science, Co-design of agrosystems, Soil fertility, Ecological intensification, Earthworms, Madagascar

**Year :** 2021

**Project number :** 2101-003

**Type of funding :** AAP OS

**Project type :** AAP

**Research units in the network :** AGAP MOISA AIDA QUALISUD

**Start date :** 2022-01-01

**End date :** 2024-05-31

**Flagship project :** no

**Project leader :** Eric Blanchart  
**Project leader's institution :** IRD  
**Project leader's RU :** ECO&SOLS

**Budget allocated :** 190000 €  
**Total budget allocated ( including co-financing ) :** 190000 €  
**Funding :** Labex

## GOAL

Based on scientific and traditional knowledge and objectives, it seems very urgent that such knowledge be shared to improve agricultural practices in the Highlands of Madagascar, so that farmers efficiently use natural (organic and biological) resources in a sustainable way, and improve food production, climate resilience, food and nutrition security, and farmers' wellbeing. Based on a multi-disciplinary and multi actor approach, the Innov'Earth project aims to develop innovative agricultural practices considering the beneficial role of earthworms and vermicomposts. The main objective of the project is to develop the use of earthworms and vermicomposts in small family farms in the Highlands of Madagascar in order to improve crop production and yield, climate resilience, nutritional quality of food products. Rice being the main food crop in the Highlands of Madagascar will be the studied crop; we will focus on upland rice.

## ACTION

WP1: Multi-actors design  
WP2: Science-based knowledge