

### 63. Smallholders farm carbon footprint reduced by agroecological practices (Highlands & East Coast, Madagascar)

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Carbon footprint calculation is being more and more used to assess the contribution of activities to greenhouse gas emission. This work aims to determine the impact of farm activities and agricultural practices to farm carbon footprint. The carbon footprint is the carbon dioxide equivalent impact of the activities within each farm. Smallholder farms located on two different soil and climate areas of Madagascar have been selected: 12 in the Highlands and 8 on the East Coast. The farms located in the Highlands were characterized by intensification of annual cropping systems using agroecological practices such as intensive rice farming system, composting organic residues and intercropping of annual crop and trees. Farms from the East Coast use agroforestry systems (simple and multiple tree species) and the traditional twice-a-year rice cropping system. Farm resource flow maps were developed in order to represent all of the structures and characteristics of each farm. GHG source and sink compartments' inventory was performed and emission factors adapted to each zone were selected from the literature. A local/specific farm carbon footprint calculator was developed. Results showed that average farm carbon footprint amounted to 3.04 Mg CO<sub>2</sub>eq ha<sup>-1</sup> y<sup>-1</sup> and 7.69 Mg CO<sub>2</sub>eq ha<sup>-1</sup> y<sup>-1</sup> in the Highlands and in the East Coast respectively. The intensive rice farming system alternating wet and dry period improved the farm carbon footprint in the Highlands by reducing methane emission while the traditional twice-a-year rice cropping system is an important source of methane in the East Coast. Nevertheless, the contribution of agroforestry systems in the East Coast allowed a farm carbon footprint reduction of between 15 to 51%.