The Tanjona from Fenoarivo:
Integrated fish farming systems in Madagascar

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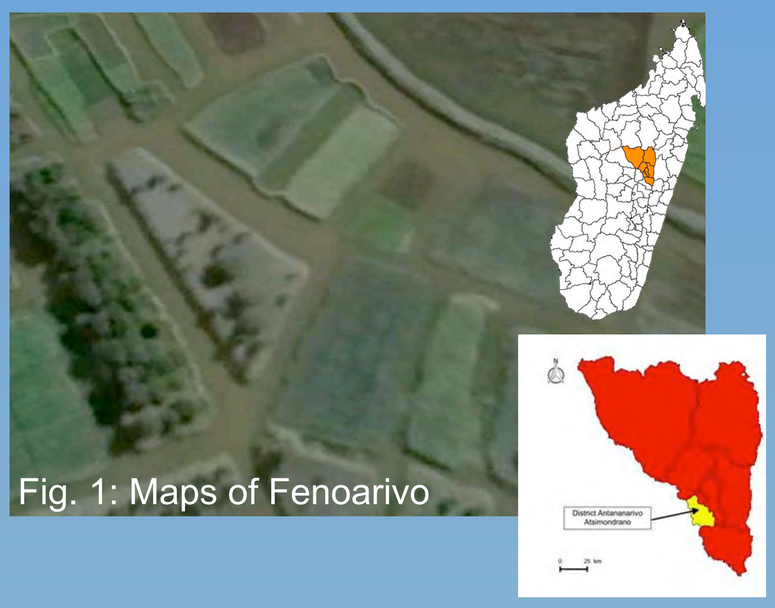

Fig. 1: Maps of Fenoarivo

Introduction:

- Antananarivo city, Madagascar, grew out on the edge of a vast floodplain.
- In some cities of the periphery as Fenoarivo, the Tanjona, an agriculture production system (Fig. 1), has been developed to promote floodplains use.
- Tanjona refers locally to large earth's dyke raised in the middle of a floodplain to realize different kind of culture (e.g. vegetables, rice, fruits; Fig. 2).
- Tanjona are old systems (Fig. 3), however integrated fish farming started recently by simply closing the dykes to create a pond.


Fig. 2: Fenoarivo's Tanjona , 2016

Aims and methods:

- The aim was to realize a first description of this system, in order to evaluate the economical performances of each agricultural activity (duck, cattle, gardening, rice…).
- Census of all Tanjona practicing fish production.
- Survey on fish farmers to characterize the technical pathways and production factors.


Fig. 3: Fenoarivo's Tanjona, 1963

Results:

- 27 fish farmers were counted from Tanjona of Fenoarivo in 2016
- Two typologies were identified (Fig. 4):
  1) Tanjona with fish farming in ponds and culture on dykes
  2) Tanjona with rice-fish aquaculture and culture on dykes
- Polyculture (carp, tilapia, snake head fish)
- Cycle of 6 to 12 months
- Fish stocking from caught in the neighbouring Sisaony Swamp or from rice plots
- Fish production:

Tanjona typology	Cycle (months)	Productivity (ton/ha/cycle)
1) Fish ponds	6 to 12	0.7 to 1.3
2) Rice-Fish	6 to 9	0.3 to 1


Fig. 4a: Tanjona with fish farming in pond and culture on dykes


Fig. 4b: Tanjona with rice-fish aquaculture and culture on dykes

Study case:

- M. Dàdà is a farmer/fisherman from Fenoarivo. He own 12 rice plots of 0.76 ha, 3 Tanjona of 0.15 ha associated to oranges, leaves and sweet potatoes of which one is dedicated to fish farming (0.10 ha). He raises ducks and makes bricks every year.
- Fishing and fish farming:
  - Fish farming is realized on a pond (**0.04 ha**)
  - Fish stocking occurs from is own fishing activity (Nov. to May)
  - Fish are fed every 15 days with rice bran, maize, leaves, sweet potatoes and cow skin
  - Fertilization result from crops watering runoff
  - Fish production is about 300 kg/yr with a growth of **30 kg**
  - Total fish growth is **714 kg/ha/cycle**
- Synthesis of economical performances for each activity (Fig. 5):

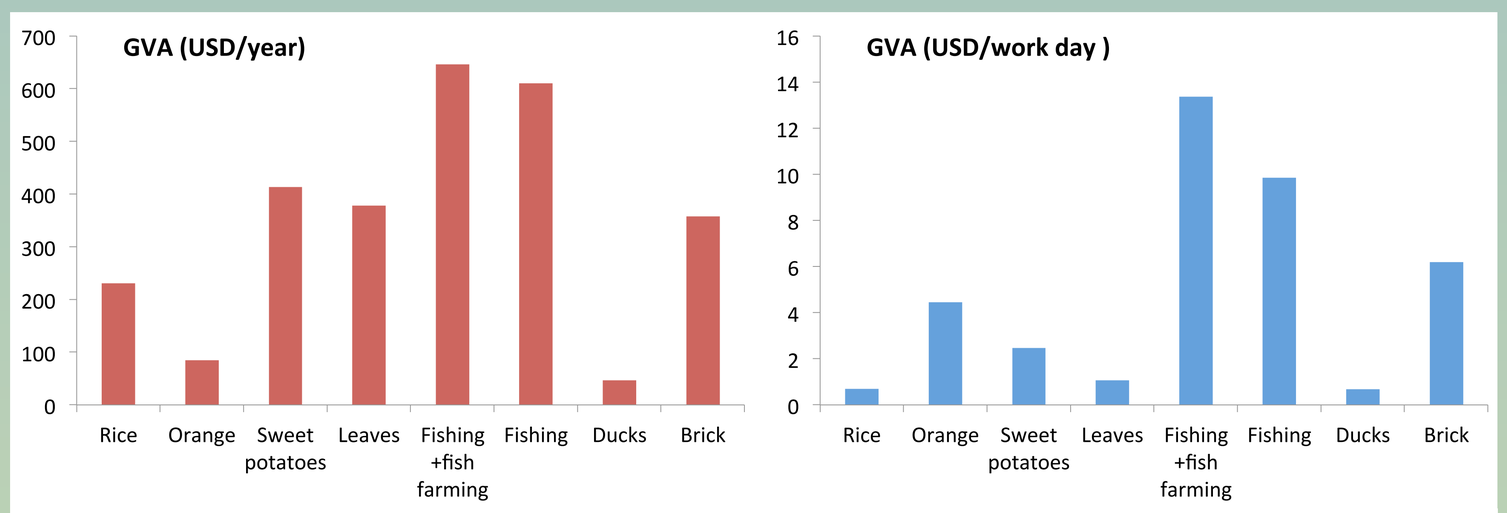

Fig. 5: Gross value added from each activity (Per year and Per work day)

Conclusion:

The fish Tanjona system is poorly broadcasted (27/hundreds Tanjona) while it presents an opportunity to intensify fish production around Antananarivo. **Pros:** high yield with self fish stocking, feed production and fertilization; **Cons:** cost to close the Tanjona and build pond.

However, floodplains from Fenoarivo receive wastewater effluents from Antananarivo. Water and fish characterization need to be done before promoting this system.

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