The Tanjona from Fenoarivo: Integrated fish farming systems in Madagascar

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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.

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.

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:

<table>
<thead>
<tr>
<th>Tanjona typology</th>
<th>Cycle (months)</th>
<th>Productivity (ton/ha/cycle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish ponds</td>
<td>6 to 12</td>
<td>0.7 to 1.3</td>
</tr>
<tr>
<td>Rice-Fish</td>
<td>6 to 9</td>
<td>0.3 to 1</td>
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</tbody>
</table>

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):

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.

⇒ See POSTER BOARD 239