

# IMPACT OF IMPROVED SYSTEMS ON RICE AND COMMON CARP *Cyprinus carpio* MULTITROPHIC TROPICAL AQUACULTURE, ANTANANARIVO, MADAGASCAR

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Flooded rice fields are ecosystems favorable to the growth and production of many aquatic organisms. They can even play a major role in the feeding and nutrition of local communities, as a source of self-recruiting species or by supporting the production of farmed fish in association with rice. In Madagascar, integrated rice-fish aquaculture systems are a 150+ years-old tradition. The initial species was goldfish *Carassius auratus*, locally known as *Trondro gasy* (meaning, “the Malagasy fish”) but now, the common carp (*Cyprinus carpio*) took over as the main produced species, sometimes in polyculture with tilapia. Although traditional, the technology has recently been improved by several organizations (FAO, APDRA) by building larger and higher side dykes and digging a canal in the middle of the field, which serves as a refuge area for fish when the field is drained. However, this also implies an approximate 10% loss of space for rice production, a basic food commodity for local populations, which is supposedly compensated by higher rice productivity in integrated system.

The first aim of this farm experiment was therefore to assess the productivity of these systems by characterizing the importance of the different trophic compartments in traditional (rice + self recruiting species) and integrated systems (rice+carps improved systems, Fig. 1). However, nutrient availability can be a limiting factor, as feed and fertilizers are expensive. Trophic deadlocks can then be suspected in iron-rich areas due to phosphorous chelation in sediments. As common carp is a detritivore/omnivore fast-growing species which trophic behavior (bioturbation) involves re-suspending sediments, it is expected that its introduction in inundated rice field will improve nutrient availability and increase rice and fish production. The second scientific question is then focused on determining the nutrient pathways and deadlocks, and how they impact the common carp, rice and fish production.

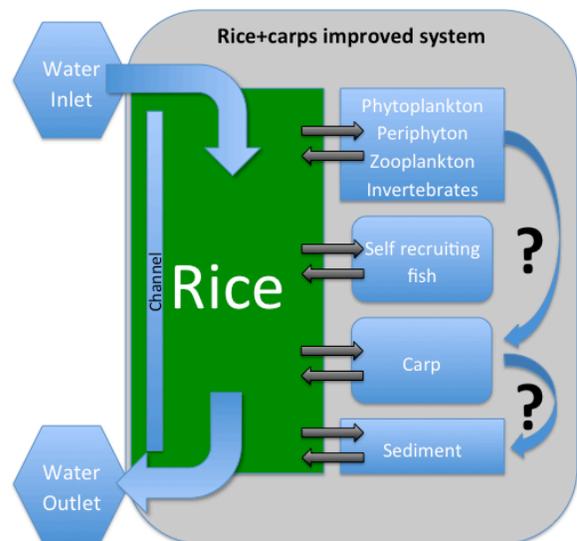


Fig. 1: Experimental design of “rice+carps improved system”