



Tropentag, September 14-16, 2010, Zurich

“World Food System —  
A Contribution from Europe”

## Growth Functions of Fish Species Cultured in Small Scale Upland Aquaculture Systems under Traditional and Modified Pond Management Schemes in Yen Chau, Northern Viet Nam

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### Abstract

Pond aquaculture significantly contributes to the protein supply and cash income of Black Thai farmers in Yen Chau, Son La province, northern Viet Nam. The current aquaculture system is a polyculture of the macroherbivorous grass carp as main species together with 3–5 other non-herbivorous fish species like common carp, silver carp, bighead carp, mud carp, silver barb and Nile tilapia. The productivity amounts to about 1.5 t fish ha<sup>-1</sup> a<sup>-1</sup>, which must be considered as low for a tropical, feed-based aquaculture system. Feeding predominantly leave materials and a constant flow of water through the ponds, causing high turbidity and a loss of mineral nutrients for primary production, are seen as major reasons for this.

An ongoing research project, (subproject D7.1 of the Special Research Program 564), aims at increasing the productivity of the aquaculture system of Black Thai farmer in Yen Chau, northern Viet Nam, by means of several changes in pond management and the application of supplemental feed especially for the non-macroherbivorous species. In 2009, three pairs of neighbouring ponds were chosen to compare the current pond management with a modified pond management including control of water flow, liming and application of supplemental feeds in order to overcome the limitations mentioned above. All ponds were drained before starting the experiment, stocked with fingerlings at a density of 1.5 fish m<sup>-2</sup> and harvested completely after seven months, during this period, no fish were removed for home consumption. Fish weight was monitored by monthly sampling in all ponds in order to establish growth functions.

It could be demonstrated that the new management an increase of pond primary productivity, higher oxygen supply by photosynthesis and higher growth of several non-herbivorous fish species. After seven months, the new management resulted in more than twice the total fish mass and much higher net profit compared to the current pond management.

Results from this experiment, especially the growth functions of fish, are used in an extension project to educate farmers in aquaculture skills to increase the nutritional and economical outcome of aquaculture in the small scale farming systems of Black Thai farmers in the mountainous northern Viet Nam.

**Keywords:** Fish growth, pond management, upland aquaculture, Viet Nam