

Abstract

## Project report: Contribution of self-recruiting species produced in farmer-managed aquatic systems in rural areas of Southeast Asia to food consumption

Ernesto J. Morales<sup>a,b,\*</sup>, David C. Little<sup>a</sup>, Anton Immink<sup>a</sup>, Harvey Demaine<sup>b</sup>,  
Amararatne Yakupitayage<sup>b</sup>, Elsa Amilhat<sup>b,c</sup>, Kai Lorenzen<sup>c</sup>

<sup>a</sup>*Institute of Aquaculture, University of Stirling, UK*

<sup>b</sup>*Aquaculture and Aquatic Resources Management, Asian Institute of Technology, UK*

<sup>c</sup>*Department of Environmental Science, Imperial College, London, UK*

Self-recruiting species (SRS) are defined as aquatic animals that can be harvested regularly from farmer-managed systems (FMAS) without regular stocking (Little, 2002). These species were identified and their importance to rural households' food consumption assessed based on field research in six locations of three countries in Southeast Asia. Research sites in southeast Cambodia, northeast Thailand and the Red River Delta in northern Viet Nam were selected, based upon a range of agro-ecological criteria, notably the abundance of perennial water bodies and designated as LOW (lower lying flood-prone areas) and DRY (generally higher, less flood-prone sites). The research was carried out over three years using a collection of different research tools to better understand the role that SRS plays in food consumption of rural households. Participatory community appraisal was used to understand the general context (livelihood profiles, resources, trends, and shocks) of each site. This activity also provided information on the most important aquatic species in the village using local criteria of importance set by the villagers themselves (Morales et al., 2003). A baseline survey followed to identify the location and physical and social characteristics of aquatic systems, including those managed at a household level. The importance of SRS was further understood by monitoring the livelihoods and management of aquatic systems, of 54 households over a period of 12 months in each country.

Consumption of food items was assessed monthly by recall of the previous seven days (Garaway, 1999; Roos,

2001), supported by a 24 h observation study at each site. Food groups were classified into nine categories including rice, aquatic animals, meat (beef and pork), poultry (and by-products), processed food, vegetables, marine products (fish and crustaceans), insects and others. The contribution of aquatic animals to diets in both agro-ecological zones in Cambodia and Thailand was significantly higher than other animal protein sources, but in Viet Nam there was no significant difference between aquatic animal and meat consumption. The species and amount of aquatic animals consumed in both agro-ecological zones in Red River Delta in Viet Nam were not different, although households in LOW areas consumed an average of 2281 grams per household per week (g/hh/wk) compared to 2019 g/hh/wk at DRY sites. In Cambodia consumption of aquatic animals in LOW areas was also higher than the amount being eaten by households in DRY areas (2777 and 1413 g/hh/wk, respectively). In Thailand the consumption of aquatic animals by households in LOW areas was less than DRY areas with an average of 6161 and 6806 g/hh/wk, respectively.

A total of 64 (51 fish types) aquatic animal species were consumed in northeast Thailand, compared to 34 (29 fish types) and 19 (15 fish types) species in southeast Cambodia and Red River Delta in Viet Nam, respectively. The importance of FMAS as a source of aquatic animals for household consumption was high in all sites, except the LOW areas in northeast Thailand, where open-access and unmanaged aquatic resources were more important. Rice-fields contributed more than 50% of the aquatic animals harvested from FMAS in Thailand and Cambodia but not in Viet Nam where household ponds were the major source of aquatic animals.

\*Corresponding author.

E-mail address: [ernesto.morales@stir.ac.uk](mailto:ernesto.morales@stir.ac.uk) (E.J. Morales).

The importance of SRS in terms of average consumption varied by season and agro-ecological zone in each country; however, consumption of stocked and wild aquatic animals was relatively constant. Weekly consumption of SRS was high in Thailand and Cambodia, although seasonal variation was large, while consumption of stocked species was low and relatively constant. Two peaks of consumption were observed in both countries coinciding with the harvesting season in FMAS (February) and when water in rice fields starts to recede (September and October). In Viet Nam the average consumption of SRS increased as consumption of stocked species declined. Consumption of processed aquatic animals in Cambodia was significantly higher than in Thailand and Viet Nam and peaked when consumption of fresh aquatic animals decreased.

In summary, non-stocked SRS aquatic animals in FMAS play a very important role in the food consumption of rural households in locations and at times when access to other food types is limited (Little et al., 2004). These SRS do not include large species of fish alone, but also small species like anabas, rasbora and non-fish aquatic animals (*Rana sp.*, *Macrobrachium sp.* and pond snails). Availability and abundance of important aquatic animals are threatened by agricultural intensification, environmental degradation and destructive fishing practices by local resource users (Soubry, 2001; Beaton, 2002; Gregory and Guttman, 2002). As a result, the availability of important aquatic animals varies seasonally and households are increasingly processing (drying and fermenting) aquatic animals to ensure access to these species during periods of limited availability.

## References

- Beaton, P.M., 2002. Aquatic self-recruiting species in rural livelihoods, Cambodia. M.Sc. Thesis. Institute of Aquaculture, University of Stirling, United Kingdom.
- Garaway, C., 1999. Small waterbody fisheries and the potential for community-led enhancement: case study in Lao PDR. Ph.D. Thesis, Imperial College of Science.
- Gregory, R., Guttman, H., 2002. The ricefields catch and rural food security. In: Edwards, P., Little, D.C., Demaine, H. (Eds.), Rural Aquaculture, pp. 1–13.
- Little, D.C., 2002. Self-recruiting species in farmer managed aquatic systems—a new approach in aquaculture. *Aquaculture News* 28, 10–11.
- Little D.C., Lorenzen, K., Amilhat, E., Morales, E.J., Immink, A.J., Ul Islam, F., Karapanagiotidis, I., 2004. Self-recruiting species in aquaculture—their role in rural livelihoods. Project R7917. Final Technical Report. AFGRP/FMSP DFID Renewable Natural Resources Research Strategy.
- Morales, E.J., Little, D.C., Demaine, H., 2003. Participatory approaches to define the role of self-recruiting species in aquaculture on rural livelihoods. In: Wahab, M.A., Thilsted, S.H., Hoq, M.E. (Eds.), Small Indigenous Species of Fish in Bangladesh. Proceedings of BAU – ENRECA/DANIDA Workshop on Potentials of Small Indigenous Species of Fish (SIS) in Aquaculture and Rice-field Stocking for Improved Food & Nutrition Security in Bangladesh, 30–31 October 2002, BAU, Mymensingh, Bangladesh. Bangladesh Agricultural University, Mymensingh, pp. 117–133.
- Roos, N., 2001. Fish consumption and aquaculture in rural Bangladesh: nutritional contribution and production potential of culturing small indigenous fish species (SIS) in pond polyculture with commonly cultured carps. Ph.D. Thesis. Research Department of Human Nutrition, The Royal Veterinary and Agricultural University Copenhagen, Denmark.
- Soubry, C., 2001. Aquatic resources in southeast asia: their importance to rural livelihoods, and the ecological factors affecting their availability. M.Sc. Thesis. Imperial College of Science, Technology and Medicine, University of London.