

is relatively low, industrialising countries in Asia that consume very high levels of fish need to urgently consider potential health time bombs.

The Institute of Aquaculture, Departments of Marketing, Public Health and Media at Stirling have joined with colleagues at various groups within the Universities of Dundee and St Andrews to develop interdisciplinary capacity. As well as researching issues relating to food safety, the team will consider issues of environmental impact, aquaculture and fishery sustainability, how producers communicate with consumers in the modern media age and whether aquaculture products can (or should) be further engineered to meet consumer requirements (including taste). SHEFC, the body that supports higher education development in Scotland, have awarded a feasibility study, being coordinated by Stirling Aquaculture, that addresses the need and potential for such partnership. Immediate needs for such research are close to home but it is expected that such work has global implications.

¹Hites. RA, Foran, JA, Carpenter DO, Hamilton MV, Knuth, BA and Schwager SJ. 2004 Global assessment of organic contaminants in farmed salmon. *Science* 303, 5655, 226-229.

²Gochfeld M and Burger J. 2005. Goodfish/ Bad fish: A composite benefit-risk by dose curve. *Neurotoxicology* 26, 511-520.

Book Reviews

Aquatic Ecology of Rice Fields – A Global Perspective.
Edited by C.H. Fernando, Friedhelm Göltenboth and Josef Margraf (Volumes publishing, Kitecher, Ontario, Canada, 472p)

and

Culture of Fish in Ricefields.
Edited by Matthias Halwart and Modaduga Gupta (FAO and the WorldFish Center, 83 p.)

A joint review by Dave Little, Systems Group

In recent years there has been something of a drop-off in original articles about ricefields as aquaculture systems and the two following reviews borrow heavily from previous workshop/conference proceedings such from meetings in Ubon, Thailand in 1988¹, in Munoz, Philippines in 1989¹ and West Java in 1993². WorldFish Center, formerly ICLARM, has also been involved in field research in Bangladesh³ and the Philippines⁴ in recent years. In addition to this rice-fish in China, where the greatest area of culture and most dynamic development is believed to exist, was reviewed by MacKay in 1995⁵.

The Aquatic Ecology volume should be essential reading for those interested in sustainable agriculture and dispelling the fallacy of 'traditional rice monoculture' - until recent times rice was merely one product of many harvested from flooded, bunded fields. The editors have pulled together contributions based on experience on four continents and included hitherto less available information from areas such as the former USSR. The book includes reviews of the limnology and applied ecology of ricefields, covering aspects such as nitrogen fixation and nutrient recycling together with a case study of the Ifugao rice terraces in the Philippines. The impacts of pesticides on rice field ecology and the public health implications of ricefields as habitats for mosquitoes are covered. Central to the volume is the role of fish,

both as natural stocks and culture interventions in ricefields. Herbert Fernando and his co-editors have done a great job in persuading key workers in the field to contribute but could, perhaps, have kept them from wandering off their real areas of expertise. On a more practical issue the volume is poorly proof edited with numerous typos throughout.

The book begins with a chapter by Charles Heckman whose detailed study on a single rice field in Northeast Thailand published in 1979 has been endlessly cited by field researchers working on rice fish. His contribution here is welcome but unfortunately an excellent ecological treatise becomes a critique of modern development politics and a somewhat uninformed one at that... 'in most tropical countries, limited monetary earnings make it difficult for most rural families to purchase food on the market'... a statement no longer true in crowded, joined up and dynamic societies in large areas of SE Asia. His assertion that 'a recent trend to replace rice fields with aquaculture ponds is just as undesirable as producing rice without fishes in the fields' also ignores the complexity of how aquaculture evolves and the interdependence of ricefields and pond-based aquaculture in many contexts.

The book has a few interesting surprises. Martin's chapter based on a community analysis of the Ifugao rice terraces in the Philippines outlines that the dreaded rice pest, the golden apple snail (*Pomacea canaliculata*), although common, appears to be currently less of a problem - indeed possibly an asset in this particular system; this is reassuring to those believing these pests are munching their way through the rice fields of Asia. Detailed studies of this sort that consider the whole ecosystem are very valuable, but no less interesting were the no-fish chapters on aquatic microbiology and benthos based on the Japanese experience. I particularly liked the nitrogen fixation chapter where the pros and cons of the 'biological way' are well stated but the reality of declining price of inorganic nitrogen means that it remains an approach in waiting. The public health implications of changes in rice field ecology/management are partially covered through a chapter on disease transmission (=mosquito vectors) by F.P. Amarasinghe. Pesticide use in rice fields, although greatly impacting on ecology (Lim), is having more direct impacts on human well-being through accidental and purposeful mis-use, but perhaps a fuller treatment of this would have exacerbated a tendency to wander off-piste.

continued on page 31



Book Reviews

Matthias Halwart has a chapter in this volume which together with Chapman and Sollows forms the bedrock of the fish perspective within rice field ecology. Halwart also co-edits 'Culture of fish in ricefields', a FAO-WorldFish monograph to mark the 2004 International Year of Rice, with Modadugu Gupta. An entire paragraph is provided for readers to explain how the volume was developed, suggesting a tortuous birth. Both editors have been associated with field research in the area and produce a very useful overview; in particular the summary of the role of fish in rice pest management is informative.

The poor quality binding of both volumes means that they will, unfortunately, not survive the rigour of library use for long and is something to be considered if second editions beckon. Both volumes however expose a key problem with most research published to date. In both cases lack of wider adoption of the practice away from research sites is identified as a major challenge and yet there is little assessment of household level decision making that leads us to understand the reasons. Whereas explanations of macro-level factors i.e. rice intensification processes/too much pesticide etc., are trotted out there is little evidence for the relative failure to promote the practice. Future research will hopefully inform these outstanding issues and balance our considerable technical knowledge with a more human perspective.

¹ De la Cruz CR, Lightfoot C, Costa-Pierce BA, Carangal VR, and Bimbao MP, (eds). Rice-fish research and development in Asia. ICLARM Conf. Proc. 24, Manila, Philippines 457 p.

² De La Cruz, CR. Third Asian Regional Rice-Fish Farming Research and Development Workshop, 6-11 June 1993, Sukamandi Research Institute for Food Crops, West Java, Indonesia, 50 p.

³ Gupta, M.V. Sollows, J.D. Mazid, MA, Islam, M. S.Rahman, M and Hussain, M.G. 1999. Integrating aquaculture with rice farming in Bangladesh: feasibility and economic viability, its adoption and impact. ICLARM Tech. Rep. 55, 90p.

⁴ Horstkotte-Wesseler, G 1999. Socio-economics of rice-aquaculture and IPM in the Philippines: synergies, potentials and problems. ICLARM Tech. Rep 57, 225 p.

⁵ MacKay, KT (ed) 1995 Rice-fish culture in China. International Development Research Center (IDRC), Ottawa, Canada, 276 p.

Other recent volumes with rice-fish interest:

FAO/ICLARM/IIRR. 2001. Integrated agriculture-aquaculture. A primer. FAO Fisheries Technical Paper 407. FAO, Rome, Italy 149 p.

Edwards P, Little DC and Demaine H eds. 2002 Rural aquaculture Wallingford, UK: CAB International, 358 p.

Costa-Pierce, B., Desbonnet, A., Edwards, P. & Baker, D. (2005) Urban Aquaculture. CABI Publishing. pp. 277.

by Will Leschen, Systems Group

This eagerly awaited text covers an area which, in terms of past publications and research, has been overshadowed by the volume of literature on urban agriculture and its role in the future of increasingly expanding urban metropolises - particularly in the developing countries of Asia and Africa. As such Urban Aquaculture provides a thought provoking historical and current overview through a number of case studies of peri-urban aquatic production systems in Asia, Europe and North America, highlighting their various constraints and benefits, whilst also looking to their future. One of the key concepts throughout the different articles is the increasing legacy of urban population growth in this new century producing vast volumes of waste water that many of the authors believe cannot be economically treated using existing capital intensive treatment technologies. The result in many of the coastal cities of southern Asia and Africa is the increasing pollution and degradation of coastal ecosystems as the majority of urban waste water flows directly untreated into the surrounding marine environment – a slow fuse time bomb waiting to go off. With water becoming an increasingly scarce resource, cultivating fish and edible aquatic plants using this abundant source of nutrients will produce food and create employment whilst providing a more ecologically and financially sustainable method for treating urban waste water. This can be considered by some as utopian in its outlook, but the authors argue that in many cases the technological and engineering solutions are already available to us, as can be seen from the East Kolkata wetlands.

One of the main constraints within the urban planning process is re-iterated by many of the authors as being the lack of multi-sectoral dialogue and information exchange between the urban planners involved as well as the necessity for the inclusion of a wider, more multi-disciplinary stakeholder base to be actively consulted with in the planning process. Increasingly, as is illustrated in China, the deterioration in quality of urban domestic waste water due to mixing with industrial effluents

is also cited as leading to decreases in fish and aquatic plant production levels whilst also fuelling health concerns of the increasingly health conscious urban consumer. If urban aquaculture is to survive and develop then city planners have to find practical, cost effective solutions within existing urban infrastructures to separate their industrial and domestic wastes, whilst actively reassuring the wider audience that the fish and plants produced are safe for human consumption.

In terms of case studies the book illustrates the relatively divergent approaches between the research, development and even promotion of urban aquaculture in Europe and North America compared to the developing cities of Asia, Africa and South America. In the former urban aquaculture is presently being developed and promoted on a more localised, commercial basis often using discrete, smaller scale recirculation systems within existing buildings to produce high value species. In contrast, in developing countries there has been a traditional culture of using waste water in larger more extensive systems to grow fish and aquatic plants, primarily for the consumption of lower income citizens, which are now coming under threat from urban expansion, pressure on land and pollution. It is important that lessons can be learnt and incorporated from both approaches so that safe, attractive, and cost effective models for the promotion of urban aquaculture are made available, not just to senior level planners but also through education and the media to the wider urban populations themselves so that informed and constructive debate and dialogue can commence.

