

The Future of Periurban Aquatic Food Production Systems in Southeast Asia

Periurban aquatic food production systems are systems in transition. They are always at the cusp of change, on the point of shifting from one thing to another. New activities, physical features, agencies, institutions, populations and infrastructures colonise the periurban space, and may replace or displace existing peoples, institutions and activities, or lead them to respond and adapt to the evolving situation.

Not only are they physical systems with flows of energy, inputs and outputs which determine their sustainability and productivity as ecological systems, but they are also embedded in social, economic and political contexts which can play an important, even over-riding role in driving change and determining their resilience – or sustainability – over time. The process of diversification in the periurban area is not a case of a discrete, gradual and smooth shift from one type of occupation and activity (farming) to another (non-farming). Not only does it involve a period of time – of varying lengths – during which pluriactivity is the norm, but it introduces trade-offs, tensions and conflicts.

LABOUR

Aquatic production systems are in competition for labour with other activities. Unlike some more rural contexts where *in situ* employment opportunities may be limited to farming, in periurban areas this is rarely the case. In Village 5 (Da Phuoc Commune) outside Ho Chi Minh City (HCMC), for example, a buoyant demand for local labour resulted in quite severe shortages of labour in agriculture. There is a generational aspect to work in the commune: older members of the village work on the land (and water) in agriculture and aquaculture, while younger generations engage in factory

work or are employed as masons. To make up the shortfall, local land owners employ labour from Nha Be District or from provinces further a field. It is important to recognise that local agricultural labour shortages are arising not only because there may be an absolute shortage of labour but also because young people increasingly find employment outside agriculture. The importance of wage rates in driving change (and vice versa) was also evident in Village 1 in Dong Thanh Commune (Hoc Mon District, HCMC) where, local people told us, rising wages (and the rising costs of agricultural inputs) had encouraged farmers to move out of farming and into fish culture.

LAND USE CONFLICTS

While labour availability would seem to be an important issue only in some villages, a theme that unites all of the cities under investigation is the conflicts that arise between different land uses and activities. While some scholars write of ‘inter-locking’ livelihoods and the complementarities that exist between different activities, the evidence from the Participatory Community Appraisals (PCA) is that in periurban areas aquatic production systems are being undermined in various ways and conflicts are more pronounced than the complementarities. This is clearly an important consideration when it comes to identifying the policies necessary to support such production systems.

Village 5 (Da Phuoc Commune) reveals the conflicts that may arise in periurban areas between industrial and agricultural activities. During the dry season, water bodies and courses become increasingly polluted. Local

people suspect that a local plastics factory and the Kim Hang Aluminium Factory contribute to this pollution. Skin diseases and respiratory illnesses also increase during these months. While increasing levels of pollution are problematic for aquatic system sustainability, occupying the periurban zone presents another, related, challenge: having to operate in the context of an advancing city.

At the time of the PCA, Village 5, Phong Phu Commune, had a strong aquaculture component with some 40-50% of households engaging in aquaculture at some level. Significantly, however, the village head believed that given the pattern and speed of urban development in HCMC (this village is just 17 km from the city centre), aquaculture will begin to decline in the next two to three years. Key informants in Village 5 reported that many villagers would like to continue aquaculture, but suitable land was rapidly disappearing. Moving to a new area (“relocation”) where land might be available so that households could continue culturing fish and aquatic vegetables was raised as a possibility.

Similar levels of concern were expressed in Khuyen Long village (Tran Phu Commune) and Duc Tu village (Duc Tu Commune) outside Hanoi. In these villages, the pattern and pace of land conversion were threatening, farmers contended, to lead to their effective marginalisation. These worries were being translated into low levels of investment. The VAC group in Duc Tu (see page 9-11) identified insecurity of land tenure and, in particular, the short period that farmers could be sure of having control over their land as the



Fish, people, and transport co-mingle at Hanoi's biggest early morning freshwater fish market in Thanh Tri District

Jonathan Rigg and Albert M Salamanca

Department of Geography
University of Durham

✉ j.d.rigg@durham.ac.uk
albert.salamanca@durham.ac.uk

most serious problem facing them. When land development costs and related investments are relatively high (for example, for dyke improvements), security and length of tenure become critical issues constraining, or otherwise affecting, the development of aquatic production systems. When concerns and worries are translated into concrete investment decisions (namely, not to invest in the improvement of aquatic systems), a loosely articulated fear is in danger of becoming a self-fulfilling prophecy.

The baseline survey lends further support to these suggestions derived from the PCAs. Of the four cities, Hanoi and HCMC are under the greatest pressure if we are to take expansion/contraction of area under aquatic production as indicative of “pressure”. The apparent – and surprising – resilience of Bangkok is, we suspect, linked to the fact that the survey sites were at the extreme edge of the periurban zone while in Hanoi and HCMC sites closer to the city centre were selected for analysis.

There is a tendency to see these conflicts between land uses and activities as external to communities. In other words, that communities – implicitly portrayed as homogeneous and often also as harmonious – are in conflict with individuals, agencies and actors situated outside and beyond the “village” or “community”. The debate, and the challenge, becomes easily framed in

terms of a local/non-local, and, more generally, us/them dichotomy. What is clear, however, is that communities are internally differentiated and that many of the tensions and conflicts are generated from within. The process of social and economic change necessarily creates a degree of *frisson*. In Duc Tu village outside Hanoi, for example, some households have embraced steel making while the livelihoods of others are still firmly based on farming (market gardening, fish culture and livestock raising). The total income of the village has, undoubtedly, increased with this diversification into new non-farm activities, but it has brought with it higher levels of pollution which are impacting negatively on traditional, land-based livelihoods. Furthermore because it is mainly wealthier households that can access the capital to establish small steel workshops, this pattern of development will have a differential impact by class, and on the whole to the detriment of the poor. In this way, aquatic production is implicated in a wider process of social differentiation.

PAPUSSA BASELINE SURVEY

Villages with known concentrations of households directly involved in AFPS, whether fish or plants, were sampled. Table 1 shows the balance of types of production system among the sample households. Involvement in aquatic plant production dominates. We suspect that this is due to the fact that entry into small-scale aquatic plant production is

not as highly capital intensive as fish culture, nor as knowledge/skill intensive. Plant-based systems use organisms – especially morning glory – that thrive in highly eutrophic environments and the infrastructure demand is limited only to a few wooden poles and a boat. Depending on the type of system, producing fish entails cages, antibiotics, seed supply, transport, and feeds. But this divide between low-entry vegetable production and relatively high-



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Early afternoon morning glory market at Don Mueang Market, Bangkok

entry fish production begins to break down as the scale of production rises. Large-scale production of morning glory and water mimosa, characteristic of the extended Bangkok metropolitan region, is highly commercialised with high inputs of fertilisers and pesticides as well as preservatives to keep the plants green. Marketing is also sophisticated and capital and technology intensive with products being trucked to wholesale markets, packaged and then rapidly trans-shipped to all corners of the country.

Periurban areas are, usually, zones of population attraction. More than one-fifth (22%) of the 818 heads of household surveyed in 2004 across the four cities were not born in their current place of residence and this was most pronounced in Phnom Penh where almost two-thirds (62%) of those surveyed were born elsewhere (The figures for the other cities were 21% for HCMC, 14% for Bangkok and 3% for Hanoi). The large majority (82%) of these “migrants” embraced aquatic production with no prior experience. In other words, it would seem that rather than migrants with experience of AFPS moving to new and more amenable areas to re-engage in such systems, it is far more common for such systems to attract or absorb new players. This makes the issue of knowledge acquisition more important than we anticipated. Neighbours were a particularly important source of knowledge (52%), but a substantial fraction also progressed through trial-and-error (29%). This entry of new AFPS actors was evidently far from seamless. Some 60% have changed their production system since settling, although whether this was linked to

Table 1 Types of production systems surveyed households are involved with

Type	No. of Households involved	%
Aquatic plants	329	40.3
Fish	144	17.6
Plant polyculture	22	2.7
Fish polyculture	131	16.0
Mixed (i.e. fish & plants or rice& plants)	22	2.7
Rice-fish	29	3.5
Rice	17	2.1
Land vegetables and crops	27	3.3
Integrated systems (VAC)	59	7.2
Shrimp	9	1.1
Labour provision development	10	1.2
Fish seed	13	1.6
Livestock	1	0.1
No involvement in Aquatic production	4	0.5
TOTAL	817	100.0

changing market demands, changing land uses, household dynamics, or progressive learning is not clear.

While in some places, such as in HCMC and Hanoi, the lack of planning controls and weakness of institutions can impact negatively on aquatic production, often accentuating the conflicts between different forms of land use and activities in the periurban zone, the reverse can also be the case. In Phnom Penh, for example, most of the people living in the periurban zone are illegal settlers. From planning documents it would seem that the Department of Land Management, Urban Planning and Construction would like to re-settle these “squatters” elsewhere to free-up space for the planned expansion and development of the city. As yet, however, the Department has neither the means nor the political will to do so, thus opening up a legal and institutional space within which periurban communities can engage in aquatic food production. These communities are, however, living on borrowed time with the latent threat of eviction.

The majority of households (70%) in the four cities own less than 1 hectare of land. Hanoi is striking among these cities as nearly 95% of the households surveyed have less than 1 ha of land, although the proportion of households with no land in Phnom Penh and HCMC is higher. The exception is Bangkok where nearly all households have land and where the plot sizes are substantially bigger than in the other cities (12% of the respondents owns 4-7 hectares, 2.5% 8-10 and 2% more than 10).

In general, across the four cities, respondents echoed similar sentiments: that their plot sizes have decreased over the last five years. That said, the land uses of their owned lands have remained the same during the last five years, according to 73% of respondents. This will require further investigation.

DRIVERS OF CHANGE

In the above some of the issues facing communities engaged in aquatic food production across these four very different periurban zones are given. In the following, the factors driving and moulding the periurban zone with respect to aquatic production and the communities that engage in such production will be given (see also Table 2).

It is essential to understand the important role of institutions in shaping the pattern and development of aquatic food production systems and, therefore, in land use change. Institutions provide – in theory – a mechanism that limits, directs and promotes access to resources in periurban spaces, most obviously land but also water, credit and so forth. Urban and land use planning provides the means by which city authorities and national governments pursue certain policy agendas. These agendas may be supportive, although not necessarily so. In addition, there is often a lack of capacity or intervening factors that may limit the effectiveness of such planning or distort it in favour of other national and local interests.

When planning fails, or is poorly articulated, conflict among uses and users will arise and uncoordinated development will result, as the periurban landscape studies shows. Agricultural areas are simultaneously zones for dense human settlements and manufacturing industries. In the cities in this study, the periurban zone, in planning terms, is often treated as if it were a spill-over space that can be freely “used” to absorb surplus people and activities displaced from core urban areas. Although the cities are not necessarily spreading out in linear fashion, a typical story emerges where roads are built on once productive agricultural or aquaculture land and then

Wet food from restaurants around Bangkok’s extended metropolis awaits disposal – or aptly “recycling” – at a fish farm in Pathumthani



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New road and bridge in Ho Chi Minh City’s periurban area, 2004

opened up for industries and settlement. Existing households involved in aquatic production are, in this schema, squeezed out – a trend that was evident in a number of the villages studied in Hanoi. It is for this reason that institutions and the wider planning context takes on such an important role. If the institutions do not exist or are ineffective then transition will be destructive, leading to social problems and the displacement of families whose lives and livelihoods are grafted to the land and water bodies. Where households have insecure land tenure or when the land market favours either intensive or extensive land uses such as housing estates and industries rather than small-scale aquatic food production, these problems will be exacerbated still further.

Of course, linked to any discussion of institutions is the issue of economics. Economics dictates that land uses which yield the greatest returns will be pursued. In light of this, the aquatic food production systems need to be viewed in the context of competing opportunities between land uses and, importantly, also between the activities that individuals and households choose to embrace. When households possess secure tenure to their land, they will be able to enter the land market and sell to the highest buyer. This sentiment was echoed in interviews in HCMC and Hanoi, where there are ongoing government efforts to develop new towns on the urban periphery creating a vibrant market in land. In Phnom Penh, however, something rather different is underway. Here the interplay of economics, land ownership and the informality of settlement are some of the factors that, seemingly, are marking out a different trajectory of development from

Table 2 Drivers of periurban change

Driver (moulding/driving factor)	Outcome/result	Case study source
Weak planning, administration and control at the local level	Heightened risk of land use/activity conflicts and tensions	Duc Tu Village, Duc Tu Commune (Hanoi)
Weak planning, administration and control at the local level	Opportunities for aquatic food producers to develop in an unregulated fashion	Phnom Penh
Conflicts between land uses and activities	Rising levels of pollution	Village 5, Da Phuoc Commune (HCMC); Village 1, Dong Thanh Commune (HCMC)
Urban sprawl/expansion	Land conversion; reduced opportunities for aquatic production due to lack of land and rising land prices	Village 5, Phong Phu Commune (HCMC); Khuyen Long Village, Tran Phu Commune (Hanoi); Duc Tu Village, Duc Tu Commune (Hanoi)
Urban sprawl/expansion	Environmental conflicts impact negatively on aquatic production systems and on community health profiles	Village 5, Da Phuoc Commune (HCMC); Village 1, Dong Thanh Commune (HCMC)
Land conversion and weak planning controls	Reduced investment in improvements to aquatic systems	Duc Tu Village, Duc Tu Commune (Hanoi)
Availability of alternative work	Rising labour costs and shortages of agricultural labour	Village 5, Da Phuoc Commune (HCMC); Village 1, Dong Thanh Commune (HCMC)
Cultural change	Younger generations avoid farm work, including work in aquatic systems	Village 5, Da Phuoc Community (HCMC)
Pattern of immigration	Established families will have access to land, while newcomers will either work as farm labourers or in non-farm activities	Village 5, Phong Phu Commune (HCMC)

from marginal, and the planning context and the institutions that support that context are well developed.

At the intersection of economics and institutions lies the household, which also has its own dynamics. As households expand and splinter, land and water bodies become fragmented, unless there is a conscious effort to accumulate them. One of the results of this process is that “off-spring” households are less likely to have access to (sufficient) land – a key resource. This generational fracture may also lead, in time, to the demise of knowledge and skills among some households while others accumulate skills and knowledge and further professionalise their engagement and involvement in aquatic food production systems.

The consumption end of the production chain also, potentially, plays an important role. The growing affluence of households, such as in Vietnam, leads to rising demand for aquatic products. But this is not, in most cases, “more of the same”. The acquisition of new tastes and standards among these households may mean that the role of waste in feeding may have to be replaced, toned down or denied. There are already increasing signs in both Hanoi and HCMC that waste-fed fish are not the fare of the *nouveau riche* such that some sellers deny that their fish are sourced from ponds fed with wastes, especially human wastes. This phenomenon is also associated with the government campaign to ban the use of overhung latrines for reasons that have more to do with tourism and international public relations than with objective health concerns.

For an overview of project documents, see the [Papussa website](#)

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Like the other papers in this issue, to illustrate our argument we draw on surveys and Participatory Community Assessments undertaken in Bangkok, Hanoi, Ho Chi Minh City and Phnom Penh.

the Vietnamese cities. Households engaged in aquatic production in Phnom Penh do not have formal title to their land and their production systems exploit the availability of eutrophic nutrients within a sewage lake, a common property resource. When government policies shift against their interests, or when the value of the land appreciates, there is little scope either to resist such policies or cash

in on the increasing value of their land. The result is likely to be an end to aquatic production in the area, the dislocation of the households involved, intrusion of new land uses and land users, and a loss of livelihood by the original settlers. In Bangkok there is another pattern of land use and ownership – which it is tempting to see as more “mature”. There is a developed land market, producers are far