

INCO: International Scientific Cooperation Projects (1998-2002)

Contract number: ICA4-CT-2002-10020

AFPS and its institutional context

(Report D19)

Prof Jonathan D Rigg and Albert M Salamanca

University of Durham

August 2006

Keywords: institutions, policies, tensions, conflicts, dynamics, peri-urban areas

Website: www.papussa.org

Contract number : ICA4-CT-2002-10020

**TITLE : PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN
SOUTHEAST ASIA**

COORDINATOR

University of Stirling
Institute of Aquaculture
FK9 4LA Stirling
Scotland

DR. David Little
E-M : d.c.little@stir.ac.uk
TEL : +44 01786 467923
FAX : +44 01786 451462

CONTRACTORS

Royal Veterinary and Agricultural University
Department of Veterinary Microbiology
Bulowsvej 17
1870 Frederiksberg C
Denmark

DR. Anders Dalsgaard
E-M : ad@kvl.dk
TEL : +45 35282720
FAX : +45 35282757

National Institute of Hygiene and Epidemiology
1 Yersin Street
4000 Hanoi
Vietnam

PROF. Phung Dac Cam
E-M : cam@ftp.vn
TEL : +84 4 8219074
FAX : +84 4 9719045

University of Durham
Department of Geography
South Road
DH1 3LE Durham
England

DR. Jonathan Rigg
E-M : J.D.Rigg@durham.ac.uk
TEL : +44 0191 374 7305
FAX : +44 0191 3742456

Research Institute for Aquaculture No. 1
Binh Bang
Tu Son, Bac Ninh
Vietnam

DR. Pham Anh Tuan
E-M : patuan@fpt.vn
TEL : +84 4 8781084
FAX : +84 4 8785748

University of Agriculture and Forestry
Faculty of Fisheries
Thu Duc
Ho Chi Minh City
Vietnam

DR. Le Thanh Hung
E-M : lthungts@hcm.vnn.vn
TEL : +84 8 8963343
FAX : +84 4 7220733

Royal University of Agriculture
Faculty of Fisheries
Chamcar Daung, Dangkor District
PO Box 2696 Phnom Penh
Kingdom of Cambodia

Chhouk Borin
E-M : 012898095@mobitel.com.kh
TEL : +855 12 898 095
FAX : +855 23 219 690

Kasetsart University
Department of Aquaculture, Faculty of Fisheries
Bangkhen, Chatujak
10900 Bangkok
Thailand

DR. Ruangvit Yoonpundh
E-M : ffrisrvy@ku.ac.th
TEL : +662 579 2924
FAX : +662 561 3984

TABLE OF CONTENTS

1 INTRODUCTION 5

2 INSTITUTIONAL DECOMPOSITION AND ANALYSIS FRAMEWORK 6

3 PROBLEMS AND THREATS 8

4 LAND AND WATER-RELATED PROBLEMS 10

4.1 Land 10

4.1.1 Hanoi 10

4.1.1.1 Urban planning system - Hanoi Urban Master Plan for 2020 12

4.1.1.2 Land law 14

4.1.2 Bangkok 17

4.2 Water-related problems 18

5 OTHER PROBLEMS 21

5.1 Infrastructure-related problems 21

5.2 Capital-related problems 23

5.3 Market-related problems 24

5.4 Input-output related problems 26

5.5 Other social problems 27

6 CONCLUSION 27

7 ACKNOWLEDGEMENT 29

8 REFERENCES CITED 29

9 APPENDICES 37

LIST OF TABLES

Table 1 Urbanisation levels of the three countries and the region.....	11
Table 2 Preparation process of different types of plans in Viet Nam (Taken from the The World Bank 2006: 32-33)	13
Table 3 List of relevant legislation on water and environment (The World Bank, Danida, and Ministry of Environment and Natural Resources 2004).	19
Table 4 Main sources of light (Source: PAPUSSA Survey)	23

LIST OF FIGURES

Figure 1 Land and water institution and their relationship with households, livelihood and production systems and their exogenous influences (Based on Saleth and Dinar 2004: 104).....	8
Figure 2 Foreign direct investment, net inflows (BoP, current million US\$)	12

APPENDICES

Appendix 1 First ranked problems raised during the PCA (Set A).....	37
Appendix 2 First ranked problems raised during the PCA (Set B).....	38
Appendix 3 First ranked problems raised during the PCA (Set C).....	38
Appendix 4 Action research agenda developed during the SoS (Rank 1)	39
Appendix 5 Action research agenda developed during the SoS (Rank 2)	40
Appendix 6 Action research agenda developed during the SoS (Rank 3)	41
Appendix 7 Action research agenda developed during the SoS (Ranks 4-6)	42
Appendix 8 List of individuals interviewed in the qualitative interviews in Bangkok	43
Appendix 9 List of individuals interviewed in the qualitative interviews in Phnom Penh	44
Appendix 10 List of individuals interviewed in the qualitative interviews in Hanoi	45
Appendix 11 The water resources-related laws in Thailand (Source: (Takeuchi <i>et al.</i> 1999).....	46

1 Introduction

Institutions set the rights and rules of resource use, access and development among groups of people, members of an organization or individuals in a community. Rights are actions that are authorized while rules refer to prescriptions that forbid, permit, or require on acts performed in relation to a right (Ostrom 1990). Thus, institutions are “instruments for interpreting and transforming information into knowledge” (Saleth and Dinar 2004:24). Institutions could be either formal or informal. Formal institutions are those enacted by the state or its various apparatuses such as policies, laws, and regulations issued by different branches of the government. Informal institutions refer to those commonly agreed rules of behaviour in a community which are not written down or encoded within a formal system of governance but are nonetheless defined behaviours among members. These include customary laws or local or indigenous systems. To understand these institutions, an institutional analysis has to be carried out. Institutional analysis, therefore,

...focuses on the institutional arrangements by which is understood the set of rights and rules by which a group of resource users and government organises resource governance, management and use.... The purpose of institutional analysis is to separate the underlying rules from the strategy of the players. Institutional analysis examines how institutional arrangements (rules and regulations) affect user behaviour and incentives to coordinate, cooperate and contribute in the formulation, implementation and enforcement of management regimes. (ICLARM and IFM 1998: 4)

Peri-urban aquatic food production (AFPS) essentially lies at the interface between land and water. Land provides the medium through which production becomes possible, but all other processes concerning its aquatic nature can rightly be classified as fisheries and by the latter, we mean to also include the cultivation of aquatic plants. Thus, there are two institutional streams that affect AFPS. One stream is directly related with land uses and another is anchored in the production system itself. Arguably, other streams can always be included such as those institutions that affect human well-being, as production systems and producer livelihoods are closely linked. However, for the purpose of the project, we will only concentrate on land and water.

The land stream concerns how land in the peri-urban is used, acquired, and disposed of. Special focus is made on how these institutions lead to contending land uses on one hand and adjudicates competition of land uses on the other. By virtue of their close geographical connection with the city, the land institutions discussed in this report tend to be related more with ‘urban’ land. However, any discussion on institutions on the use of agricultural land does not separate the ‘urban’ from the ‘rural’, although it is likely that such agricultural land can always be construed as ‘rural’ by virtue of the fact that agriculture is a predominantly rural occupation. What this study and the literature on urban agriculture has shown is that agriculture is not only necessarily ‘rural’ but is also ‘urban’ thus giving rise to urban agriculture as an area of advocacy, development and research.

The productions stream is about how production and marketing of AFPS products are regulated. What sort of regulatory instruments and policies are in place

to address production issues? What are the gaps? Other institutions related to fisheries or water have been reviewed in various publications such as Nissapa et al. (2002) for coastal resources in Thailand, Ministry of Fisheries and The World Bank (2004) for Vietnam, and Le Thac Can et al. (2001) for water resources in Vietnam. The literature on environmental governance in the Mekong has, in some ways, tackled institutional issues, including work by Dore (2001), Chomchai (2001), Kao Kim Hourn (2001), (Le Quang Minh 2001), and Nilsson and Segnestam (2001).

The Papussa project has also carried out separate institutional analysis of each study sites (i.e. Le Thanh Hung *et al.* 2004, Pham Anh Tuan, Nguyen Thi Dieu Phuong, Pham Van Trang *et al.* 2004, Yoonpundh *et al.* 2004a) as part of its scoping activities during the initial stages of the project. Although the results of these analyses are generally descriptive, they provide for a broad and valuable indication of the formal institutions engaged in fisheries and urban development and management.

In order to understand the trajectories of change of AFPS, we need to look at the basic institutions that will underpin its sustainability. Arguably, understanding institutions concerning land is fundamental to understanding how the system will unfold in the future.

There are basic questions we need to ask in this institutional analysis. First, what land institutions that determine land use management and change will have ramifications for AFPS? Second, how do they interact with fisheries and aquatic vegetable institutions to produce change in AFPS? Third, to what extent is the production system ready to accept possible changes brought about institutionally? By change, we mean both positive and negative developments that will affect AFPS. We are particularly interested in rooting out the factors that will serve as breaking points in the continued practice of this livelihood, whether individually (i.e. at a household level) or more generally at the community scale.

This report is informed by a particular take on the institutional context within which AFPS in peri-urban areas operate. We wish to argue that AFPS do not sit comfortably in institutional terms. The obvious institutions that should manage and govern the production systems – most obviously departments of fisheries and agriculture – largely ignore peri-urban systems. At the same time, ministries of agriculture usually adopt the view that agriculture occurs, necessarily, in rural spaces thus overlooking peri-urban production. Moreover, institutions for the management of urban land are not comfortable or familiar with agricultural production and are geared to 'urban' land uses and activities such as housing and industry.

2 Institutional decomposition and analysis framework

There are many ways of approaching institutional analysis from old institutionalism to neo-institutionalism to meso-corporatism to game theory and finally to transaction cost theory. All of these fall within the rubric of institutional economics. However the key objective of institutions is to provide information and reduce uncertainty in human to human and human to resource relationships. An assumption in many approaches is that human beings have limited knowledge regarding how to behave within a society or community so that given such incomplete knowledge, environmental behaviour is defined and regulated according to formally or informally agreed rules provided by duly constituted authorities or

mutually agreed in the community (Saleth and Dinar 2004). In approaching our institutional analysis, we are guided by the framework developed by Saleth and Dinar (2004) as applied to water resources. This framework is comprehensive and its use in our analysis is only limited to those key institutions which we believe directly correspond with the problems, threats and land use changes identified during the household surveys and qualitative interviews carried out in the project. Thus, our analysis is partial and may best be seen only as exploratory.

The basic objective of this framework is to decompose AFPS institutions into their major components and subcomponents and subsequently tracing their linkages and relationships (Saleth and Dinar 2004). In a sense, this framework unpacks the diverse institutional make up that underpins AFPS and hence map out their relationship in terms of the interactions between the land, water, and fisheries/aquatic plants components of AFPS. But not only is this a process of simple unpacking of institutions, such action is done with the overall intention of understanding its trajectories of change. In effect, addressing the question: how do existing institutions define or control trajectories of change? Furthermore, what can we glean from these institutions to address the issue of the sustainability of AFPS within their current contexts? We understand that decomposing institutions in this way is essentially about unbundling the AFPS governance network. And like all social phenomena, outcomes are determined by a host of interacting and interdependent factors which are largely embedded within its larger political economy. As such, what we have noted earlier still holds true: that our institutional analysis here is coarse. The decomposition of AFPS institutions here only concerns the formal rules such as land laws and policies. Admittedly, informal institutions are also relevant, but are beyond the scope of this report. Furthermore, institutional arrangements as manifested in organisations are not considered in the analysis.

Figure 1 shows the triad that underlines our institutional analysis. There are three nodes in the triad: land and water institutions or resources, and households/livelihoods. In the diagram, institutions or resources may be seen as analytical complements depending on the analysis undertaken. That is, we can look at land and water institutions vis-à-vis AFPS or land and water resources vis-à-vis AFPS. Both have interactive effects. AFPS lie at the intersection of land and water resources and as such, are covered by institutions that concern these resources. Their interaction may vary depending on the strength of the association between households and these resources as for instance it is direct when households use land or water resources to provide immediately for their needs as the case of land farming or aquaculture show or indirect if households use land or water resources only tangentially as in the case of building shops for metal foundry. In this figure, exogenous factors that influence the interaction between institutions and between institutions and livelihoods are also represented. The exogenous factors also interact with each other so that their impact on the triad is not necessarily linear, but could also be additive and multiple. Our interest here is not on analysing each set of institution *per se* but on their interaction and their resulting outcome with respect to the livelihood systems and the household. Each set of institutions, or more precisely, each resource sector (i.e., land and water), is normally analysed separately. However, in our case, we are more interested in those key institutions that have bearing on the sustainability of the livelihood systems and as such we look at institutions located at the intersection. Rather than understanding each institutional component in itself, and in detail, we are interested in exploring the synergies, tensions, conflicts, points of intersection, and the gaps that impinge on AFPS.

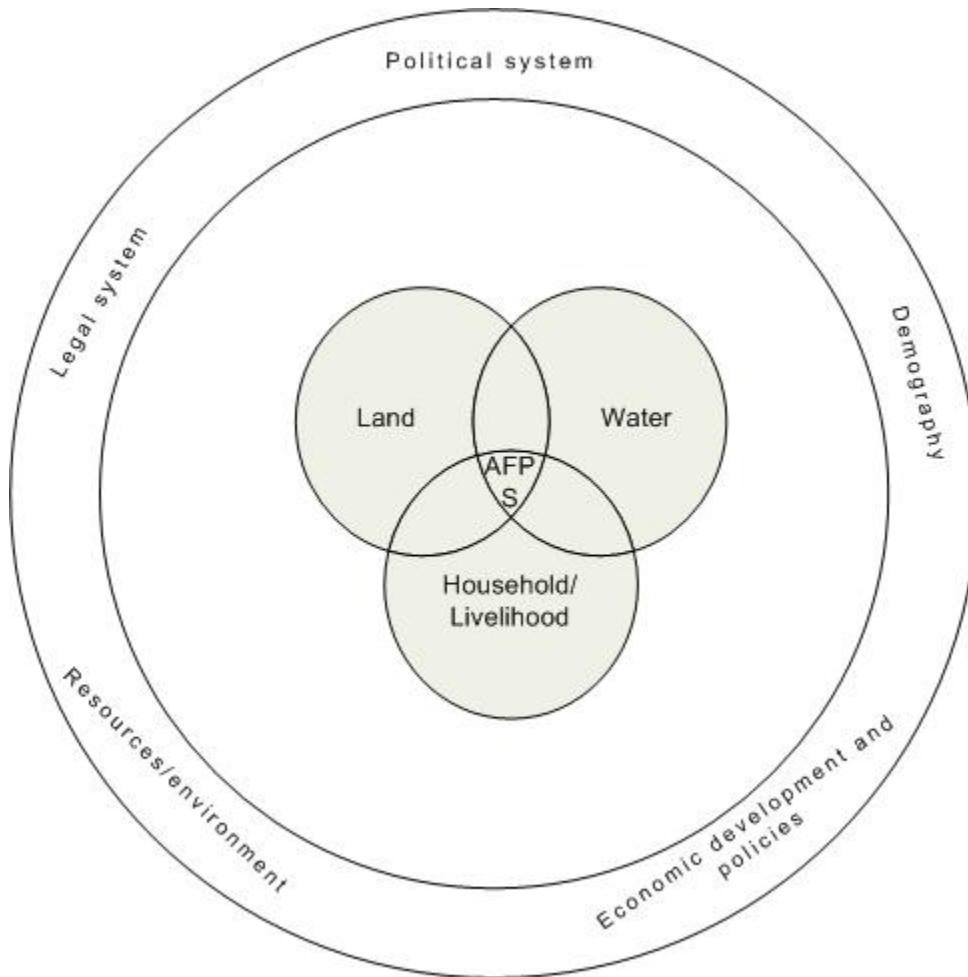


Figure 1 Land and water institution and their relationship with households, livelihood and production systems and their exogenous influences (Based on Saleth and Dinar 2004:104)

3 Problems and threats

To begin the process of institutional decomposition, we use the problems (Appendices 1, 2, and 3) identified in the course of the project as bases for understanding their institutional underpinnings¹. The underlying assumption of this

¹ It is always possible to cast the net wider and undertaken a broad-ranging institutional analysis, but given the complexity of AFPS which transcend both land and water dimensions, not to mention spanning

approach is that these problems, and threats, have institutional dimensions. For problems or threats to occur, either the institutions available are deficient, inactive or generally unable to respond appropriately to address them. The problems were identified during the PCA and then corroborated by the research and intervention priorities set out during the SoS meetings in each city (see Appendices 4-7). We only use the first-ranked problems identified by each group in the PCA². These problems are analysed alongside the threats that came out of the qualitative interviews conducted with selected key informants. These informants were taken from a pool of survey respondents and selected based on age and the type of production system they were involved with. The qualitative interview tried to get a balance of men and women, however, the bias in the survey towards men was predicated on the definition of a household head and tended to obscure the role of women. The characteristics of the household head are described in another report (D08).

The problems listed in Appendices 1-3 are classified thematically. Obviously, these problems are interrelated and the classification deployed here is only for ease of analysis. Not all problems were present in each city. In fact, each city tends to exhibit different configurations of problems. The absence of a certain problem within the configuration does not necessarily mean that they are absent in the city studied. It could only mean that they are not a priority. It is possible that many problems are competing for the attention of producers or key informants.

Land-related problems are prominent in Hanoi and Bangkok, but not in the other cities. However, all cities have water-related problems. Except for HCMC, problems of lack of certain kinds of infrastructure, be it electricity or its price, communication, water, and roads, are reported in Phnom Penh, Hanoi and Bangkok. Three of four sites in Hanoi, one in four sites in HCMC and two of four in Phnom Penh raised the problem of lack of capital. Market-related problems are noted in Hanoi, Bangkok, and Phnom Penh. Problems with inputs such as production techniques, water supply and labour as well as poor outputs are reported in the two Vietnamese cities (i.e., three sites each in Hanoi and HCMC) only. Among the sites in the four cities where the PCA was carried out, those in Phnom Penh reported other social problems, which, on the face of it, appear to be more serious problems than those faced in their production systems. Children's education, drug abuse and theft are reported in three sites in Phnom Penh. These problems do not, however, imply that they are absent in other sites. It only means that their gravity must have been more palpable than production-related problems.

other associated social spheres, a focus is necessary so as to analyse only institutions with immediate effects on AFPS.

² Depending on the interpretation by project partners of the actual situation on the ground, wealth ranking exercises and gender stratification were selectively employed to determine groups that joined in the PCA. In some situations, wealth became the basis of the groupings while it was gender and production systems for others. In short, there was no single way adopted by all cities in determining groups for the PCA. This is just as well as it reflects the different dynamics in each city. In Hanoi, for example, the PCA in Duc Tu Commune was carried out separately between VAC and fish farmers groups. However, project partners decided to stratify group membership by wealth groups and then by gender in Hoang Liet Commune producing a 'better-off' men and women's group, 'worse off' men and women's group and aquatic plants grower and fish farmers group. The situation was different in HCMC, Phnom Penh and Bangkok where PCA groups were only stratified by gender as each of the villages were known to specialise in a particular production system.

In the next section, we will discuss each of these sets of problems and their corresponding institutional underpinnings. As shown in Figure 1, land and water institutions are the key focus of this analysis such that we will begin with these sets of problems.

4 Land and water-related problems

In Hanoi, the fish producers in Tran Phu reported that development plans in their commune are changing while the VAC group in Duc Tu commune expressed dissatisfaction with the land lease period for the land they use for their VAC production. Based on qualitative interviews (Interviews, Appendix 10), these problems in the two communes appear to be a general sentiment across the AFPS farmers in the Hanoi peri-urban. In Bangkok, on the other hand, a group of male key informants in Lumsai said that one important problem they face is the lack of agricultural land.

4.1 Land

4.1.1 Hanoi

Among the four cities, it is noticeable that Hanoi registers the highest number of observed changes or new developments especially with respect to new infrastructure construction such as roads and bridges and more areas deployed for aquaculture (See Table 7 of D09). This is largely due to the strong interest of the Hanoi People's Committee to develop Thanh Tri and Hoang Mai Districts into new towns, tourism and aquaculture areas. New bridges and ring roads are being built as part of improving Hanoi's urban transport infrastructure, anticipatory planning of the future transport demands of the city, and encouraging dispersal of activities and human settlements away from the city centre, which is already congested. Dr Iwata Shizuo, Programme Manager of the JICA-funded Comprehensive Urban Development Programme in Hanoi Capital City, revealed in an interview that Thanh Tri District will be quickly urbanised as it is within Ring Road No 3 which is planned for urban uses in the next 10 years. He further noted that the urban pressure is too strong in Hanoi and that agricultural lands on the fringes of the city are very easy sources of urban land.

Rapid urbanisation, as the case of Hanoi demonstrates, has been known to be one driving factor in land use changes and is causing social, environmental, political and economic repercussions which in most instances are negative in character such as urban poverty, housing problems, food insecurity, increasing population, poor governance, environmental degradation, land scarcity, decrepit infrastructures, and uneven economic growth between rural and urban areas (Dick and Rimmer 1998, Drakakis-Smith 1996a, 1996b, 1997, Drakakis-Smith and Kilgour 2001, Hardoy, Mitlin, and Satterthwaite 2001, Hardoy and Satterthwaite 1991, Kelly 1998, Marcotullio 2001, McGee 2001).

The urbanisation levels of the three countries and the region are shown in Table 1. Among the three countries in this study, Thailand has the slowest growth in its urban population showing an average change in its percentage urban of only 1.15 % between 1995 and 2010 compared to 2.2% in Viet Nam, 2.87% in Cambodia. The region as a whole has a percentage urban change of 3.67% during the same period. These figures are, however, misleading if the intention is to

compare the urbanisation of the cities directly involved in this study as they are based on different definitions³ of urban settlements.

Table 1 Urbanisation levels of the three countries and the region

	Total population at mid-year (thousands)				Urban population at mid-year (thousands)				Percentage urban			
	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
South-eastern Asia	482,590	522,121	559,418	594,353	163,125	196,029	230,689	266,227	33.8	37.5	41.2	44.8
Cambodia	11,393	13,104	14,800	16,630	1,613	2,216	2,922	3,796	14.2	16.9	19.7	22.8
Thailand	58,729	62,806	66,500	69,681	11,315	12,453	13,844	15,517	19.3	19.8	20.8	22.3
Viet Nam	72,841	78,137	83,397	88,684	16,148	18,816	21,926	25,547	22.2	24.1	26.3	28.8

Source: United Nations Population Division. 2002. World urbanization prospects: the 2001 revision. ST/ESA/SER.A/216. New York: Population Division, Department of Economic and Social Affairs, United Nations Secretariat.
 Estimates: 1995 and 2000; Projections: 2005 and 2010

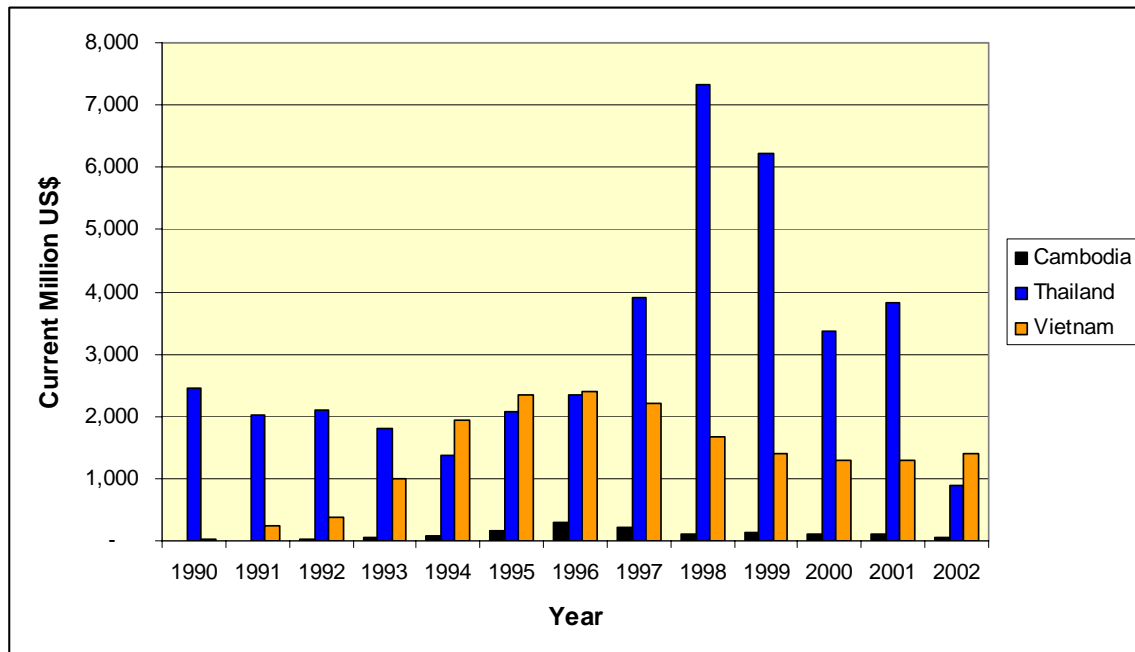
The problems highlighted above have institutional dimensions. At a macrolevel, changes in development plans in Hanoi were driven by government plans and priorities. In Hanoi, there is an increasing trend towards encouraging larger scale industries to locate in the peri-urban zone, such as the Thang Long Industrial Park, a joint venture between Dong Anh Chemical company (Ministry of Construction) and Sumitomo Corporation (Japan) (Hanoi Authority for Planning and Investment 2004), which are financed with foreign invested capital. Like elsewhere, the flow of transnational capital has been shown to be an important determinant in urban land use change in a significant number of cities or regions in Asia such as in the Pearl River Delta, China (Seto and Kaufmann 2003); Cebu, Philippines (Sajor 2003); Cavite, Philippines (Kelly 1998, 1999, 2000); Bandung Metropolitan Region, Indonesia (Firman 1996); Hanoi, Vietnam (Douglass et al. 2002: 1-1, Leaf 1999, 2002, Nguyen Quang and Kammeier 2002); and Bangkok, Thailand (Greenberg 1994, Sauwalak Kittiprapas 1999, Utis Kaothien and Webster 2000, Webster 2002a, 2002b, 2003).

Douglass et al. (2002: 1-1) claim that the future economic growth of Vietnamese cities is tightly coupled with growth in FDI as well as its integration with the global economic order. In 2002, 13% of 4,381 approved FDI projects since 1988 in the country went to Hanoi. Larger amounts of FDI went to Ho Chi Minh City. Other provinces and smaller cities received limited amount of FDI. Hanoi accounted for 6% and 7% of total industrial output value in 2000 and 2001 respectively (General Statistical Office 2003).

³ Using national censuses, data for urban population in Cambodia is gathered from the municipalities of Phnom Penh, Bokor and Kep and 13 additional urban centres (United Nations Population Division 2002: 117). The same data comes from municipalities in Thailand (p.129) and places with 4,000 inhabitants or more in Viet Nam (p.130). In terms of urban agglomeration, national census bureaus provide data to the United Nation Population Division using statistical concepts employed at the time of the survey. The UNPD has supposedly corrected those that are not based on the concept of urban agglomeration (p.115) but there remain doubts about the comparative basis of the data. In Cambodia, the urban agglomeration data is based on the municipality of Phnom Penh (p.134); the metropolitan area in Thailand; and city proper in Viet Nam (p.153). Furthermore, there are additional doubts about the accuracy of the raw population/residency data themselves.

The growth of FDI in Viet Nam and other countries in this project is associated with the fundamental change in development policy favouring export promotion over import substitution (JBIC Institute 2002: 3) and has led to the development of industrial zones and manufacturing centres. Creative incentives particularly tax holidays, cheap labour, and shorter export documentation processing as well as the availability of facilities notably container ports, telecommunications, airports, roads, stable electricity supply and suitable business amenities (e.g., gated subdivisions and recreation facilities) have spurred the development of these areas and enticed firms to relocate to the region (JBIC Institute 2002:84). A comparison of volume of FDI in Cambodia, Thailand and Viet Nam is shown in Figure 2. Cambodia's FDI is small compared to either Viet Nam or Thailand.

Figure 2 Foreign direct investment, net inflows (BoP, current million US\$)



Source for 1990-2001: The World Bank. "World development indicators 2003," ESDS International, University of Manchester, http://esds.mcc.ac.uk/wds_wb/eng/ReportFolders/Rfview/Explorer.asp?CS_referer=.

Source for 2002: The World Bank. 2004. "World Development Indicators 2004." Washington DC: The World Bank, Accessed on 24 August 2004, <http://www.worldbank.org/data/countrydata/countrydata.html>.

4.1.1.1 Urban planning system - Hanoi Urban Master Plan for 2020

In Viet Nam, urban planning as traditionally understood in the west is different. There is no single source of planning integration. Instead, planning is facilitated by three different planning approaches: socio-economic development, sectoral development, and spatial design (also called construction or master plans). Socio-economic development plans are development strategies that define, among other things, precise development and investment targets and integrate proposals provided by sector plans (e.g. transport, industry, education, health). All levels of government including wards and communes prepare this plan, which are then consolidated by top level planning departments. Spatial plans present a detailed spatial layout of a province, city, district, or development site. "Spatial plans", "master plans", or "construction plans" are Vietnamese versions of physical plans.

Sector development plans are plans designed to achieve production or development targets and strategies for a particular sector e.g. tourism, export promotion etc (The World Bank 2006: 32). Table 2 illustrates the preparation process for each type of plan, as described by The World Bank.

Type of Plans	Preparation Process
Socio-economic development plans	Based on the five-year socio-economic development plan (SEDP), SEDP are prepared after formal consultation within government and Party structures. The Ministry of Planning and Investment (MPI) has the primary role in coordinating and ultimately producing the SEDP. At the provincial level, the Departments of Planning and Investment (DPI) take the lead role. A bottom up approach is adopted. Each level of sub-national government (communes, districts, provinces) submits proposals to the next level where they are consolidated and passed on up eventually to MPI where they are consolidated for the whole country.
Spatial plans	<p>Most plans are prepared by the National Institute of Urban and Rural Planning (NIURP), or its sister organization in the south, NAGECO. Both are subsidiaries of MOC. Only the three largest cities have their own planning institutes.</p> <p>Spatial plans are prepared in four levels of detail: orientation plans (national policy), regional plans, general plans (province or city), and detailed area plans (ward, industrial zone, or project). Most are prescriptive for specific land uses in specific locations, rather than permissive as in Western land use planning.</p> <p>This lack of coordination is probably exacerbated by the fact that the planning institutes tend to overlook economic and social dimensions, while the economic planners (equivalent institutes affiliated with MPI) seem to overlook the spatial and environmental implications of investment programs. The result is that spatial plans are too abstract with insufficient attention given to the “real world”.</p> <p>General spatial plans are required to include long and medium term direction for physical development and the arrangement of urban space and infrastructure networks and facilities. They also cover the characteristics of urban areas, population size, land use, resettlement, redevelopment, conservation, and zoning. The technical master planning specifications that drive plan design, city investment priorities, and city classification reduce local flexibility.</p> <p>The Prime Minister approves the general plans for Special, Class I and Class II cities. Detailed area plans are prepared under the guidance of sub-national People’s Committee. They predetermine the specific uses of urban space and include the quality, quantity, and position of each development type and building footprint.</p> <p>Spatial plans (general and detailed plans) are not generally converted into specific short-term programs and budgets and are not dependent on anticipated resources. They do not include identified strategies for reaching their vision.</p>
Sector development plans	<p>The overall goal of sector planning is the maintenance of the socialist market-oriented economy, particularly for major industries and agriculture. Sector plans are also prepared for infrastructure. The main planning functions are divided between ministries at the national level, departments at the provincial level, and the State Owned Enterprises (SOEs).</p> <p>Sector plans and spatial plans for the same location may not be linked in phasing, finance or implementation.</p>

Table 2 Preparation process of different types of plans in Viet Nam (Taken from the The World Bank 2006:32-33)

Thus, we can see that what partly explains the problem raised by farmers about the instabilities in the plans in their commune relates to the nature of the urban planning process in Viet Nam, the various types of plans that operate, and the myriad of government ministries and departments involved. At a spatial level, one plan which is likely to have a defining impact on land uses in the AFPS communes is the Hanoi Urban Master Plan for 2020.

Based on the plan, the population of the city will increase by about 1.6% per year to reach around 3.5 million in 2020 from 2.5 million in 2000. In order to decongest the old city centre, the plan strongly pushes for the urbanization of the peripheries of the seven urban districts located on the right side of the Red River as well as those areas on the left bank of the Red River. Thanh Tri district, currently considered a suburban district, is being planned as a development expansion area. It is expected that the population in areas defined in the plan as zones of development expansion will have reached 700,000 by 2020. By 2020, the urban area will cover an area of 250 km² from an area of 84.13 km² in 2000. Despite the expansion of the urban area, the Master Plan noted that the principal land use of the city in 2020 will still be agriculture, covering 43% of the land (Japan International Cooperation Agency and Hanoi People's Committee 2000: 12-13).

To understand the rationale why peripheral areas need to be brought into urbanization, one has to look at the demand for land in the city. As mentioned, there are, at present, seven urban districts in Hanoi with total land area of 5,676 ha or 43.75m²/person. By 2020, it is forecasted that the land-use demand will reach 25,000 ha or 100 m²/person. The structure of this demand is as follows. For civil land, it will increase to 73.52 m²/person from 35.85 m²/person and non-civil land to 26.48 m²/person from 7.9 m²/person in 2000 (Transport Engineering Design Inc. (TEDI) 2003: 9). Such demand necessitates that peripheral areas of the city need to be brought in by conversion or rezoning to provide for new urban lands.

The Urban Master Plan further stresses the importance of industrialization as an engine of growth of the city, economically and spatially, through the set up or expansion of 17 large scale industrial zones. As of 2000, the area occupied by industries covered only 570 ha. In 2020, this will increase to 2,155 ha. No developments are planned within the city core but in the new city area and suburban area in Soc Son. In 2000, Thanh Tri District occupied the biggest share of this designated industrial zone but this will change as industrial zones in Dong Anh, Gia Lam and Soc Son are developed (Japan International Cooperation Agency and Hanoi People's Committee 2000: 14).

Earlier comments of the master plan approach are not encouraging as far as the use of this tool in improving the urban development of Hanoi. Leaf (1999: 307) argues that "...the master plan approach to regulating the development of Hanoi has proven to be of limited value in its present formulation. Fundamental problems have occurred on two fronts: on one hand, the entrenchment of a flexible and ambiguous administrative system has allowed informal practices of uncoordinated household investment in the built environment to flourish, while, on the other hand, the formal methods of urban development were premised on the continuing flow of foreign capital, a supposedly solid ground for decision-making, which has proved to be ephemeral..."

With regard to AFPS, we can see both of these criticisms in operation. On the one hand, there is a dysfunctional separation between 'planning' and outcome in the areas studied, where local level actors and exigencies often prevail over city-wide coordination efforts. At the same time, city/national level pressures and priorities regularly conflict with local-level (AFPS) demands.

4.1.1.2 Land law

Regarding the concerns among VAC farmers about the short lease period for lands they use in the VAC, it is instructive to return to the provisions of the land law

to understand this. However, it should be noted that there has been a series of revisions of the country's land laws since the renovation process. The first major land law was enacted in 1993 while the most recent was introduced in 2003. The 2003 Land Law⁴ is considered the most comprehensive. As such, the farmer-informants may have been referring to the lease period in earlier laws, although a check between the different laws reveals that the prescribed period of lease are the same.

The newest Land Law, Land Law 2003, sets out the terms for the use of, or technically 'lease', a particular type of land⁵:

- Land allocated for the cultivation of annual crops, aquatic farming and salt production to households and individuals – 20 years; and,
- Land allocated for cultivation of perennial crops and production forest to households and individuals – 50 years.

In other countries, the period of use of land is unlimited, which, as shown above, is not the case in Viet Nam. Since the enactment of the first Land Law in 1993, it had been in operation for slightly over a decade at the time of the PCA (2003) when farmers were leasing the land for their VAC systems. Given this situation, it would appear that the problem expressed by the VAC farmers in Hanoi may rightly be considered a worry or an anxiety as their leases have not yet passed the prescribed period of 20 years for aquaculture land. At this point in the development of land institutions in Viet Nam, the problem expressed by the VAC farmers appears to have no solution as the Land Law, whether 1993 or 2003, is clear that the duration of lease is only 20 years unless there are efforts to amend this. What they can bank on are the provisions that existing users may still use the land if there is a need, and if they have complied with the land legislations for the duration of their previous lease, and the use of the land is still within the State's land use plan⁶. What is not clear is what happens when there are competing users of the land. Is outbidding another user possible? How dependable are the land institutions to protect the interests of existing users? If the answers to these questions are negative, then these could be the source of farmers' anxiety.

It is possible that the lands the VAC farmers are referring to actually came from the 5%-public land fund in communes, wards and townships which the 1993 Land Law specified to have a land lease term of not exceeding 5 years. If this is the

⁴The World Bank (2006: 34) has noted the following improvements in the 2003 Land Law from the previous Land Law. These improvements are:

- Modernization of state land ownership and administration;
- Use of market values for establishing compensation, taxes, and fees (given the imperfect mechanics of the current market, it is however difficult to identify a true "market";
- Recognition of real estate markets;
- Devolution of responsibility to local levels for land administration and registry promulgation of uniform standards and local single points of contact for land registration;
- Greater availability of land registration information;
- Public participation in planning and public notification of approved plans;
- Consolidation of land use right certificates into a single type;
- Improvements in compensation procedures for expropriated land;
- Local officials to become more accountable; and,
- Long term leases for foreigners and overseas Vietnamese to become transferable.

⁵ Article 67(1), Land Law 2003

⁶ Article 67(1), Land Law 2003

case, then there is no recourse for the farmers short of amending the law. The 5%-public land fund was created as a reserve for agricultural production, which the public can use, and is based on the total land area of the ward, commune or district⁷. If this fund exceeds 5%, the excess can be used for construction works, compensation, or allocated to households or individuals who have not yet received land for agricultural or aquatic production⁸. The Local People's Committees in communes, wards or districts manage the use of the public-use agricultural land reserve⁹. And the use for VAC is just one of the many uses it is intended for.

Although land is considered 'the property of the whole people', the State is 'the representative owner'¹⁰, which provides land use rights to its citizen¹¹. As such, the possessor of the land use right granted to a piece of land has the right of ownership, possession, and use of the land. Specifically, a person who possesses land use rights may exchange, transfer, inherit, subleases, mortgage, provide guarantee, and make capital contribution using his/her land use rights¹². However, these bundles of rights are limited only to the use right granted as defined for that particular land. That is, these rights do not include rights below the land (e.g., minerals) and above the land (e.g., airspace) and specific to the classification of that land. Land is classified as agricultural land, non-agricultural land, and unused land, where uses of this type of land is yet to be determined¹³. Agricultural land includes lands for:

1. cultivation of annual crops such as paddy land, grassland for livestock, and land for annual crops;
2. cultivation of perennial crops;
3. production forests;
4. protection and special-use forests;
5. aquatic farming; and,
6. salt production.

Non-agricultural land includes lands for;

1. Residential land, including rural and urban;
2. Construction of offices, public service delivery institutions;
3. National security and defense purposes;
4. Non-agricultural production and business, including land for construction of industrial zones; land for production, business establishments; land for

⁷ Article 72(1), Land Law 2003

⁸ Article 72(1), Land Law 2003

⁹ Article 72(2), Land Law 2003

¹⁰ Article 5(2), Land Law 2003

¹¹ Article 5(4), Land Law 2003

¹² Article 46(2) & Article 61(1), Land Law 2003

¹³ Article 13(1-13), Land Law 2003

mineral activities; land for production of construction materials, land for production of ceramic products;

5. Public use, including land for transportation and irrigation; land for construction of cultural, health, training, educational, sport and physical training works for public service; land with historical and cultural relics and places of interest; and land for the construction of other public utilities as determined by the government;
6. Religious establishments;
7. Communal houses, temples, shrines, hermitages, worship halls, ancestral temples;
8. Cemeteries and graveyards;
9. Rivers, canals, streams and specialized water surface; and
10. Other non-agricultural land as determined by the government.

The State, through the Ministry of Natural Resources and Environment, manages land¹⁴.

4.1.2 Bangkok

In Lumsai, Bangkok, the lack of agricultural land, while it may be attributed also to rapid urbanisation in a general but in indirect sense, has more to do with the current state of ownership of land by fish farmers in this area. All fish farmers on this sizeable block of land rent their land from the Rangsiya Village Estate Company, a land property developer. Originally, the area which fish farmers used to farm was owned by the Catholic Church until around 1994 when it was sold to the company. It is part of a 9,500 rai estate which the church owned for years. When it was sold, 3,000 rai was converted into a golf club, currently known as the Lumlukka Gold and Country Club. Farmers who were farming the land were given plots of land for residential purposes if they invest or rent land from Rangsiya for agriculture or aquaculture purposes. Access to residential lands is, therefore, free if they make a corresponding investment for their other land needs. For example, Mrs. Penpan Chewnawin received 800m² of land to build her house for the 20 rai of riceland she rented from the company. The land in 14 villages in Tambon Lumsai belongs to Rangsiya (Interviews, Appendix 8). What this implies is that land is limited unless a farmer has the capital to be able to rent more from the company, assuming that free lands are still available. At the moment, there is no intense competition for land. Current land uses for this block of land are limited to the golf club, residential, and agriculture-aquaculture. However, as soon as the price of land escalates with other changes in the area, possibly brought about by urbanisation, it is likely that the current owner will find other more economically profitable uses of the land to the detriment of farmers and their production systems. This explains why the male key informants from this village observed that there is a lack of agricultural land.

¹⁴ Articles 7(2) and 64(2), Land Law 2003

All the conditions needed for a working land market exist in Bangkok judging from the number of new developments and the presence of big, transnational real estate companies such as CBRE and Jones Lang LaSalle. In fact, it can be argued that the ease with which land disposal and acquisition is facilitated through its existing land institutions in Bangkok explain, in part, its extended metropolitanisation. Thus, institutions *per se* are not the limiting factors in the case of the Lumsai farmers, but their existing situation within a tightly controlled space. With more capital, it is possible that such lack of agricultural land will be addressed as one can always acquire land elsewhere – but, at a price.

4.2 Water-related problems

As noted earlier, water-related problems are reported in all cities in this study. The men's group from Duong Village, 12kms from the centre of Phnom Penh a village populated with a substantial number of Vietnamese fisherfolk, reported that fish catches along the river have decreased while the women's group in Suanprixthai, a Muslim village along an irrigation canal in Bangkok, said that flooding was their major problem. During the months of the rainy season, water levels in the canal rise, destroying their water mimosa production, which women are largely involved with, and affecting their dwellings. Floods wash away their plots. Water/environmental problems were also reported by the better-off men's group in Hoang Liet in Hanoi and both men and women's group in HCMC.

These problems can be disaggregated by sector. The problem in Phnom Penh can be considered solely within the purview of the fisheries sector while the problems in Bangkok and Viet Nam lie within the water sector. These sectors are interrelated and the institutions involved in one sector affect in multiple ways the other sector but for the sake of this analysis we will keep this distinct and no attempt is made to compare them.

Problems, such as the one reported by fisherfolk in Duong Village, in the fisheries sector in Cambodia are well-known (for example, Ahmed *et al.* 1998, Baran 2005, Baran, van Zalinge, and Ngor Peng Bun 2001, Jensen 2001, Kurien, Baran, and So Nam 2006, Kurien, So Nam, and Mao Sam Onn 2006, Nao Thuok and van Zalinge 2000, Poulsen 2003) and there has been attempts to address them.

The use, development and exploitation of water in general is governed by a variety of institutions including those which do not belong to the water resource sector such as those institutions engaged in the management of land and forestry. The involvement of the latter institutions reflects the fact that each resource sector is interdependent with one another. This necessitates that institutions take this reality into consideration so that a comprehensive institutional analysis dictate a review of institutions from other sectors.

In Viet Nam, there is a myriad of legislation designed to address environmental, or in particular, water pollution such as those listed in Table 3.

Legislation	Area of concern	Date
National Law on Environmental Protection and Decree No 175/CP	Implementation of the Law on environmental protection	December 27, 1993 and October 18, 1994, respectively

Law on Water Resources	Water resources	May 20, 1998
Law on Fishery resources	Fishery resources	
Ordinance on Development and Protection Aquatic resources	Aquatic resources	1989
Ordinance on prevention, combat against floods and typhoons	Flood and typhoon protection	1993
Ordinance on Supplement and amendment ordinance on prevention, combat against floods and typhoons	Supplement to flood and and typhoon protection legislation	2000
Decree No 26/CP	Administrative fines for violation of environmental protection	April 26, 1996
Decree No 49/ND-CP/1998	Issuing regulation of fishery activities of foreigners and foreign boats in Vietnam's areas	July 13, 1998
Decree No 67/2003	fees for wastewater	June 13, 2003
Decree No 70 -CP	Administrative fines for violation in the fishery sector	June 17, 2003
Directive No 200/TTg of Prime Minister	Guarantee clean water and rural environmental sanitation	April 29, 1994
Directive No 487/ TTg of the Prime Minister	Enhancement of State management on water resources	July 30, 1996
Decision 327 CT	Policies for the use of bare land, denuded hills, forests, alluvial flats and water bodies	September 15, 1992
Decision No 299/TTg of Prime Minister	Establishment the Central Guidance Board of prevention, combat against floods and typhoons	May 13, 1996
Decision 63/1998/QD-TTg of Prime Minister	National Orientation on water supply development in urban areas by 2020	March 18, 1998
Decision No 155/1999/QD-TTg of Prime Minister	Issuing regulation of hazardous waste management (including hazardous wastewater)	July 6, 1999
Decision No 104/2000/QD-TTG	National strategy on Clean water and environmental Sanitation in rural areas	August 25, 2000
Decision No 357 of MARD	Issuing temporary regulation of implementation of regimes of license and permit for searching, exploring, exploiting and drilling ground water and registration of ground water exploitation works	March 13, 1997
Decision No 37, 38, 39/2001/QD/BNN-TCCB of MARD	Establishment boards for River basin planning and management of Mekong, Dong Nai, Thai Binh and Red Rivers	April 09, 2001

Table 3 List of relevant legislation on water and environment (The World Bank, Danida, and Ministry of Environment and Natural Resources 2004).

Despite the 'impressive gains in tackling water resources management issues in the country', as claimed by the World Bank (2004: 35) in its *Vietnam Environment Monitor 2003*, problems such those noted by PCA participants questions the success of existing institutions and investments in changing the situation on the ground. The amount of investment at the national level to address key water resources issues (and reflected in the legislative activity noted above) appears to be unmatched by the level of enforcement needed to ensure that these investments attain their objectives. That is to say, pollution has been reported to occur in certain communes or districts due to poor enforcement of basic environmental regulations. Although this problem may be only local, it is nonetheless creating anxiety among small-scale farmers. Possibly the most basic step to resolve environmental problems is to enforce existing regulations. Later, changes may be introduced if they are found to be wanting in addressing the identified problems.

At another level, water-related problems may in the future be one of the avenues where tensions and conflicts manifested and of interest to small-scale farmers or resource users will be swept aside by more influential interest groups. A reading of the 2003 Land Law seems to indicate that this is possible in light of the lack of preferential treatment for small-scale farmers, fisher groups, and marginalised households. Although aquatic farming may be practised alongside new non-agricultural activities, Article 102 of the 2003 Land Law specifies that lands with specialised water surface may be allocated to organisations (but not to households or individuals) for non-agricultural purposes. Furthermore, land with rivers, streams, or canals may be leased to overseas Vietnamese, foreign organisations and individuals. The same land may also be leased to organisations, households and individuals. However such lack of preferential treatment for small-scale farmers, fisher groups, and marginalised households will limit their ability to compete with moneyed elites.

The water-related problem reported in Bangkok is flooding. 'Flooding' as used here may refer to two aspects: flooding at the local level (i.e. as the level of the production system) and flooding at a macro level (i.e. covering a district, town or village). Flooding of the first type is associated with structures primarily established to convey irrigation water to agricultural fields in Pathumthani Province, but are now currently being used for producing water mimosa by households settled along the canal. Because of the location of the households and their water mimosa fields along an irrigation canal, such flooding is not a result of obstruction of the flow of water by objects, such as solid wastes, nor related with the lack of infrastructure to control flooding. Flooding could be the result of several factors unique to the area and the location of the production system. First, it could result from the failure of the canal to hold rising floodwater from upstream areas as the canal was originally built as a tap water canal. Second, water mimosa gardens may be constricting the water channel as the crop expands to the centre of the canal, although water mimosa fields are mostly located along the sides of the canal.

Institutionally, understanding competing demands for irrigation canals not only as an infrastructure for the delivery of water but also as sites for agricultural production is key to understanding this flooding¹⁵ problem. There have been efforts

¹⁵ Whether at a local or wider level, tropical storms and depressions, rarely typhoons, are the major causes of floods in Thailand. The storm season starts in May and ends in December. Statistics collected from 1951 to 1996 indicate that on average 3.5 storms occur annually. Several major flooding episodes occurred in 1983 and 1995 leading to the loss of lives and property. These floods were not only caused by storms and depressions but also due to associated factors such as insufficient capacity of rivers and

by the Royal Irrigation Department (RID) to stop the canals being used for water mimosa gardens as they impede water flow and are also blamed for the increase in water hyacinths in the canal. However, according to our interviews (Appendix 8), the local *Aorbortor* intervened on behalf of the households to allow the production to continue. In response the RID curtailed its regular maintenance activities clearing the canal of all obstructions including water mimosa gardens. Seeking assistance from the RID with respect to their concerns for flooding would be pointless as their production systems are not supposed to be practised in the canal in the first place. Some of the water-related laws in Thailand are listed in Appendix 11.

5 Other problems

5.1 Infrastructure-related problems

Access to basic infrastructure is an important indicator of the level of well-being among AFPS households. The infrastructure problem is raised by all cities except HCMC. In Phnom Penh, the women's group in Thnout Chrum and both men's and women's groups in Muoy Village ranked lack of electricity supply as their main problem. In Hanoi, male key informants reported that existing infrastructure such as roads, power supply and water are either poor or lacking. In Lumsai in Bangkok, an important catfish producing area, lack of communication and transportation networks were reported as major problems by the women's group who participated in the PCA. In the Hanoi and Bangkok, the areas studied in the Papussa project have existing infrastructures except that they are insufficient for the needs of the producers. Lumsai in Bangkok is an interesting case because Bangkok itself is a well-connected city and has the highest infrastructure penetration among all the cities in this study. Although a high class golf and country club is located adjacent to the village and is connected to the main road with a good surfaced road, there exists in the village a road, which is potholed and poorly maintained. It runs parallel to the canal and separates the aquaculture ponds from the residential areas. Women complain that riding this road is bumpy. This is not the road well-heeled golfers use. They enter through another road. However, the maintenance of the road the villagers complain about is no longer the responsibility of the company as it has already been transferred to the *Aorbortor*. It is therefore the *aorbortor's* job to look after the road.

In the case of Hanoi, the lack of financial resources to fund major infrastructure development has been a major problem. But there are other associated factors that hinder such development, despite an increase in state budget and assistance from donor agencies. The World Bank (2006) reckons that

canals, poor drainage and sewerage systems in populated areas, denuded forests, poor land management, and the inadequacy of reservoirs. As a result, flood defences and mitigation measures were put up including the construction of embankments, improvement of drainage canals, provision of drainage pumps, dikes and zoning. At the national level, there are already various institutions involved in flood mitigation and disaster management. For instance, aspects on hydrology and flood warnings are being handled by the Department of Energy Development and Promotion (DEDP) while The Ministry of Interior concerns with civil defence (Charoensamran 1999). In order to address flooding not only in this area but the whole Chao Phrya Basin, a master plan has been developed which integrates planning for water management and flood mitigation (Hungspreug, Khao-uppatum, and Thanopanuwat 2000).

four urban planning related problems affect the provision of infrastructure. These are: fragmentation and lack of coordination; idealized top-down spatial plans; rigid technical specifications; and, lack of strategic planning.

The World Bank (2006: 35-36) describes fragmentation and lack of coordination as:

Planning of all types tends to be centrally driven and top-down. It is not yet affected by moves toward decentralization. The planning systems are intricate and, in theory, socio-economic, sector, and physical (construction) planning are integrally interrelated....The physical planning system lacks the ability to insure the relevance of the plans and the ability to manage, enforce, or adhere to them. In the practical world, even official development elements may not be tied together....There is a general inability to manage, implement, or enforce plans, particularly in the context of other urban activities and decisions including financing.

Idealised top-down spatial plans refer to the way physical planning is undertaken in Viet Nam where beautiful billboards and maps showing 'ideal' zones and developments are given emphasis with a lack of attention to such plans' applicability and the reality of demands on the ground. The country's urban planners appear to possess a vision of how the physical layout and structure of the city should be like but lack the context and connections which make good plans a reflection of the wishes and desire of the inhabitants. Furthermore, planning is also driven by technical standards which tend to rigidify the plans which become inflexible to change. Technical standards do not anymore serve as guides to proper planning but become the end goal of planning. Finally, urban planning is still dominated by national planning agencies. Planning is not decentralized to local or municipal planning units that best appreciate local conditions (The World Bank 2006).

The electricity problem is only reported in Phnom Penh and considering that two communes (with one commune reported by both men's and women's groups) reported it, it is a major problem. This conclusion is supported by findings of the baseline survey conducted by the project. The survey showed that nearly all the households in Bangkok and Hanoi have electricity as a source of light as compared to Phnom Penh where it is only around three-fifths of interviewed households. Other light sources used by households in Phnom Penh include kerosene, candles, battery, and generator (Table 4). A significant number of households also admitted that they use electricity tapped from other households. In addition, an interesting finding emerges in Phnom Penh when the result of this study is compared with the 1998 General Population Census where 76% of households in the city reported to have electricity as their main source of light (National Institute of Statistics). With the general trend in the country moving towards full electrification of households, it is surprising, although not necessarily unexpected, to have a substantial number of households located on the edge of the city without electricity. However when the survey data is compared nationally, it appears that the surveyed households in this study are substantially better off as only 13% of households in Cambodia as a whole have electricity in 1998.

The infrastructure problem in Phnom Penh and Cambodia as a whole is further complicated by recent developments which led the World Bank to suspend three important projects worth USD71.8 million. Two of these were infrastructure

projects: provincial and rural infrastructure and provincial and suburban water supply and sanitation (Associated Press 2006). Cambodia is heavily donor dependent for its development. Without this funding for key infrastructure, lack of electricity will continue to be a problem even in areas around the city.

Type	City ^a			Total
	Bangkok	Phnom Penh	Hanoi	
Mains electricity	209	90	200	499
	98.6%	45.0%	95.7%	80.4%
Tapped electricity from another house	1	21	3	25
	.5%	10.5%	1.4%	4.0%
Kerosene		30	6	36
		15.0%	2.9%	5.8%
Candles	2	6		8
	.9%	3.0%		1.3%
Battery		48		48
		24.0%		7.7%
Generator		5		5
		2.5%		.8%
Total	212	200	209	621
	100.0%	100.0%	100.0%	100.0%

a. % within city

Table 4 Main sources of light (Source: PAPUSSA Survey)

5.2 Capital-related problems

Capital-related problem refer to problems of lack of capital or credit. In Hanoi, this was reported by the fish farmers' group in Duc Tu commune, the worse-off men's group in Hoang Liet commune, and female key informants from Da Phuoc Commune. In HCMC, only the men's group in Dong Than commune reported a problem with shortage of capital. In Phnom Penh, this problem was reported only by women in Thnout Chrum and Kbal Tumnob, villages located within the same region, the Boueng Cheung Ek Lake.

Considering the number of villages or communes covered within Hanoi and Phnom Penh, we can safely conclude that this appears to be a widespread problem among small-scale farmers. The desire to improve their lot (i.e. from being small-scale) may have likely prodded them to raise this problem. In contrast, problem of capital does not seem to be a worry among producers in Bangkok, especially the morning glory farmers in Nongpaongai and the catfish farmers in Lumsai, who tend to be involved in large-scale commercial ventures as compared to those in Hanoi, HCMC and Phnom Penh. The sheer extent of the land areas involved is enough to serve as collateral for acquiring loans from commercial and government banks.

The problem of capital in Hanoi is further validated by the action agenda set by the producers who attended the SoS. They reckoned that to address this problem they have to borrow money from different sources such as agriculture banks and other government sources and personal networks. The local officers who attended the same meeting tabled a research agenda to identify simpler mechanisms to access credit (). In Vietnam, some institutions exist to provide microfinancing to individuals such as the Vietnamese Bank of the Poor (VBP), the Vietnamese Bank of Agriculture (VBA), and the People's Credit Fund (PCF). The VBP was established in 1996 to address poverty. The VBA was patterned after the Indonesian BRI and has a microfinance department. The PCF was formed from funds provided by the ADB and CIDA and is managed by the Central Bank. As of September 1998, there were 983 *caisses* serving 625,000 clients and with consolidated assets of US\$ 128 million¹⁶.

However data from the Papussa survey suggest that Phnom Penh households are more likely to borrow money compared to other cities with 43% of households in this city borrowing money during the 12 months prior to the survey (2004) to invest in their aquatic production systems. NGOs have figured as major credit sources in Phnom Penh followed by private lenders. This may stem from efforts by NGOs in Phnom Penh to improve the livelihoods of marginalised communities through the direct provision of credit and other livelihood support. Interestingly, social networks such as friends, neighbours, family members, relatives and farmers' union are also major sources of credit aside from community rotating savings schemes and commercial banks. Credit is availed for a number of reasons. Purchase of capital equipment and the renting of land were among the major reasons cited.

There are several microfinance providers in Cambodia but those who operate in Phnom Penh, which AFPS producers may source funding from, include the ACLEDA Bank, Cambodian Entrepreneur Building Limited (CEB), Cambodia Rural Economic Development Initiatives for Transformation (CREDIT), and VisionFund Cambodia Limited¹⁷. Institutionally, the government provides limited credit options for small-scale farmers such that civil society actors such as NGOs and church-based organizations fill the void. However, much of the credit they provided is in the rural areas – where much of the poverty is concentrated.

5.3 Market-related problems

The problems that belong in this category are: lack of market for products, low commodity prices, and marketing problems. These problems are reported in all cities except Phnom Penh. However, the nature of the problem in each city differs. For instance, lack of market for products is reported by the better-off women's group from Hoang Liet Commune in Hanoi¹⁸. Low commodity prices are primarily

¹⁶ This was taken from <http://www.gdrc.org/icm/country/asia-vietnam.html>.

¹⁷ This was taken from http://www.bwtp.org/arcm/cambodia/II_Organisations/organisations.htm.

¹⁸ A survey by PAPUSSA showed that there are more women involved in trading aquatic plants than fish in Hanoi. But the men are largely involved in transport and collection. Most retailers and consumers are also women. Most wholesalers and collectors are between 36-45 years old and have on average at least 10 years experience in the business. The freshwater fish sold in markets in Hanoi comes from surrounding provinces such as Nam Ha, Ha Tay, Hung Yen, Hai Duong and Phu Tho. Only 10-20% of freshwater fish production supplying the city's markets comes from peri-urban Hanoi, mainly from Thanh Tri district. However, the aquatic plants sold in Hanoi's markets come primarily from peri-urban areas such as Yen So, Tran Phu, Hoang Liet and Vinh Quynh communes of Thanh Tri district (Pham Anh Tuan, Nguyen Thi Dieu Phuong, Leschen et al. 2004).

problems among the morning glory producers in Nongpaongai and the men's group involved in water mimosa production in Suanprixthai in Bangkok. Aquatic plants and fish producers in Binh My and Da Phuoc Communes in HCMC also identified problems in the marketing of their products.

These market-related problems are confirmed by several market surveys conducted in each city. Marketing problems among vegetable producers were similarly reported in Hanoi through another project, SUSPER (Mai Thi Phuong Anh *et al.* 2004). In Bangkok, the market survey showed that over supply from a large number of traders is creating marketing problems (Yoonpundh *et al.* 2004b). This situation is likely to have contributed to the decrease in commodity prices, which PCA participants also noted.

Institutional interventions to address these market problems cannot easily be made unless we understand fully the contexts and dimensions of the problems reported. It is highly unlikely that that these problems can have blanket application to all the different AFPS. To begin with, fish and aquatic plants have different demands and markets. Unpacking the problem within each type of AFPS is necessary so that appropriate institutional interventions can be made. That said, it is obvious from official claims that AFPS products do not have comparative advantages and are not considered to have export potential. In Resolution No. 9 of June 15, 2000 known as "Some directions and policies regarding economic structure adjustment and agricultural product consumption", AFPS products are not classified as having a high world market demand and competitiveness. Products that are considered competitive in the international market are rice, rubber, coffee, and tea. Less competitive products but with export potential are livestock products, silk and sugar. Products that are exclusively for the domestic market but can be import substituted are cotton, milk, oilseeds and paper powder. In this light, these products receive support from the government by virtue of Resolution No. 9. Support includes the development and promotion of new varieties, new technologies, infrastructure support, processing industries, marketing support, tax exemptions, investment support, and overseas marketing campaigns (Shindo 2003:28).

Considering the demand for fish and aquatic plants and the trajectories of their development, it is obvious that markets exist. The question now is whether the government does – or will – actively support their marketing. However, there are two levels of support: at the domestic and export levels. Domestically, support is limited to provision of market infrastructures such as stalls and hygiene and sanitation controls. There are no active government campaigns for aquaculture/aquatic products except for the development and promotion of new strains of genetically improved fish and certain forms of aquaculture. Domestic marketing of fish and aquatic plants have always depended on traditional (and domestic) demands and traditional market networks and are carried out by the private sector.

In Vietnam, marketing support is geared more to fisheries products with export potential such as shrimps. This concerns satisfying requirements of HACCP¹⁹ protocols and other food safety standards which export markets demand. In view of these protocols, AFPS products are unlikely to pass through the rigorous food safety standards of importing countries and the traceability requirements of HACCP. The

¹⁹ Hazard Analysis Critical Control Point

use of waste in producing AFPS is a *de facto* barrier to export unless stringent measures are in place at source to remove pathogens and other health threats from the product. Image-wise, the use of waste no matter how harmless the impact might prove to be is already a strong impediment to marketing. The Ministry of Fisheries in Vietnam recognizes that the food safety of its exported fisheries commodities is a major challenge especially in the European, American and Japanese markets and imposing international standards on domestic producers requires institutional and financial readiness (Ministry of Fisheries and The World Bank 2004). The application of these standards as well as others will further intensify as soon as Vietnam becomes a member of the WTO in late 2006.

A similar study carried out by the Ministry of Fisheries in Vietnam on the fisheries and aquaculture sector has noted the same marketing problems in fisheries and aquaculture products in general. In particular, the study found that there was:

1. spontaneous, not systematic, development of the market for raw materials;
2. too much emphasis on the export market to the detriment of the domestic market;
3. the market demand does not dictate processing capacity;
4. a need to explore ways of improving prices for producers through more competition and direct market access;
5. a need for better understanding of international markets to be able to compete effectively (Ministry of Fisheries and The World Bank 2004: 11).

Measures recommended to address these deficiencies in fish marketing in Viet Nam include product promotion internationally, branding, developing a policy for an efficient market system, developing mechanisms for traceability of aquatic products, and seeking donor assistance to improve the country's fish marketing system (Ministry of Fisheries and The World Bank 2004: 11-12).

In Thailand, there is no support for marketing aquatic plants except to an extent those for export.

5.4 Input-output related problems

Input-output problems are reported only in Hanoi and HCMC and include major inputs necessary for successful production such as freshwater, labour, pesticides, farming techniques, and seed production. The absence of these problems in other cities does not mean that they are not present; it only means that they are outranked by other more pressing problems. The problems reported in Hanoi were exactly the same problems reported from a survey among vegetable producers carried out by SUSPER. This survey found that low output prices, problems in marketing, high input costs, shortage of labor, and shortage of water are major constraints on agriculture production in all survey sites. Another major problem that did not figure in the Papussa PCA but figured in the SUSPER survey is flooding. Apparently, certain peri-urban areas in Hanoi are susceptible to flooding, which affects the productivity of agricultural production systems (Mai Thi Phuong Anh *et al.*

2004). In HCMC, flooding is considered a major natural disaster that besets farmers involved in different AFPS systems every year. Certain sites in HCMC are susceptible to flooding such as Da Phuoc Commune (Huynh Pham Viet Huy and Le Thanh Hung 2006).

To understand these institutionally, we need to ask what kind of extension services are available in Viet Nam for AFPS production. For aquatic plants, the answer appears to be none. Much of the aquatic plants grown in these cities have not had the benefit of external support from the government or other entities. However, the situation is different for fish where it is considered a major industry and thus, has been given ample support in terms of policy, research, extension and funding. This is specially the case in rural areas where substantial support and extension services have been provided by government departments in-charge with aquaculture and fisheries so as to stimulate the growth of this sector. Support is also given in areas around Hanoi where there are export potentials such as Hai Duong and Ha Tay Provinces (Leschen, pers comm.).

5.5 Other social problems

Only PCA participants in Phnom Penh ranked other social problems such as drug abuse, theft, and not being able to support their children's education ahead of production-related issues in terms of importance. This indicates that these problems are going concerns that need to be addressed. Since these problems do not relate to AFPS, we will not discuss them in detail here.

6 Conclusion

This report has highlighted the institutional constraints impeding the development of peri-urban aquatic production systems in four major cities of mainland Southeast Asia: Bangkok, Hanoi, Ho Chi Minh City and Phnom Penh. Four major observations arise from the research on which the paper draws, and the discussion here.

First of all, there is an identified institutional 'gap' which, although manifested in different ways, exists in all the study sites. In summary, in none of the cities are institutions adequately structured and deployed to manage AFPS in an effective, efficient, sensitive and sustainable manner. This, though, is for different sets of reasons in each city. Although this is more prominent in Phnom Penh, it links to the highly informal nature of AFPS in the peri-urban zone, the fact that they slip out of sight, and a lack of regulatory and management capacity on the part of city and national authorities. In Hanoi and HCMC, the explanation is associated with the relative power of different actors in the peri-urban zone, and the failure to legislatively acknowledge the presence of AFPS in and around cities. This means that latent conflicts between actors and land uses are not anticipated and, therefore, not effectively managed. When they do occur, AFPS and aquatic food producers tend to lose out. The situation in Bangkok is, again, rather different and, perhaps surprisingly given the rapid and extensive development of the city, less problematic. It seems that producers are able to exert sufficient local level pressure and influence to maintain their systems against competing users due to the commercial scale of their systems in general and the level of 'political capital' which relative economic might brings. We might hazard that this is because, over time, producers have been

able to develop informal systems of sufficient resilience to deal with regulatory and institutional insufficiencies.

The second observation, which is implicit in the previous paragraph, is that while we can make the general comment that there are institutional gaps and failures across all the countries and cities, these take different forms in each. We must be careful, therefore, not to take such generalisations too far – and certainly not use them in a blanket fashion to make generic policy recommendations. That said, we feel that we can offer a view about the way in which institutions and regulation evolve over time. The policy-making focus has tended to be on formal mechanisms for planning, management and regulation and, from a policy angle, improving and developing these formal mechanisms through strengthening institutions. However it seems that informal or community regulation, and the 'institutions' that undertake this regulation, are often just as important, and often more so, than formal structures. The danger is that these informal mechanisms are overlooked and their potential ignored. With the evident weakness of formal mechanisms and institutions it is no surprise that informal systems should have developed to fill the void and they often provide a highly effective and locally-sensitive community-level regulatory mechanism (O'Rourke 2004).

The third observation, which follows from the previous one, is that not only are there differences between cities, but also between aquatic food production systems, even in single communities. We would not wish to reify the 'local' and to suggest that all conflicts lie at the interface of the local and the non-local (or local/elite, local/national, local/city). With development and differentiation, so intra-community tensions and conflicts are likely to become pronounced as activities diversify and people's interests diverge. This is why community-level regulation is unlikely, alone, to be an effective management tool. Simply decentralising management to local level institutions harbours the danger of permitting powerful local groups and individuals to manage development in their own interests. It is for this reason that AFPS management, and the institutions of management, must be multi-scalar in their operation.

Finally, one source of tension which has not been adequately covered above is the institutional response by government departments on the use of 'waste' in aquatic food production systems. Among the studied sites, outright denial of this practise is found in Hanoi and HCMC as the national government looks after the welfare of its tourism industry. Tourists, as claimed, are not wont to enjoying the country's cuisine if they know that one of its key ingredients may be produced using waste, human waste in particular. However, protecting the tourism sector is only one aspect. Another aspect that potentially keeps the government from providing the needed support to waste-related production systems is the perceived low class and revolting notion often associated with waste-produced fish (Leschen, pers comm.). As discussed in Rigg and Salamanca (2006), this perception among urban elites has also been a considerable source of stigma for waste-fed farming systems. The negative public relation which waste-fed aquaculture receives is further complicated by the advent of SARS and bird flu and the responses of international organisations. Regarding bird flu, claims made by Birdlife International, an international nature conservation organisation and the Food and Agriculture Organisation (FAO) on the links between the use of waste in fish farming and influenza pandemics (McCarthy 2006) is causing concern among governments, although these reports highlight China in particular and did not target any of the countries in this study. In Viet Nam, the use of waste in aquaculture in general is

widespread. These perceptions of the role of waste in aquaculture have hampered pro-active interventions to assist the growth of the industry and the households involved in this livelihood. Instead of developing, implementing, and researching food safety standards and occupational best practises to address public health and safety concerns, governments tend to outrightly ban the practise. Such stance is counterproductive as the negative perceptions of waste-fed aquaculture have no solid scientific bases. In fact, research from PAPUSSA, as shown in accompanying reports in this compilation, shows that there are no straightforward and definitive health risks in the use of 'wastes' in AFPS production systems.

7 Acknowledgement

This report was produced with the involvement of all project partners. In particular, we would like to acknowledge Dr Dave Little and Will Leschen from the University of Stirling; Nguyen Thi Dieu Phuong, Nguyen Thi Hanh Tien, Ho Kim Diep, Pham Bau, and Dr Tuan from the Research Institute of Aquaculture 1 in Hanoi; Kuong Kuov, Sok Darem, Seyha, Khuntheang, Sam An, Rumunny, and Borin from the Royal University of Agriculture in Phnom Penh; Dr Le Than Hung, Huynh Pham Viet Huy, Tam, Thao, Tuc, Minh, and Binh from Nong Lam University in HCMC; Dr Cam, Tuan Anh, Tuan, Tram, and Phuc from the National Institute of Health and Epidemiology in Hanoi; Dr Ruangvit Yoonpundh, Dr Varunthat Dulyapurk, Chumpol Sritong, Komsan Silma, Thanasorn Rukdontri, Rattanachai Rungsunsert; and, Ms Wanwisa Saelee Gamucci and Prof C. Kwei Lin of the Asian Institute of Technology in Bangkok. Special thanks to the AARM-Aqua Outreach Program of the Asian Institute of Technology for hosting Mr Albert M Salamanca during the duration of his fieldwork. Any shortcoming of this report should be attributed to us.

8 References Cited

- Ahmed, M., N. Hap, L. Vuthy and M. Tiongco. 1998. *Socio-economic Assessment of Freshwater Capture Fisheries of Cambodia: Report on a Household Survey. MRC/DoF/Danida Project for the Management of the Freshwater Capture Fisheries of Cambodia*. Phnom Penh, Cambodia: Mekong River Commission. 186 pp.
- Associated Press. 2006. "Phnom Penh tells bank to show proof," in *The Nation*, pp. 6A. Bangkok.
- Baran, E. 2005. *Cambodian inland fisheries: facts, figures and context*. Penang: WorldFish Center. 44 pp.
- Baran, E., N. van Zalinge and Ngor Peng Bun. 2001. "Floods, floodplains and fish production in the Mekong Basin: present and past trends," in *Proceedings of the Second Asian Wetlands Symposium, 27-30 August 2001, Penang, Malaysia*. Edited by Ahyaudin Ali et al., pp. 920-32. Pulau Pinang, Malaysia: Penerbit Universiti Sains Malaysia.
- Charoensamran, V. 1999. "Flooding and flood management in Thailand." Bangkok: Food and Agriculture Organization of the United Nations, Mekong River

- Commission Secretariat, Department of Irrigation, Ministry of Agriculture and Forestry of LAO P.D.R., Accessed on 26 June 2006, Website:
<http://www.fao.org/docrep/004/ac146e/AC146E01.htm#chl.4>.
- Chomchai, P. 2001. "Environmental governance: a Thai perspective." World Resources Institute, Accessed on 5 June 2006, Website:
http://governance.wri.org/project_content_text.cfm?ContentID=2064.
- Dick, H. W. and P. J. Rimmer. 1998. Beyond the Third World City: the new urban geography of Southeast Asia. *Urban Studies* 35(12):2303-21.
- Dore, J. 2001. "Environmental Governance in the Greater Mekong Sub-region." World Resources Institute, Accessed on 5 June 2006, Website:
http://governance.wri.org/project_content_text.cfm?ContentID=2064.
- Douglass, M., M. DiGregorio, V. Pichaya, *et al.* 2002. *The urban transition in Viet Nam*. Honolulu: Department of Urban & Regional Planning University of Hawaii, United Nations Centre for Human Settlements, Fukuoka, Japan and United Nations Development Programme.
- Drakakis-Smith, D. 1996a. Sustainability, urbanisation and development. *Third World Planning Review* 18(4):R3-R10.
- . 1996b. Third world cities: Sustainable urban development .2. Population, labour and poverty. *Urban Studies* 33(4-5):673-701.
- . 1997. Third World cities: Sustainable urban development .3. Basic needs and human rights. *Urban Studies* 34(5-6):797-823.
- Drakakis-Smith, D. and A. Kilgour. 2001. "Sustainable urbanization and environmental issues in Vietnam," in *Living with Environmental Change: Social Vulnerability, Adaptation and Resilience in Vietnam*. Edited by W. N. Adger, P. M. Kelly, and Nguyen Huun Ninh, pp. 213-33. London: Routledge.
- Firman, T. 1996. Urban development in Bandung Metropolitan Region: a transformation to a desa-kota region. *Third World Planning Review* 18(1):1-22.
- General Statistical Office. 2003. *Statistical Yearbook 2002*. Hanoi: Statistical Publishing House. 725 pp.

- Greenberg, C. 1994. Region based urbanization in Bangkok's extended periphery. PhD Dissertation, Department of Geography, University of British Columbia.
- Hanoi Authority for Planning and Investment. 2004. "Thang Long Industrial Park." Hanoi Authority for Planning and Investment, Accessed on 13 June 2006, Website: <http://www.hapi.gov.vn/portals/default.aspx?portalid=5&tabid=68>.
- Hardoy, J. E., D. Mitlin and D. Satterthwaite. 2001. *Environmental Problems in an Urbanizing World: Finding Solutions in Africa, Asia and Latin America*, Updated, expanded ed edition. London: Earthscan. 448 pp.
- Hardoy, J. E. and D. Satterthwaite. 1991. Environmental-Problems of Third-World Cities - a Global Issue Ignored. *Public Administration and Development* 11(4):341-61.
- Hungspreug, S., W. Khao-uppatum and S. Thanopanuwat. 2000. "Flood management in Chao Phraya River Basin." Kasetsart University, Accessed on 26 June 2006, Website: http://std.cpc.ku.ac.th/delta/conf/Acrobat/Papers_Eng/Volume%201/Wirat%20RID.pdf.
- Huynh Pham Viet Huy and Le Thanh Hung. 2006. *Baseline and Monitoring Survey Report HCMC*. HCMC: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 74 pp.
- ICLARM and IFM. 1998. *Analysis of co-management arrangements in fisheries and related coastal resources: a research framework. Working Paper No. 1, Fisheries Co-management Project*. Manila: ICLARM.
- Japan International Cooperation Agency and Hanoi People's Committee. 2000. *The study on environmental improvement for Hanoi City in The Socialist Republic of Vietnam. Final Report Summary*. Hanoi: Japan International Cooperation Agency and Hanoi People's Committee. 54 pp.
- JBIC Institute. 2002. *Foreign direct investment and development: where do we stand? JBICI Research Paper No. 15*. Tokyo: JBIC Institute, Japan Bank for International Cooperation. 125 pp.
- Jensen, J. G. 2001. Managing fish, flood plains and food security in the Lower Mekong Basin. *Water Science and Technology* 43(9):157-64.

- Kao Kim Hourn. 2001. "The impact of regional integration on the governance processes in Cambodia: the environmental perspective." World Resources Institute, Accessed on 5 June 2006, Website: http://governance.wri.org/project_content_text.cfm?ContentID=2064.
- Kelly, P. F. 1998. The politics of urban-rural relations: land use conversion in the Philippines. *Environment and Urbanization* 10(1):35-54.
- . 1999. Everyday urbanization: The social dynamics of development in Manila's extended metropolitan region. *International Journal of Urban and Regional Research* 23(2):283-303.
- . 2000. *Landscapes of globalization: human geographies of economic change in the Philippines*. London: Routledge. 208 pp.
- Kurien, J., E. Baran and So Nam. 2006. *Factors that drive Cambodia's inland fish catch: what role can community fisheries play?* Phnom Penh: Inland Fisheries Research and Development Institute (IFReDI) of the Department of Fisheries, Royal Government of Cambodia. 12 pp.
- Kurien, J., So Nam and Mao Sam Onn. 2006. *Cambodia's aquarian reforms: the emerging challenges for policy and research*. Phnom Penh: Inland Fisheries Research and Development Institute (IFReDI) of the Department of Fisheries, Royal Government of Cambodia. 32 pp.
- Le Quang Minh. 2001. "Environmental Governance: A Mekong Delta Case Study with Downstream Perspectives." World Resources Institute, Accessed on 5 June 2006, Website: http://governance.wri.org/project_content_text.cfm?ContentID=2064.
- Le Thac Can, Do Hong Phan and Le Quy An. 2001. "Environmental Governance in Vietnam in a Regional Context." Accessed on 5 June 2006, Website: http://pdf.wri.org/mekong_governance_mreg_canphanan.pdf.
- Le Thanh Hung, Huynh Pham Viet Huy, Nguyen Thò Thanh Truc, *et al.* 2004. *Institutional analysis relating to fish and aquatic plants cultivation in and around Ho Chi Minh City*. Hanoi: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 12 pp.
- Leaf, M. 1999. Vietnam's urban edge - The administration of urban development in Hanoi. *Third World Planning Review* 21(3):297-315.

- . 2002. A tale of two villages: globalization and peri-urban change in China and Vietnam. *Cities* 19(1):23-31.
- Mai Thi Phuong Anh, M. Ali, Hoang Lan Anh and To Thi Thu Ha. 2004. *Urban and peri-urban agriculture in Hanoi: oportunities and constraints for safe and sustainable food production. Technical Bulletin No. 32, AVRDC Publication 04-601*. Shanhua, Taiwan: AVRDC – The World Vegetable Center. 66 pp.
- Marcotullio, P. J. 2001. Asian urban sustainability in the era of globalization. *Habitat International* 25(4):577-98.
- McCarthy, M. 2006. "Bird flu could be linked to fish farming ".New Zealand: The New Zealand Herald, Accessed on 21 August 2006, Website:
http://www.nzherald.co.nz/section/story.cfm?c_id=5&objectid=10361729.
- McGee, T. 2001. "Urbanization Takes on New Dimensions in Asia's Population Giants." Population Reference Bureau, Accessed on 27 November 2002, Website:
<http://www.prb.org/Template.cfm?Section=PRB&template=/ContentManagement/ContentDisplay.cfm&ContentID=3931>.
- Ministry of Fisheries and The World Bank. 2004. *Vietnam fisheries and aquaculture sectory study (final report)*. Hanoi: Ministry of Fisheries and The World Bank. 46 pp.
- Nao Thuok and N. van Zalinge. 2000. "Challenges in managing Cambodia's inland fisheries, how can we meet them?," in *Management aspects of Cambodia's capture fisheries. Eleven presentations given at the Annual Meeting fo the Department of Fisheries of the Ministry of Agriculture, Forestry and Fisheries, 27-28 January 2000*. Edited by N. van Zalinge, Nao Thuok, and Leing Sopha, pp. 10-7. Phnom Penh: Mekong River Commission and Department of Fisheries.
- National Institute of Statistics. 2004. "Phnom Penh."Phnom Penh: National Institute of Statistics, Ministry of Planning, and United Nations Population Fund, Accessed on 19 May 2004, Website:
<http://www.nis.gov.kh/CENSUSES/Census1998/provinfo.htm>.
- Nguyen Quang and H. D. Kammeier. 2002. Changes in the political economy of Vietnam and their impacts on the built environment of Hanoi. *Cities* 19(6):373-88.
- Nilsson, M. and L. Segnestam. 2001. "Development and natural resources in the Mekong region: The institutional challenge." World Resources Institute,

Accessed on 5 June 2006, Website:
http://governance.wri.org/project_content_text.cfm?ContentID=2064.

Nissapa, A., A. Masae, S. Boromthananarat and V. Jungrungrot. 2002. "Institutional and policy perspectives in the management of fisheries and coastal resources in Thailand," in *Institutional Issues and Perspectives in the Management of Coastal Resources in Southeast Asia*, WorldFish Center Tech. Rep. 60. Edited by M. Torell and A. M. Salamanca, pp. 143-82. Penang: The World Fish Center and Swedish International Development Cooperation Agency (SIDA).

O'Rourke, D. 2004. *Community-driven regulation: balancing development and the environment in Vietnam*. Cambridge, Massachusetts: The MIT Press. 299 pp.

Ostrom, E. 1990. *Governing the Commons: the Evolution of Institutions for Collective Action. The Political economy of institutions and decisions*. Cambridge: Cambridge University Press. 280 pp.

Pham Anh Tuan, Nguyen Thi Dieu Phuong, W. Leschen, et al. 2004. *Marketing channels of fish and aquatic plants in Hanoi City*. Hanoi: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 51 pp.

Pham Anh Tuan, Nguyen Thi Dieu Phuong, Pham Van Trang and Pham Bau. 2004. *Institutional analysis in Hanoi, Vietnam*. Hanoi: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 25 pp.

Poulsen, A. 2003. Floods are vital for fisheries. *Catch and Culture* 9(2):8-9.

Rigg, J. D. and A. M. Salamanca. 2006. *Tensions between AFPS production systems and other land uses (Report D09)*. Durham: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 21 pp.

Sajor, E. E. 2003. Globalization and the urban property boom in Metro Cebu, Philippines. *Development and Change* 34(4):713-41.

Saleth, R. M. and A. Dinar. 2004. *The institutional economics of water: a cross-country analysis of institutions and performance*. Cheltenham, UK: E. Elgar Pub. 398 pp.

- Sauwalak Kittiprapas. 1999. Role of Bangkok and its periphery in the Asia-Pacific Region: toward globalization economy and sustainable development. *TDR Quarterly Review* 14(3): 18-24.
- Seto, K. C. and R. K. Kaufmann. 2003. Modeling the drivers of urban land use change in the Pearl River Delta, China: Integrating remote sensing with socioeconomic data. *Land Economics* 79(1):106-21.
- Shindo, S. 2003. "A review of the present situation and policies of the growing sub-sectors," in *Growing sub-sectors in Vietnam's agriculture, Joint Research Project*. Edited by Ministry of Planning and Investment and Japan International Cooperation Agency, pp. 27-42. Hanoi: Ministry of Planning and Investment and Japan International Cooperation Agency.
- Takeuchi, K., C. Sukhsri, N. Phuriphanphinyo and S. Kerdnark. Editors. 1999. *Water resources laws in Thailand*. Bangkok: Department of Energy Development and Promotion, Japan International Cooperation Agency, The Japanese Institute of Irrigation & Drainage.
- The World Bank. 2006. "Project brief on a proposed credit in the amount of USD 176 million equivalent and a proposed grant from the Global Environment Facility Trust Fund in the amount of USD 9.8 million equivalent to The Socialist Republic of Vietnam for a Hanoi Urban Transport Development Project." The World Bank, Accessed on 14 June 2006, Website: http://www.gefweb.org/Documents/Council_Documents/GEF_C28/documents/2368Vietnam_HUTDP_Brief_May8cleancopy.pdf.
- The World Bank, Danida and Ministry of Environment and Natural Resources. 2004. *Vietnam Environment Monitor 2003: Water*. Hanoi: The World Bank, Danida, and the Ministry of Environment and Natural Resources. 74 pp.
- Transport Engineering Design Inc. (TEDI). 2003. *Hanoi transport development master plan 2020. Summary*. Hanoi: Transport Engineering Design Inc. (TEDI).
- United Nations Population Division. 2002. *World urbanization prospects: the 2001 revision. ST/ESA/SER.A/216*. New York: Population Division, Department of Economic and Social Affairs, United Nations Secretariat.
- Utis Kaothien and D. Webster. 2000. "Globalization and urbanization: the case of Thailand," in *Local dynamics in an era of globalization*. Edited by S. Yusuf, W. Wu, and S. Evenett. Washington DC: The World Bank.

- Webster, D. 2002a. "Bangkok: evolution and adaptation under stress," in *World Cities in Poor Countries*. Edited by J. Gugler. Cambridge: Cambridge University Press.
- . 2002b. *On the Edge: Shaping the Future of Peri-urban East Asia*. Stanford: Asia/Pacific Research Center (A/PARC), Standford University. 53 pp.
- . 2003. *The future of Thai urbanization: new drivers, new patterns. Draft Issues Paper*. Bangkok: Planning for Sustainable Urbanization in Thailand Project, National Economic and Social Development Board and Asian Development Bank. 29 pp.
- Yoonpundh, R., V. Dulyapurk, C. Sritong, *et al.* 2004a. *Institutional analysis of aquatic production systems in peri-urban Bangkok*. Hanoi: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 20 pp.
- . 2004b. *Marketing appraisal of aquatic production peri-urban systems of Bangkok (Thailand)*. Bangkok: PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA, INCO: International Scientific Cooperation Projects (1998-2002) Contract number: ICA4-CT-2002-10020. 14 pp.

9 Appendices

FIRST RANKED PROBLEMS III PCA		LAND			WATER				INFRASTRUCTURE			
		VAC group, Duc Tu, Hanoi	Fish producers, Tran Phu, Hanoi	Men's group, Lumsai, Bangkok	Men's group, Duong Village, Phnom Penh	Better-off men's group, Hoang Liet, Hanoi	Both Men's and Women's Group, Phong Phu Commune HCMC	Women's group, Suanprixthai, Bangkok	Women's group, Thnout Chrum, Phnom Penh	Both Men's and Women's group, Muoy Village, Phnom Penh	Male key informants, Dong MY, Hanoi	Women's group, Lumsai, Bangkok
LAND-RELATED	The period of land lease for VAC production is too short	*										
	Changing plans for the area		*									
	Lack of agricultural land			*								
WATER-RELATED	Decrease in fish catch along the river				*							
	Water/environmental Pollution					*	*					
	Flooding							*				
INFRASTRUCTURE-RELATED	Far from electricity supply grid								*			
	High price of Electricity									*		
	Infrastructure, such as roads, power supply and water, is either lacking or poor										*	
	Lack of communication and transportation networks											*

Appendix 1 First ranked problems raised during the PCA (Set A)

FIRST RANKED PROBLEMS III PCA		CAPITAL						MARKET					
		Fish farmers group, Duc Tu, Hanoi	Men's group, Dong Than Commune, HCMC	Women's group, Thnout Chrum, Phnom Penh	Worse-off men's group, Hoang Liet, Hanoi	Women's group, Kbal Tumnob, Phnom Penh	Female key informants, Dong MY, Hanoi	Better-off women's group, Hoang Liet, Hanoi	Both Men's and Women's group, Nongpaongai, Bangkok	Men's group, Suanprixthai, Bangkok	Both Men's and Women's Group, Binh My Commune HCMC	Women's group, Da Phuoc Commune HCMC	
CAPITAL	Lack of capital	*	*	*	*	*	*						
	Lack of credit						*						
MARKET-RELATED	Lack of market for products							*					
	Low commodity price								*	*			
	Marketing problems									*	*		

Appendix 2 First ranked problems raised during the PCA (Set B)

FIRST RANKED PROBLEMS IN PCA		INPUT/OUTPUT						OTHER SOCIAL PROBLEMS		
		Aquatic plant growers and fish farmers, Hoang Liet, Hanoi	Men's group, Da Phuoc Commune, HCMC	Worse-off women's group, Hoang Liet, Hanoi	Men's group, Dong Than Commune, HCMC	Women's group, Dong Than Commune HCMC	Aquatic plant producers, Tran Phu, Hanoi	Men's group, Thnout Chrum Phnom Penh	Men's group, Kbal Tumnob, Phnom Penh	Women's group, Duong Village, Phnom Penh
INPUT/OUTPUT-RELATED	Lack of freshwater	*								
	High price and lack of available labour		*							
	Lack of pesticides			*						
	Lack of techniques to prevent fish disease				*					
	Lack of techniques for seed production					*				
	Poor output						*			
SOCIAL PROBLEMS	Not being able to support children's education						*			
	Social problems such as drug abuse or theft							*	*	

Appendix 3 First ranked problems raised during the PCA (Set C)

Rank	City	Producers (farmers)		Local officers		Market actors		Institutions (policies)	
		Action	Research	Action	Research	Action	Research	Action	Research
1	Bangkok	Study the content of wastewater from factories and village-estates	Coordinate the work and interventions of the Tambon Administrative Organisation in the community efficiently	Develop mechanisms to improve the price of agricultural commodities	Develop plans or regulations to reduce chemical residues in aquatic production	Study the marketing direction or trend of aquatic vegetables and freshwater species in Thailand or certain selected markets	Improve the potential and capabilities of farmers to be able to respond to market trends and adjust their production according to the real marketing situation	Develop new technology to improve production without negatively affecting the environment	Organize cooperatives of producers/farmers so that they will be able to have bargaining leverage with the middlemen
	Hanoi	Borrow money from different sources e.g. agriculture bank, personal, fund for poor people	Assess the quality of wastewater systems and find solutions	Increase knowledge on aquaculture techniques using the mass media	Research on simpler mechanisms to access credit	Provide information through mass media (TV, radio, poster, book, newspaper) on the safe use of pesticides	Provide clear labels for pesticide products	Improve capacity of technician and farmers	Improve the evaluation of status of aquatic plants, fish in the peri-urban
	HCMC	Separate industrial wastes from domestic wastes in order to prevent the former from affecting their production systems	Study the content of wastewater in order to assess its impact on aquaculture			Disseminate technologies on the production of water mimosa, climbing perch (<i>Anabas</i>) and <i>Pseudapocrystes lanceolatus</i>	Establish maximum acceptable limits of chemical contamination and parasite loading for human consumption	Construct infrastructure (e.g. roads, houses, etc) contained in the housing plan in the peri-urban zone of the city	Develop proper plans for the development of the city
	Phnom Penh	Build a local medical centre, provide medicines especially for skin irritation and fever, and train/teach them on how to improve their health and sanitation	Reduce the impact of (inorganic) polluted wastewater on their fish and vegetable production	Treat the wastewater at source before it enters the lake Solve the drug problem NGOs to provide interest-free grants to improve production Build a medical centre in a community Build a well (groundwater source) in Boeung Kok and Boeung Cheung Ek	Introduce a system for the treatment and recycling of wastewater	Find new markets for their aquatic products in Phnom Penh and other provinces	Investigate the market for aquatic products in other provinces and other countries	Build a medical centre in the community	Identify the cause of skin irritation

Appendix 4 Action research agenda developed during the SoS (Rank 1)

Rank	City	Producers (farmers)		Local officers		Market actors		Institutions (policies)	
		Action	Research	Action	Research	Action	Research	Action	Research
2	Bangkok	Reduce pollution from agricultural and domestic sources in irrigation canals	Improve the price mark up of their products	Understand the tastes and preferences of consumers and markets of aquatic production	Improve the bargaining situation of producers to get a good price for their production	Study the city plan and movement of community, industrial and residential units on waste management	Make the farmer proud of their production being the 'kitchen' of the country to ensure conservation of their environment	Study the ecology of peri-urban aquatic food production in the extended metropolitan region of Bangkok	Ensure that all districts will develop land use plans
	Hanoi	Limit use of wastewater from the city	Provide early forecasts of weather	Provide low interest loan over a period of time	Research on reasonable techniques for each setting	Provide good fish seed and land lease for fish farming	Establish short term and long term training courses for fish and vegetable producers, including visiting modern farms	Strengthen the national management of fish seed production through an investment from the government and set up an organization for this	Research on sustainable fish farming including research on equipment and method for spot testing of sewage
					Research on consumer preferences of aquatic product				
	HCMC	Provide training on the safe use of pesticides in aquatic plants and increase in the availability of appropriate pesticides	Study the causes of fish diseases and their treatment in the 4 communities esp for giant gouramy, snakehead, and red tilapia			Inform people about the criteria for food safety	Research on the health impacts of food produced from different waste-related systems	Inform the public about the housing plan	Review irrigation plans or supply of water to fish and vegetable production systems and ensure their efficient implementation
Phnom Penh			Reduce the smell of wastewater	Reduce domestic violence		Reduce the cost of transportation from production sources to markets			
				Prevent illegal fishing in the lake					
				Educate market sellers on the health impacts of the use of chemicals to keep the vegetables, fish and other food fresh					

Appendix 5 Action research agenda developed during the SoS (Rank 2)

Rank	City	Producers (farmers)		Local officers		Market actors		Institutions (policies)	
		Action	Research	Action	Research	Action	Research	Action	Research
3	Bangkok	Produce organic fertilizers for morning glory production	Ensure that factories will use their water treatment	Lack of budget for producer groups	Develop a neighbor watch system to monitor water quality	Study the demand of pesticide/toxic free vegetables	Set up demonstration/model farms including marketing system to serve as sources of knowledge and training centers	Develop and disseminate new production technology to farmers	Review the law to ensure people's participation in community and environmental activities
	Hanoi	Establish trading cooperative to market their products	Find sources of funds to develop production	Provide technical knowledge on aquaculture	Increase farmers' knowledge	Create more water pumps for the farms	Provide longer contract of land for farming, to build fish seed centres at the community level, and to open export markets	Treat the wastewater from factories and fish ponds by biological and chemical methods	Practice and apply new technologies of high quality fish seed
		Relax and reduce hard work to rent labour, to buy medicine from pharmacy and treat themselves		Establish an association among peers to help each other market their product					
	HCMC	Establish a cooperative to directly market products in order to maximise profitability	Study new fish culture species for aquaculture production and dissemination				Reduce the effect of seasonal price variation	Establish appropriate pricing system of aquatic products	Construct and increase the height of the dike to prevent flooding along the Saigon and Can Giuoc Rivers
Manage water quality properly in ponds and ensure good quality seed in order to prevent fish diseases		Establish rules to limit the number of fish and vegetable shops in the market to 'limit' competition							
Phnom Penh	Find market for their surplus product	Research on the wider health impacts of wastewater reuse	Eliminate catfish culture because it make the water dirty	Provide technical information on the culture of fish and other animals to improve their stock quality	Research the ecology of Boueng Cheung Ek and Boueng Kok	Provide health services and build health centre	Research on diseases of fish and morning glory and other aquatic vegetables	Improve the quality of tap water in the city	Research the ecology of Boueng Cheng Ek and Boeung Kok

Appendix 6 Action research agenda developed during the SoS (Rank 3)

Rank	City	Producers (farmers)		Local officers		Market actors		Institutions (policies)	
		Action	Research	Action	Research	Action	Research	Action	Research
4	Bangkok	Find solution for the acid rain problem in Pathumthani	Reduce the dust and other particulate matters from airport construction in Samut Prakarn	Study chemical residues in aquatic production	Develop strategies to reduce productions costs of aquatic produce	Study the strategies to cut out the lifecycle of parasites (e.g. helminthes) in aquatic production	Set up an independent center composed of all stakeholders to provide training, good agricultural practices (GAP), market trends and information; and to cooperate with other government departments to avoid overlaps and confusion		
5	Bangkok	Develop ways of controlling golden snail infestation in water canals	Encourage members of every community to curb the expansion of water hyacinth	Develop mechanisms on managing wastewater in the community		Develop ways to prevent diseases in aquaculture	Ensure less confusion and consistent implementation of rules and acts and for extension staff to develop result from research to fit to the needs of the farmers		
6	Bangkok	Find solution to diseases in morning glory and water mimosa							

Appendix 7 Action research agenda developed during the SoS (Ranks 4-6)

Bangkok	Place	Date
Government		
1. Dr Douglas Webster	Team Leader Planning for Sustainable Urbanization Project Office of the National Economic and Social Development Board Krung Kasem Road, Pomprab	22 July 2003
Farmers		
1. Mr Manuwan Mohamad	Suanprixthai, Pathumthani	22 April 2005
2. Mrs Teemu Jaewae	Suanprixthai, Pathumthani	23 April 2005
3. Mr Yong Tanom Suk	Suanprixthai, Pathumthani	26 April 2005
4. Mrs Samran Buakanthong	Suanprixthai, Pathumthani	26 April 2005
5. Mr Pon Kongdun	Nongpraongai, Nonthaburi	27 April 2005
6. Mrs Pew Thaket	Nongpraongai, Nonthaburi	02 May 2005
7. Mrs Penpan Chewnawin/Mrs Yean Suthichai	Lumsai, Pathumthani	03 May 2005
8. Mr Vichai Suthikongka	Lumsai, Pathumthani	03 May 2005
9. Mrs Ravee Pethin	Lumsai, Pathumthani	03 May 2005

Appendix 8 List of individuals interviewed in the qualitative interviews in Bangkok

Phnom Penh	Place	Date
Government		
1. Mr Aunny Ieng	Architect and Urban Planner Deputy Chief of Cabinet and Director of Bureau of Urban Affairs Municipality of Phnom Penh	10 November 2005
Farmers		
1. Ms Keang Bunthach	Kbal Tomnub Village, Boeung Tompun Commune, Meanchey District, Phnom Penh	10 May 2005
2. Ms Shom Phom	Kbal Tomnub Village, Boeung Tompun Commune, Meanchey District, Phnom Penh	11 May 2005
3. Mr Sous Leoung	Kbal Tomnub Village, Boeung Tompun Commune, Meanchey District, Phnom Penh	11 May 2005
4. Ms Siv Sa	Thnout Chrum Village, Boeung Tompun Commune, Meanchey District, Phnom Penh	12 May 2005
5. Mr Nob Phim	Thnout Chrum Village, Boeung Tompun Commune, Meanchey District, Phnom Penh	12 May 2005
6. Mr Euo Sarom	Duong Village, Prek Phnov Commune, Ponhealoeu District, Kandal Province	13 May 2005
7. Mr Chao Bunthong	Duong Village, Prek Phnov Commune, Ponhealoeu District, Kandal Province	13 May 2005
8. Ms Tang Seng Yiek	Duong Village, Prek Phnov Commune, Ponhealoeu District, Kandal Province	13 May 2005
9. Mr Meas Sophat	Duong Village, Prek Phnov Commune, Ponhealoeu District, Kandal Province	13 May 2005
10. Mr Sos Ty	Boun Village, Chraing Chamres Commune, Reussey Keo District, Kandal Province	17 May 2005
11. Mrs San Sas	Boun Village, Chraing Chamres Commune, Reussey Keo District, Kandal Province	17 May 2005
12. Mrs Srey Thy	Phum Mouy Village, Sras Chork Commune, Daun Penh District, Phnom Penh	17 May 2005

Appendix 9 List of individuals interviewed in the qualitative interviews in Phnom Penh

Hanoi	Place	Date
Farmers		
1. Mr Ng Duy Thanh	Bang B Village, Hoang Liet Commune, Hoang Mai District	17 August 2005
2. Mrs Vu Thi Thuy	Bang B Village, Hoang Liet Commune, Hoang Mai District	17 August 2005
3. Mrs Luu Thi Chung	Bang B Village, Hoang Liet Commune, Hoang Mai District	17 August 2005
4. Mrs Nguyen Thi Ngo	Khuyen Luong Village, Tran Phu Commune Hoang Mai District	17 August 2005
5. Mr Cao Van Phuong	Khuyen Luong Village, Tran Phu Commune Hoang Mai District	17 August 2005
6. Mr Nguyen Van Binh	Khuyen Luong Village, Tran Phu Commune Hoang Mai District	17 August 2005
7. Mrs Pham Thi Lan	Thon 2 Village, Dong My Commune, Thanh Tri District	19 August 2005
8. Mr Nguyen Van Kiem	Thon 5 Village, Dong My Commune, Thanh Tri District	19 August 2005
9. Mr Pham Ngac	Thon 3 Village, Dong My Commune, Thanh Tri District	19 August 2005
10. Mrs Nguyen Thi Che	Dong Dau Village, Duc Tu Commune, Dong Anh District	19 August 2005
11. Mr Do Quang Chung	Duc Tu 1 Village, Duc Tu Commune, Dong Anh District	19 August 2005
12. Mr Do Van Da	Duc Tu 2 Village, Duc Tu Commune, Dong Anh District	19 August 2005
Organisations		
1. Dr Iwata Shizuo	Program Manager, Comprehensive Urban Development Programme in Hanoi Capital City	1 September 2005
2. Mr Nguyen Hong Tien	Vice Director, Department of Urban Infrastructure, Ministry of Construction	29 August 2005
3. Mr Pham Bau	Research Officer Research Institute for Aquaculture 1 Hanoi	25 August 2005

Appendix 10 List of individuals interviewed in the qualitative interviews in Hanoi

1. Irrigation
 1. Field Dikes and Ditches Act
 2. The People's Irrigation Act
 3. The State Irrigation Act
2. Agriculture, forest and fisheries
 1. Agricultural Land Consolidation Act
 2. Agricultural Land Reform Act
 3. Cooperatives Society Act
 4. Fisheries Act
 5. Forest Act
 6. Land Development Act
3. Canal and navigation
 1. Act for Eradication of phaktob java
 2. Canals Conservation Act
 3. Conservation of Water Supply Canal Act
 4. Navigation in Thai Waters Act
4. Hydraulic power generation, energy, and water supply
 1. Energy Conservation Promotion Act
 2. Energy Development and Promotion Act
 3. Electricity Generating Authority of Thailand Act
 4. Metropolitan Waterworks Authority Act
5. Environment, groundwater, and national land and property
 1. Enhancement and Conservation of National Environmental Quality Act
 2. Exploitation of Immovable Property Act
 3. Groundwater Act
 4. Ratchaphatsadu Land Act

Appendix 11 The water resources-related laws in Thailand (Source: (Takeuchi *et al.* 1999)