2 Adapting to Aquaculture in Vietnam: Securing Livelihoods in a Context of Change in Two Coastal Communities

C. Luttrell
Overseas Development Institute, London, United Kingdom,
e-mail: c.luttrell@odi.org.uk

Abstract

This chapter examines the effects of aquaculture development on the livelihoods of households in two historically and geographically distinct coastal communities in north and south Vietnam. It is shown that the importance of open-access resources for livelihoods increases in line with the poverty and vulnerability of the social group. This increase has occurred at the same time as a decrease in the availability of open-access products because of the privatization of resources associated with aquaculture. Many open-access resources are accessed illegally or with unofficial access rights and this has implications for livelihood security, since open-access resources have uncertain rights and legislative status, a status that is open to change and frequently subject to privatization. The high capital investment required and the loans necessary to raise that capital are also increasing the vulnerability of the wealthier households involved in aquaculture.

Introduction

Vietnam's entry into the shrimp market lagged behind other Asian countries such as Thailand. However, the favourable agro-climatic conditions, particularly in the south, the opening of the economy and the spread of shrimp disease in other shrimp-producing Asian countries all led to a spectacular entry into the market (Flaherty *et al*., 1999). Traditional coastal aquaculture has been a part of the livelihood structure in Asia for hundreds of years (Ling, 1977). However, in a climate of new technologies and increasing global demand, traditional extensive systems supplying local markets have rapidly changed to resource-intensive, high-production systems catering to the global market (Barraclough and Finger-Stich, 1996; Flaherty *et al*., 1999). Shrimp became a high development priority in Vietnam as an important means of earning foreign exchange (Vo Van Trac and Pham Thuoc, 1995) and a commodity that has a high comparative advantage. Indeed, foreign earnings from aquaculture are high and are increasing annually (Vietnam News, 1999; Vietnam News Agency, 1999; Asia Pulse, 2001).

This chapter examines the effects of aquaculture development on the livelihoods of households in two historically and geographically distinct communities in coastal

 Environment and Livelihoods in Tropical Coastal Zones (eds C.T. Hoanh, T.P. Tuong, J.W. Gowing and B. Hardy)

areas in north and south Vietnam. In the two case study areas, there has been official support for aquaculture at the district level. Preferential taxation and financial support are readily available to traders and exporters of aquatic products in the form of credit insurance funds, development support funds and an export insurance fund (Vietnam News Agency, 2000). Most of the capital resources for the 'shrimp boom' came from government-supported banks (Dang Kim Son, 1998), with the Vietnam Bank for Agriculture (Agribank) in the Mekong Delta providing medium-term 3-year loans for shrimp-pond building and short-term 1-year loans for inputs, up to a maximum of 70% of the total costs (Euroconsult, 1996).

Research Context

The southern research site, Nam Hai Commune, is located in Thinh Binh District,[1] Ca Mau Province (the southernmost province of the country). The northern research site, Da Rang Commune,[1] is an island, located in Xuan Giao District, Quang Ninh Province (the northernmost province of the country), 100 km from the Chinese border (Fig. 2.1). These case studies provide two examples of very different ecological and social systems, particularly in terms of mangrove ecology, geography and social history (Luttrell, 2000). Such different contexts, as well as varying history, tenurial systems, community cohesion and social structures, have had very different impacts on the process of adaptation to change in these case study areas (Luttrell, 2001, unpublished PhD thesis).

In Da Rang Commune, the mangrove forest and associated mud flats have, until recently, provided open-access resources. Gatherers, including those from other communes, have been free to carry out low-intensity exploitation of marine and mud-flat products. Here, the spread of shrimp farming occurred later than in the south and with more caution. However, since the 1990s, large amounts of this open-access area have been in effect privatized by the granting of private contracts to individuals, many of whom were from different provinces, for the construction of shrimp ponds for extensive and semi-intensive shrimp farming. This has drastically reduced the area available to the local community for the collection of mangrove products and is said to have lowered the quality of the environment, resulting in a further reduction in these products (Luttrell, 2000).

The area of Nam Hai Commune is divided into the forest enterprise and the area of private land, both of which have very different property regimes. The forest enterprise area is managed by a state-owned company, which is directly under the jurisdiction of the province. Some of the area has been contracted out to households on 20-year leases, which gives the right to construct shrimp ponds on a proportion of their area but not to use the trees without authorization. The 'protection' area of the forest enterprise is managed as forest by the enterprise staff, and local people are forbidden to carry out any kind of activity, although it is common for the staff to grant unofficial gathering permits. The rest of the commune area is private household land, which has been completely converted to shrimp ponds carrying out semi-intensive aquaculture. There are no official areas of common or open-access land, and forest enterprise land is consequently used illegally by many to collect mangrove products.

The proximity of Da Rang Commune to the Chinese border and the opening of the border in 1990 have resulted in the recent emergence of the mangrove areas as the source of a significant amount of household income from the trading of similar mangrove products for every household in the commune. The high prices for such products in the Chinese market have caused a shift in the perception and valuation of the mangrove and mud-flat areas, and this has led to a debate about the possibility of the privatization of such areas. In Nam Hai Commune, because of the lack of a market in the vicinity, such products do not have a high

[1] The district and commune names mentioned in this chapter have been changed.

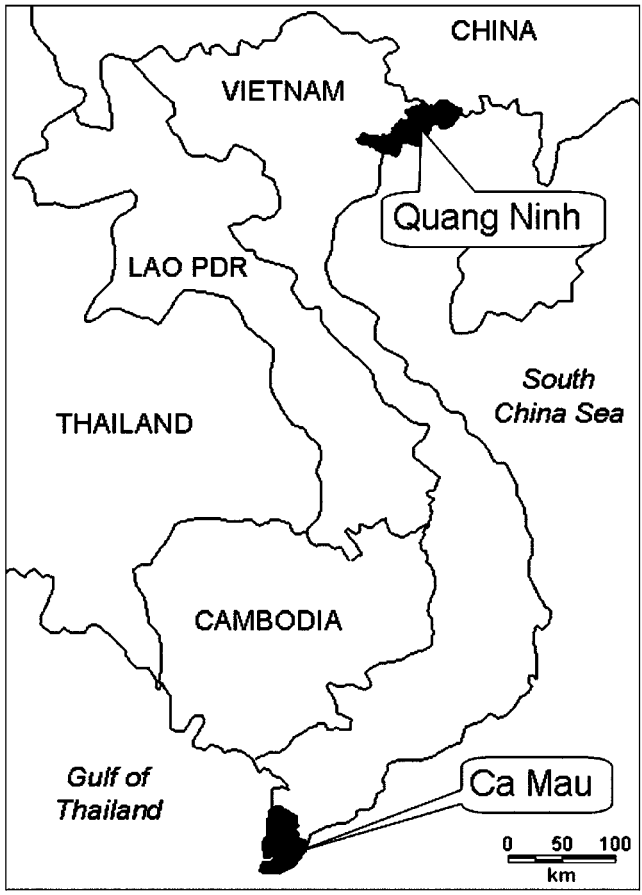

Fig. 2.1. Location of case study sites.

value and their collection is limited to landless households with no alternative income.

Research Method

Data on livelihoods and institutional change were collected during two research periods in each of the two case studies within a period of 16 months between May 1998 and August 2000. Semi-structured interviews with officials, key informants and individual permanent and temporary commune members were carried out. The research and analysis methodology primarily used qualitative techniques and the analysis employed an inductive approach drawing on principles of grounded theory (Glaser and Strauss, 1967). However, each interview also included the collection of some quantitative data.

Sampling was initially stratified by hamlet to allow recognition of the disparities between the hamlets. Administratively, Nam Hai Commune is divided into two sections, the forest enterprise land and the area of private land under the jurisdiction of the commune, and within each hamlet the sample was further differentiated according to this land ownership. Following this, respondents were initially identified by using the technique of 'snowball sampling'. This technique is a non-random method of data collection whereby interviewees are asked to nominate further informants (Eland-Goossense *et al.*, 1997; Faugier and Sargeant, 1997). In the choice of respondents, attempts were made

to maintain a balance between broad categories of household based on wealth, occupation, gender, age, location of residence and ethnicity or origin. The sampling emphasis constantly evolved through the research process. In the first stage of the research, the selection of the respondents sought to capture diversity. During the second stage of data collection, an attempt was made to return to as many households from the first sample as possible, and, in addition, to focus on specific issues identified by the first stage of the analysis. Sampling was brought to an end when it was considered that a 'data saturation'[2] point had been reached in assimilating information and that little further could be added to the understanding (Table 2.1).

For each of the sampled households, interviews were carried out with one or more of the household members and in some cases two interviews with the same household took place, one in each of the field-work periods. For the other households, adaptations to change in the recent past have been elicited through recall data. This permits conclusions as to the type of access on which the livelihood portfolio is based, how this access has shifted in the face of change and what this shift has meant for livelihood vulnerability. The households have been classified into 'social groups' based on the criteria described in Table 2.2. At both of the case study sites, shrimp farming is currently dominated by semi-intensive systems, which involve the stocking of the ponds with fry. In Nam Hai Commune, all households in the NH-FOREST and NH-LAND groups are involved in shrimp farming, the majority of which are stocking with tiger shrimp. In Da Rang Commune, a distinction has been made in the categorization between those households stocking with tiger shrimp (DR-SHRIMP) and those with other kinds of shrimp (DR-POND).

Experience of Shrimp Farming and Failure

The southern case study: Nam Hai Commune

Aquaculture production and fisheries play a major role in the economy of Thinh Binh District. Although the conversion from rice to shrimp farming was initially illegal, the district later gave its support to it. Official government-supported loans are granted to all shrimp farmers, and tax reductions were introduced in times of poor harvest. Despite the official encouragement of shrimp farming, inadequate attention has been given to the technical details necessary for effective shrimp production and environmental protection. In most cases, productivity in Nam Hai Commune was high, at 100–200 kg/ha for the first 3 years of shrimp production, but fell sharply after this. This is a situation reported throughout the Mekong Delta (Euroconsult, 1996). Many households now regret the conversion to shrimp and they prefer to convert back to rice, which would at least guarantee them a subsistence livelihood source. Others recall how rice yields were good before the conversion to shrimp. Conversion back to rice, however, could be carried out only with external assistance or loans, since it would require substantial earth-moving and dyke-building activity and would result in the absence of any returns for at least one year. Requests for assistance are therefore being put to the District. Reconversion would also require agreement of

Table 2.1. Sample numbers in the two case studies.

Number	Da Rang Commune	Nam Hai Commune
Of individuals interviewed	115	179
Of households interviewed	88	129
Of households revisited	17	31

[2] In qualitative research, there are no published guidelines or tests of adequacy for estimating the sample size required to reach saturation equivalent to those formulas used in quantitative research. Rather, in qualitative research, the signals of saturation are determined by the investigator and by evaluating the adequacy and the comprehensiveness of the results (Gubrium, 1995).

Table 2.2. Categorization of 'social groups' as used in the analysis.

Criteria	Social group	Number of respondents
Da Rang Commune		
Tiger shrimp growers	DR-SHRIMP	11
Trading households (those not in social group DR-SHRIMP)	DR-TRADE	4
Pond owners (those not in social groups DR-SHRIMP or DR-TRADE)	DR-POND	21
Landowners (those not in social groups DR-SHRIMP, DR-TRADE or DR-POND)	DR-AGRIC	61
Households with only fallow land	DR-FALLOW	3
Ethnic minorities	DR-MINORITY	15
Landless households	DR-NOLAND	2
Nam Hai Commune		
Households allocated forest enterprise land	NH-FOREST	53
Households owning commune land	NH-LAND	50
Households renting or farming agricultural land/shrimp pond without land certificate	NH-RENT	8
Landless households	NH-LANDLESS	46
Households living in the fishing settlement of Lang Ca or owning fixed bed nets on the inland rivers	NH-FISH	22

all landowners in the area because the building of dykes to prevent the intrusion of saline water would have to be a communal effort.

Interviews carried out in January 1999 with the Thinh Binh District People's Committee showed district officials to be supportive of shrimp farming. The Vice-President of the District People's Committee (1999 interview) emphasized that efforts had been made to help farmers intensify their aquacultural systems, but he was unenthusiastic about farmers' recent requests for assistance to convert their land back to rice. However, recommendations made by the Department of Agricultural Development (DARD) of the district in interviews carried out 6 months later contradicted those of the People's Committee. Contrary to the District People's Committee policy, DARD recommended the conversion of shrimp ponds back to rice cultivation.

The northern case study: Da Rang Commune

Since 1993, the Xuan Giao District People's Committee has leased the mangrove area of Da Rang Commune to private entrepreneurs for 10 to 20 years for the payment of a one-off fee. Nguyen Thanh Manh and Phan Anh Thi Dao (1998) reported a stable yield from the shrimp ponds of 250–300 kg/ha/year. Other authors, however, record low aquacultural productivity, with only 20–30% of ponds achieving an annual shrimp output of 70–100 kg/ha (Nguyen Duc Cu, 1998).

This fall in productivity has been attributed to many factors, including the collapse of dykes; loss of natural habitat for larvae of shrimp, crabs and fish (Nguyen Duc Cu, 1998); pollution; dynamite; and electric fishing, which also decreases the levels of natural fry (Da Rang Commune, 1998). By 1997, there were seven experimental tiger shrimp ponds in the commune stocked with an average of 4000 seeds (Nguyen Thanh Manh and Phan Anh Thi Dao, 1998), but by 1998 only one household had succeeded in cultivating tiger shrimp. During 1999, a few of the richest households were growing tiger shrimp from locally adapted seed that was available for sale in the commune.

Changes in the Structure of Livelihoods

Northern case study: Da Rang Commune

Social groups DR-SHRIMP and DR-TRADE consist of households that trade in aquatic products or cultivate tiger shrimp. In all cases

where tiger shrimp are grown, this activity has been adopted recently. It does not, however, represent the dominant livelihood source for all of these households, and the livelihood sources of social groups DR-SHRIMP and DR-TRADE are the most diversified of all the groups in the commune, being characterized by capital-intensive activities such as trading and renting out of machinery.

The livelihood profiles of other land-owning groups in the commune (social groups DR-POND, DR-AGRIC and FALLOW) vary according to their labour availability. Those households that do not have surplus labour are less likely to engage in open-access collecting. For those who do engage in collecting, their livelihood profile is dominated by the income from open-access products, mostly mud-worms and clams. For others, rice growing and the cultivation of natural shrimp are important. Although it may not be the dominant livelihood source, rice remains an important safety net for the majority of these households (Fig. 2.2).

For the ethnic minorities and the landless group (social groups DR-MINORITY and NOLAND), the collection of open-access products clearly dominates their livelihood structures, but rice and hiring out of labour are also important elements (Fig. 2.3).

Southern case study: Nam Hai Commune

Land-owning households on commune land (social group NH-LAND) have livelihood profiles dominated by income from their own shrimp ponds, and in some cases from the trading of aquatic products and the hiring out of labour to other shrimp ponds (Fig. 2.4). Open-access products and those collected illegally from the forest enterprise are often supplementary livelihood sources, and these sources increase in importance in times of adversity. The second round of interviews, in combination with recall data, reveals a dichotomy between those households that have suffered a decline in their shrimp harvest and those whose shrimp harvests have improved since the last interview. Those households whose shrimp have declined since the initial high harvests have shifted their main income towards activities such as migrant labour, which is encouraged by the falling demand for labour in the area, and diversified their subsidiary livelihood sources. Open-access products make up a larger proportion of these livelihood sources. Where shrimp harvests have increased, the households have benefited from the increased demand for hired labour and for the trading of products.

The livelihood profiles of the landless groups in Nam Hai Commune (social groups NH-RENT and NH-LANDLESS) are dominated by a reliance on open-access resources, a large proportion of which are collected illegally in the forest enterprise and from private ponds (Fig. 2.5). Hiring out of labour for shrimp ponds and open-access activities such as fishing are also important, but the demand for hired labour relies heavily on the success of the shrimp harvests in the area. Unlike the richer groups, all in this group identified the extreme storm Typhoon Linda as having had a serious effect on their livelihood vulnerability and as an additional 'shock' to which they had to adapt. The second round of interviews, in combination with the recall data collected in the inter-

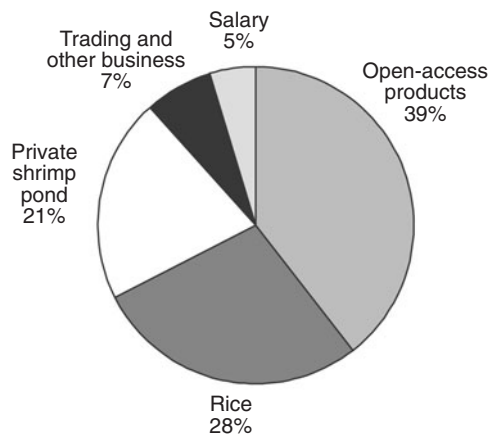

Fig. 2.2. The dominant livelihood sources (those ranked first by respondents) of land-owning households (social groups DR-POND, DR-AGRIC and FALLOW) in Da Rang Commune. The term 'private' shrimp pond is used to refer to shrimp from ponds owned by that group rather than illegal access to others' shrimp ponds (from household interviews, Da Rang Commune, 1998–1999 (n = 43)).

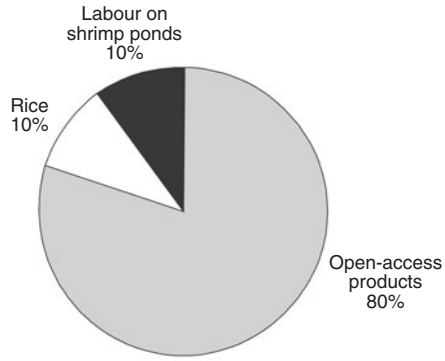

Fig. 2.3. The dominant livelihood sources of ethnic minorities and landless households (social groups DR-MINORITY and DR-NOLAND) in Da Rang Commune (from household interviews, 1998–1999 (n = 10)).

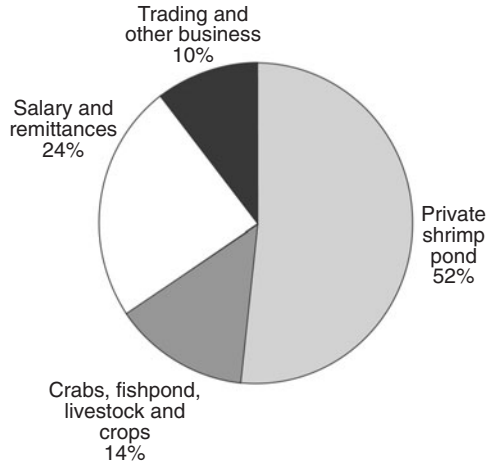

Fig. 2.4. The dominant livelihood sources of land-owning households (social group NH-LAND) in Nam Hai Commune (from household interviews, Nam Hai Commune, 1998–1999 (n = 29)).

views, reveals an increased importance of open-access and illegally accessed products for livelihoods, together with a marked diversification of livelihood sources.

The livelihood profiles of households with leases in the forest enterprise (social group NH-FOREST) are dominated by income from shrimp farming. A minority of this group, however, is more reliant on the hiring out of its labour to other shrimp-pond owners or on trading of aquatic products. Subsidiary livelihoods in this group are diverse and, for the most part, are based on open-access or illegal products collected from the forest enterprise. Some households maintain their links with land, shrimp ponds or jobs elsewhere and, for them, the land in the forest enterprise is a small part of a set of spatially diversified livelihood sources. The second round of interviews and the recall data showed that reliance on livelihoods from shrimp ponds in the forest enterprise had decreased because of the failure of local shrimp farming. There had been a shift in livelihood strategies away from the hiring out of labour and from open-access fishing towards income from shrimp ponds in other areas.

Impact on Resource Access: Implications for Livelihood Vulnerability

Box 2.1 summarizes the shifts in livelihood profiles for the various social groups in the two different communes. However, it must be acknowledged that the outcomes and shifts in activity are rarely the result of just one set of factors. The introduction of shrimp farming in Da Rang Commune occurred at a time close to the opening of trade across the Chinese border, with the accompanying expansion in export markets

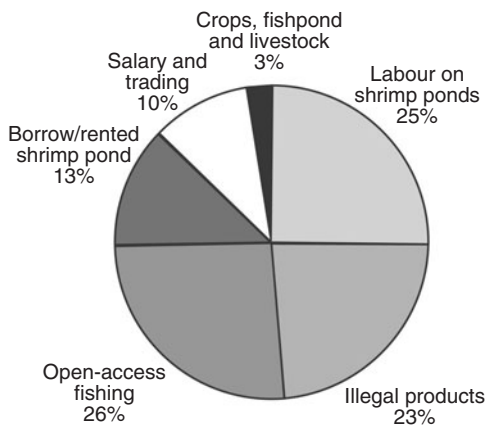

Fig. 2.5. The dominant livelihood sources of landless and tenant households (social groups NH-RENT and NH-LANDLESS) in Nam Hai Commune (from household interviews, Nam Hai Commune, 1998–1999 (n = 39)).

Box 2.1. General patterns of change in livelihood profiles of different social groups through the periods of expansion and subsequent failure of shrimp farming.[a]

Social group	Ranked livelihoods before introduction of shrimp farming	Ranked livelihoods during shrimp boom[b]	Ranked livelihoods after decline in shrimp and open-access products
Da Rang Commune			
	Pre-1992	1992	1995
DR-TRADE[c]	Insignificant as the market had not developed	Aquatic product trading	Aquatic product trading Other trading Other private business
My mother says '*Phi thuong bat phu*' ('if you do not trade, you will never be rich'). My family is getting involved in handicrafts, agricultural machinery and other trading as well (aquatic product trader, Da Rang Commune, 1998: interview no. 273b).			
DR-POND	Agriculture	Shrimp Open-access products	Shrimp Open-access products Small trading
DR-AGRIC	Agriculture	Open-access products Agriculture	Open-access products Agriculture
'If we just lived on paddy, we would die because the rice we grow is not enough for our family. I just need half a day collecting to get enough money from the mud flat to buy rice. In the morning we go collecting and by afternoon we have money' (farmer, Da Rang Commune, 1999: interview no. 239b).			
Nam Hai Commune			
	1978	1985	1992
NH-FOREST	Not available	Shrimp	Shrimp Open-access products Trading
NH-LAND	Agriculture	Shrimp	Open-access products Shrimp Labour Livestock
'Here people just work for hire; even from the shrimp pond owners we get nothing and we also have to work for hire … it is just like having no land' (shrimp farmer, Nam Hai Commune, 1999: interview no. 131).			
NH-LANDLESS	Agricultural labour	Labour on shrimp ponds	Open-access products Labour

[a] The table was derived from a general summary based on qualitative and quantitative information from the households studied.
[b] At the northern study site, this also coincided with the opening of trade across the Chinese border.
[c] The categorization is based on 1999 data, so DR-TRADE is households involved in trading in the year 1999.

for open-access products. There has been a general shift in livelihood patterns and vulnerability. The move from a dependence on agriculture to shrimp farming has been superseded more recently by further changes in livelihoods accompanying the failure of the shrimp harvest. The relative importance of open-access products has increased for all social groups, particularly the poorest. In the case of wealthier social groups, this has been one part of a more diversified livelihood profile.

Social differentiation and upheaval

Successful shrimp farming brings immediate profits and people were encouraged to take this livelihood option on account of low income from rice and limited employment opportunities elsewhere. The subsequent 'gold rush mentality' (Flaherty *et al*., 1999) has resulted in the poor construction of ponds and the phasing out of basic food crops, to be replaced by this higher-value export crop. At both research sites, the construction of shrimp ponds has had a marked social effect. Shrimp farming has further increased the disparity between those who can and those who cannot afford to continue to invest in this livelihood activity.

In Nam Hai Commune, the conversion to shrimp farming resulted in huge shifts in access rights because it represented a massive capital investment. Poorer households, which had no access to this level of capital, were forced to sell land to other households in the area or to new entrepreneurial households from other areas. In Nam Hai Commune, in particular, the poor who cannot afford the capital investment in shrimp ponds have been displaced by the inward migration of people with capital. This displacement is now leading to richer households moving out because of the low returns from shrimp farming. The so-called 'gold rush' of shrimp farming is over, ponds are being sold off more cheaply and households from a lower income group are moving in. The price of land has reportedly decreased to 25–35% of its value over 5 years.

Profit accruing to outsiders and indebtedness

In Da Rang Commune, it is mainly investors from outside the commune who have benefited from shrimp farming and, having made large profits, moved elsewhere when they realized that the harvests were failing. At first, only two local households had a share in the ponds, but, after 2 years, when returns began to decrease, the owners from outside the commune began to sell the ponds to locals (Nguyen Thanh Manh and Phan Anh Thi Dao, 1998). For the most part, those who own the shrimp ponds now face very low harvests and huge debts that cannot be repaid. In Da Rang Commune, labourers who are hired locally tend to be the relatives and friends of the pond owners, so that the ethnic immigrants, who are most in need of work, are at a disadvantage. Most outsider pond owners in Da Rang do not use much local labour, so benefit to the local residents from shrimp farming is limited.

At both research sites, those households involved in shrimp farming made huge initial profits; this was particularly the case with those able to make large investments in terms of constructing sluice gates and dredging ponds. Subsequently, many of the shrimp-farming households suffered losses, entering a downward spiral of debt, and were often forced to sell their land.

Of the 42 shrimp farmers interviewed in Nam Hai Commune, 74% had taken out loans to carry out shrimp farming and all these respondents are unable to repay the loans, with only a few able to make interest payments. The average loan, from the farmers interviewed who had taken out official loans, was 5.62 million VND. However, this is probably an understatement deriving from the sensitive nature of the topic. Furthermore, interest rates are high, ranging from 0.5% to 3.2% per month from the banks to 15% from private moneylenders. The picture is similar in Da Rang Commune: 165 households were operating ponds between 1993 and 1995 but by 1998 there were only 75 such households (Nguyen Thanh Manh and Phan Anh Thi Dao, 1998). Many suffered losses, are in debt and have been forced to sell their shares. Indeed, many of the landless households interviewed had once been involved in shrimp farming.

The results of this study do, however, show that, in the case of aquaculture, there is not a clear relationship between poverty and vulnerability as other authors note (Davies and Hossain, 1997; Ellis, 1998; Carney, 1999). In the case of the abnormal storms associated with Typhoon Linda, which hit the southern coast of Vietnam in 1997, it was the households that had invested in shrimp farming that appeared to have suffered the most because, having lost their investment, they

were pushed deep into debt. Poor households that had not taken out loans were relatively unaffected economically.

Dramatic changes in the livelihood profiles

The death of natural shrimp has increasingly forced those who have invested in the shrimp-pond infrastructure to invest in tiger shrimp, thus increasing even further the costs and risks involved. For others who cannot afford this, the failure of the shrimp to provide the expected windfall has led to households being forced to look for alternative livelihoods. Some 25% of the landless households interviewed had previously been engaged in shrimp farming, and others affected included those who previously farmed but lost their land to the spread of aquaculture.

The loss of land induces households to carry out activities such as hiring out of labour (but it has become increasingly harder to find such work as the shrimp continue to die and investment decreases), pig breeding, wine making and illegal collection of natural products from the forest enterprise or private ponds. There has been a clear trend among farmers who have retained their ponds towards activities such as crab rearing, *Nipa* (a type of palm tree) growing and the planting of fruit trees and some other crops, as well as the collection of fish and mangrove products. Richer households are attempting to diversify their livelihood away from a reliance on natural resources by developing activities such as trading and small businesses (see NH-FOREST and NH-LAND, Box 2.1).

Enclosure but increased reliance on open-access resources

The conversion of rice land to shrimp ponds in Nam Hai Commune during the late 1980s resulted in few changes to the property rights over the land itself, because shrimp ponds were built on agricultural land over which households had official private land rights. However, the enclosure of the water, and of the fish/shrimp stocks that the ponds contained, did represent a privatization of these resources *in those areas*.

At both research sites, the mangrove and mud-flat areas, which are used for shrimp ponds, previously provided livelihoods for those who depended on open-access resources. There is a clearly perceived link between the construction of shrimp ponds and the deterioration of the quantity and quality of open-access products. In spite of the hostility in Da Rang Commune against shrimp farming, local residents were not able to present a united front against the pond owners from outside because some members of the community (usually the more influential members) wanted to profit from the ponds themselves. Many members of the community have invested in shrimp farming in a number of different ways and therefore they have much to lose from its cessation. In addition, fishing contracts have been introduced by the district[3] and, although contracts are not necessary for local residents to fish, contracts are needed for more intensive fishing techniques. This has resulted in the loss to the local community of open-access resources and added benefit to the district from the renting out of contracts. Therefore, élites are able to stake personal claims over open-access resources used by local residents and this results in the situation, as described by Bailey (1985), in which a complex ecosystem supporting multiple use is transformed into a greatly simplified system that becomes the private property of a small number of individuals.

Despite the increased enclosure of open-access resources and the decrease in quality owing to environmental deterioration, open-access resources have become an increasingly important part of the livelihoods of

[3] Fisheries in the district are regulated under the Law of Fisheries Protection, Decree 40 and Decision 34. The district is responsible for the contracts and the tax level is decided on agreement between the district and the commune (Director of Thinh Binh District (DARD), 1999: interview).

many households (see Box 2.1: NH-LAND-LESS). There are two main reasons for this: first, those livelihood activities based on privately owned resources, such as rice and shrimp farming, have failed to expand successfully and, second, there has been a shift towards types of private land use that exclude the poorer groups of the community. Rice agriculture is an activity based on private resources, it requires relatively cheap inputs and it can therefore be carried out by a variety of social groups. At both case study sites, however, rice agriculture has failed to produce sufficient profits to compete with shrimp farming and, in Nam Hai Commune, this has resulted in the total conversion of rice land, thus excluding the poorer social groups from any private livelihood activity. Following initial high profits, shrimp farming itself has failed to produce significant profits and has, in fact, been the ruin of many a household economy. The conversion of failed shrimp ponds back into mud flats or mangrove forest with productivity levels similar to levels before conversion is problematic. Once again, a livelihood source based on a private resource has failed, thus pushing an increasingly wider group of people into a reliance upon open-access resources.

At both research sites, open-access resources represent the mainstay of the livelihoods of the landless and poorest groups (Figs 2.3 and 2.5). Increasingly, landlessness has led to more people depending on alternative livelihoods, such as hiring out of labour and collecting open-access resources. In Nam Hai Commune, hiring out of labour is the preferred activity of the landless households owing to the low availability and quality of wild products, but, in times of adversity when no other livelihood source is available, open-access products provide their main livelihood source. In Da Rang Commune, even households engaged in high-investment activities such as the cultivation of tiger shrimp or trading will also collect some open-access products to supplement their income. In Nam Hai Commune, the collection of open-access products by land-owning groups is less frequent, but these resources do represent an important subsidiary livelihood source that increases in importance during times of poor shrimp harvest.

Conclusions and Policy Implications

Many of those households at the research sites that could afford the investment required for the conversion to shrimp benefited from initially high profits. Conversely, the 'enclosure' of open-access resources and the inability of many households to afford the conversion resulted in serious social upheaval and a shift in livelihood profiles. The subsequent failure of shrimp farming has led to the collapse of the household economies of many shrimp farmers and to a high level of debt. This is a trend seen more recently in other areas of Vietnam such as the north-central coastal area (Luttrell *et al.*, 2004). Above all, the expansion of shrimp farming has produced a sharp differentiation between those social groups that have benefited from the conversion and those social groups that have suffered both directly and indirectly.

These results show that, despite the increasing trend toward the privatization of resources, which the introduction of aquaculture has brought about, it is open-access resources that are making an increasingly important contribution to livelihood profiles of the poorest households. The importance of open-access resources for livelihoods increases in line with the poverty and vulnerability of the social group. This has negative implications for livelihood vulnerability, since livelihood sources that are dependent on open-access resources are vulnerable because of their uncertain rights and legislative status, a status that is open to change and increasingly subject to privatization in these areas.

The way in which such an opportunity for growth has the potential to result in significant inequality (and environmental damage) emphasizes the need to make benefits more accessible to the poorest groups. It also questions the justification for state subsidies supporting infrastructure or credit for such activities such as shrimp farming.

Aquaculture is not an accessible livelihood option for the poorest because of the required levels of capital, technology, infrastructure and land. Labour opportunities in aquaculture are limited outside the family. Far more seriously, aquaculture can reduce other options by decreasing access by the poorest to open-access resources.

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[4] All district and commune names mentioned in this paper have been changed.

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