**CPWF Project # 10**

*Managing Water and Land Resources for Sustainable Livelihoods at the Interface Between Fresh and Saline Water Environments in Vietnam and Bangladesh*

# Working Paper: Act. 1.1b

# Comparing livelihood and resource-use strategies of farmers within and outside the salinity protected area of Bac Lieu Province, Vietnam

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# 1. Introduction

## 1.1 Background

In 2003, the Challenge Program for Water and Food has funded for a research and development project entitled as "Managing Water and Land Resources for Sustainable Livelihoods at the Interface Between Fresh and Saline Water Environments in Vietnam and Bangladesh" (shortcut name: CPWF#10) and led by the International Rice Research Institute (IRRI). In Vietnam, the main study site is Bac Lieu Province where the DFID-R7467c project "Accelerating poverty elimination through sustainable resource management in coastal lands protected from salinity intrusion" was implemented by 1999-2003. Bac Lieu Province is situated in southern part of the Mekong River Delta region, having broad areas created an imperative to control saline intrusion into mainland, which realized through the construction of major embankments and sluice-gates over an extended period from 1994-2000. Impacts of saline intrusion protection in Bac Lieu was reported by the DFID-R7467c project. While acknowledging contributions of the project, request for further research be done to achieve sustainable rural development in the coastal zone risen by several stakeholders including local authorities. The project CPWF#10, its goals and its building, therefore is based upon the success of the DFID project and at the request of stakeholders.

As at the request of stakeholders, one of our tasks is to study on socio-economic conditions of farmers in extended regions outside the protected areas, and to contribute to the analysis and assessment of livelihood and resource-use strategies of farmers between inside and outside the salinity protected area of Bac Lieu Province.

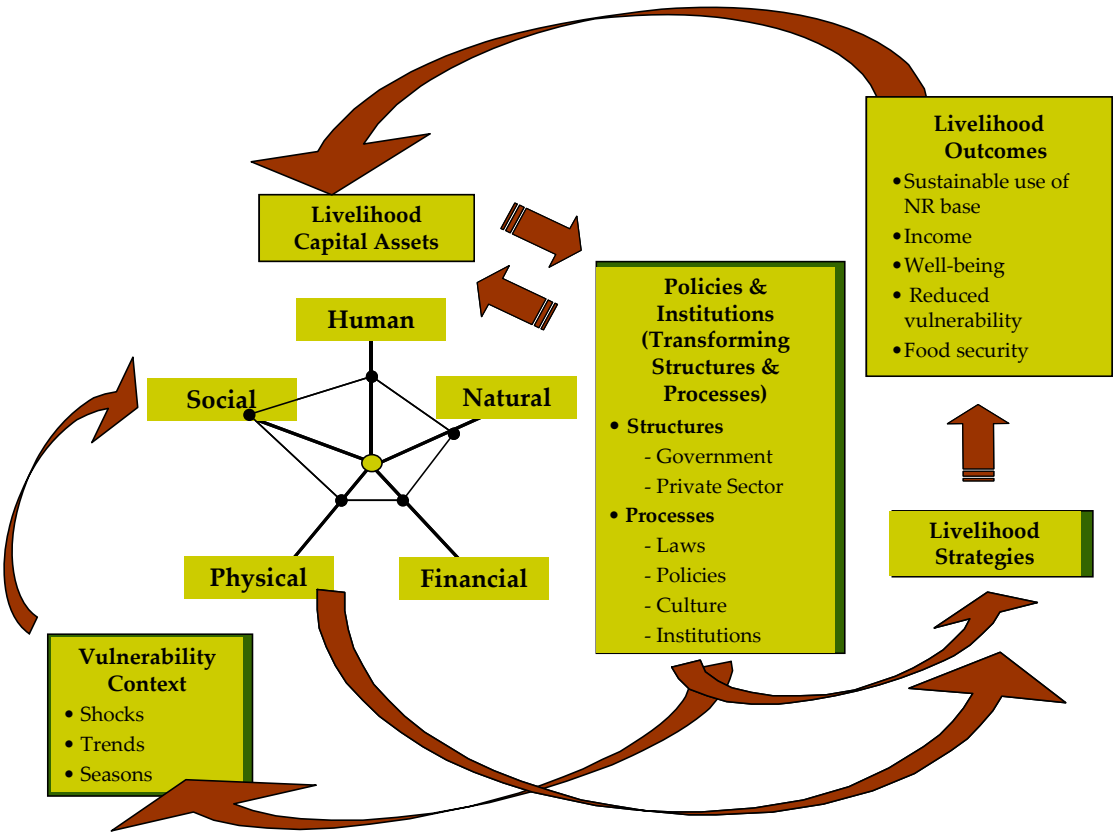
In other words, the survey on socio-economic conditions helps to improve the understanding of farmers livelihoods in areas outside the area protected from salinity. Secondly, it also provides a baseline data which will be useful in assessing changes in farmers' livelihood and resource-use strategies in both inside and outside protected areas at the end-of-project. The survey of area outside the protected area is to be conducted in the first year of the project. Two additional subregions to represent area outside the area protected to be selected for survey. The DFID-R7467c end-of-project survey and a survey in the two additional subregions are used as “benchmark” survey of the project. A major survey will be carried out in the third year of the project to assess the impact of the project.

This paper has two specific objectives:

1. to provide a baseline farmers’ livelihood and resource use strategies at the study site, focusing on area outside the salinity protected zone;
2. and to identify factors influencing farmers resource use strategies inside and outside the salinity protected areas.

## 1.2 Using the Sustainable Livelihoods Framework

In the previous study of the DFID-R7467c project, the sustainable livelihoods framework (SLF) has been adopted as a tool to assess farmers' livelihoods. Figure 1.1 presents the SLF showing the main factors that affect people’s livelihoods, and typical relationships between these. The SLF is also help us think holistically about:




**Notes**:

- Human - represents human capital: skills, knowledge & information, ability to work, health
- Natural - represents natural capital: land, water, wildlife, biodiversity, environment
- Financial - represent financial capital: savings, credit, remittances, pensions
- Physical - represents physical capital: the basic infrastructure (transport, shelter, water, energy, communications)
- Social - represents social capital: networks, groups, trust, access to institutions

**Figure 1.1: Sustainable Livelihoods Framework (Source: JI. Anton, 2005)**

- The things that the poor might be very vulnerable to external environment where farmers exist,
- The assets and resources, which are categorised into five forms of livelihoods capital (human, physical, natural, financial, social capitals) that help farmers thrive and survive,
- The policies and institutions (e.g. organisations, levels of government, private sector behaviour, laws, policies, culture, institutions) that impact on farmers' livelihoods,
- How the poor respond to threats and opportunities, and

- What sort of outcomes the poor aspire to, e.g. more sustainable use of natural resources base, more income, increased well-being, reduced vulnerability, improved food security, etc.

Of course that people derive their livelihoods through using the assets available to them. Different people may pursue different livelihood strategies depending on their asset base and on the transforming structures and processes, which determine the enabling environment (Gallop et al, 2003).

When analizing the SLF, livelihoods of farmers are sustainable when they are:

- resilient to shocks and stresses of external environment;
- not dependent upon external support;
- maintain the long-term productivity of natural resources; and
- not harm or undermine the livelihood options of others.

# 2. Methodology

## 2.1 Source of data

The end of project survey, reported in DFID-R7467c (Gallop et al, 2003), provides a general picture of farmers' livelihoods, which focused assessment of the impact of changes brought about by the salinity protection intervention in the protected areas. In order to compare livelihoods and resource-use strategies of farmers inside and outside salinity protected areas, an additional household survey outside protected area was conducted.

For comparing, available data of DFID-R7467c end-of-project survey (2003) is adopted to compare with data of additional survey outside protected area.

## 2.2 Selection of sample villages

Two villages, Vinh My A (Vinh Loi district) and An Trach (Dong Hai district), outside protected area are selected for survey. These two villages are bordered on one side by the national road, which it is also a boundary between outside and inside salinity protected areas. The selection of two villages are based on two important criteria: (1) village has history of the conversion in farming (e.g. number of years of conversion from rice to shrimp culture,...), and (2) village has levels of intensification of shrimp farming. In Vinh My A village, farmers have converted their farming systems for a few years ago, while in An Trach village farmers have converted into shrimp farming longer due to easily and availability of saline water to get into fields in this village. Shrimp farming in Vinh My A village is more intensive, while in An Trach village this system is much more extensively.

**Table 2.1 The survey hamlets outside salinity-protected areas**

| Hamlet $n_0$ | Hamlet name | Village | District |
|---|---|---|---|
| 1 | Tan Tien | Vinh My A | Vinh Loi |
| 2 | Thanh Thuong | An Trach | Dong Hai |
| 3 | Hoang Minh | An Trach | Dong Hai |
| 4 | Hamlet 15 | Vinh My A | Vinh Loi |

In each village, two representative hamlets are selected for survey. Hamlets selected for survey outside protected areas are listed in Table 2.1 and their locations are shown in Figure 2.1.

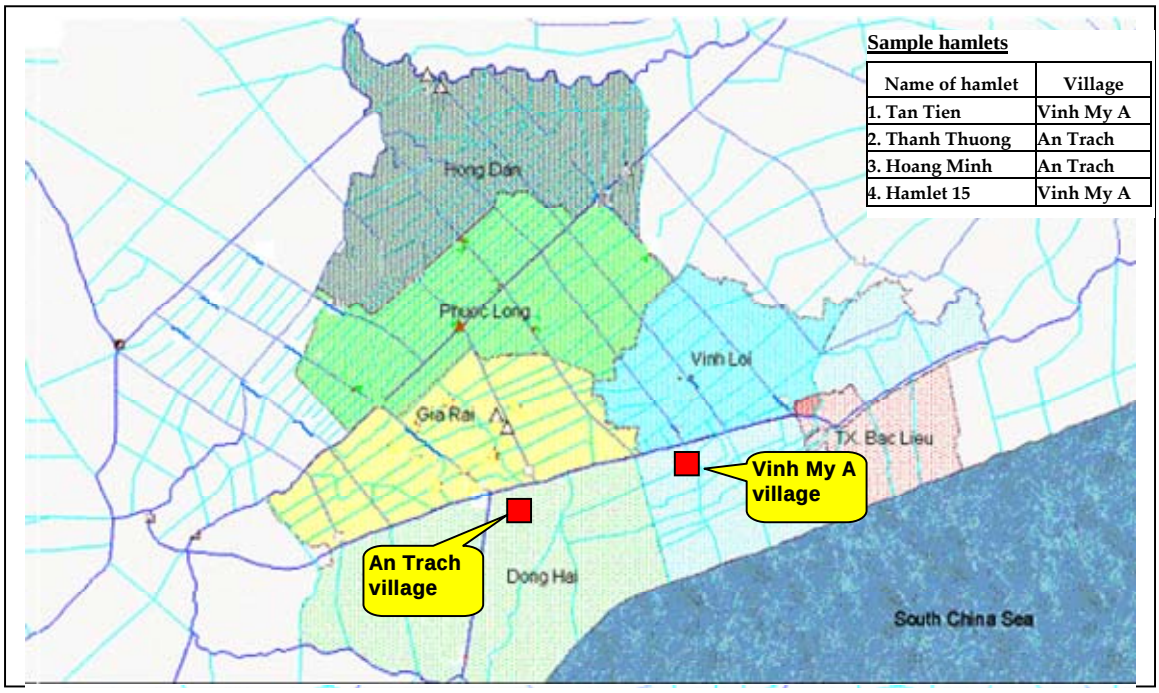



Figure 2.1: Location of sample villages outside protected areas.

## 2.3 Selection of households

Selection of households are randomly selected based upon wealthy category of the two villages. A representative of about 23- 25 households is surveyed in each hamlet. Households are stratified into three different stakeholder groups (poor, average and better-off) based upon results of a classification made by key informants and hamlet leaders.

In this survey, we use the questionnaires as the same questionnaires of DFID-R7467c end-of- project survey. This covers all aspects of the socio-economic conditions of the households, which would be used for the assessment of the livelihoods.

## 2.4 Data analysis

Data captured from survey are inputted into computer by excel software for computation. The analysis of data is according to DFID "livelihood framework", and focuses on major indicators that enable us to assess people's livelihoods. Table 2.2 summarises the indicators to be used in analysis of this additional survey to compare people's livelihoods outside protected areas with that inside protected areas.

**Table 2.2: Major indicators to be used in analysis**

| **Livelihood Assets & external environment** | **Investigate and compare in:** |
|---|---|
| Natural | Land ownership; total size of land holding; $n_0$. of land parcels; cropping patterns; rice production; aquaculture production (shrimp and other); capture fisheries catch and seasonality, including destination of catch (home consumption v. sale). |
| Financial | Total net HH income; contribution to total HH income from rice, shrimp, other aquaculture, livestock, employment, capture fisheries; remittances from relatives and other funds |
| Physical | Access to TV, radio, rowing boat, motorboat, tiller/pump/thresher |
| Human | Workers available per HH; age of HH head; % of female-headed HH; main occupation of HH heads |
| Social | Networks, member of groups |
| External environment | Shrimp diseases, ratio of failure and success (risk) |

# 3. Results

## 3.1 Natural Capital

### 3.1.1 Land for economic production

Land is an important household asset and indicator of wealth (Gallop et al, 2003). Data collected from additional survey on land for economic production in area outside protected area focuses on up to four parcels of land (while survey inside protected area in 2003 focused on up to three parcels). Households with one parcel of land are popular in both outside and inside protected area (52% and 47% households with 1 parcel of land for inside and outside protected areas, respectively). Table 3.1 describes the number and percentage of households outside and inside protected area with 1, 2, 3 and 4 parcels of land.

Table 3.1 No. of households with 0, 1, 2, 3 and 4 land parcels

| | Within protected area | | Outside protected area | |
|---|---|---|---|---|
| | No. of HHs | % | No. of HHs | % |
| 0 parcels | 31 | 18 | 7 | 7 |
| 1 parcels | 91 | 52 | 47 | 47 |
| 2 parcels | 34 | 19 | 35 | 35 |
| 3 parcels | 19 | 11 | 9 | 9 |
| 4 parcels | 0 | 0 | 2 | 2 |
| Total | 175 | 100 | 100 | 100 |

On the average, total area of land under economic production per household is not much different between inside and outside protected areas, about 1.7 ha for all hamlets inside and 1.8 ha for hamlets surveyed in area outside protected zone. Figure 3.1 shows the mean total land area per household used for economic production for each hamlet. Mean land area for economic production per household is highest in Chu Chot ( 3.1 ha), and this figure is lowest in Hamlet 21 (0.6 ha).

Figure 3.2 presents the mean area of land per household available for economic production by stakeholder group, and shows the relationship between wealth and land holdings. In both cases, outside and inside protected areas, the poor and average groups own smaller of land holdings, while the better-off group owns larger of land.

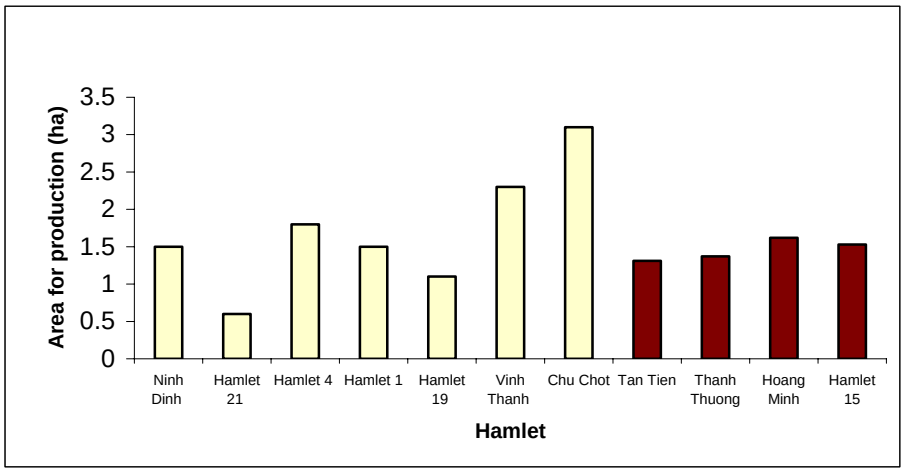



**Fig. 3.1 Mean total land area for economic production per household by hamlet**

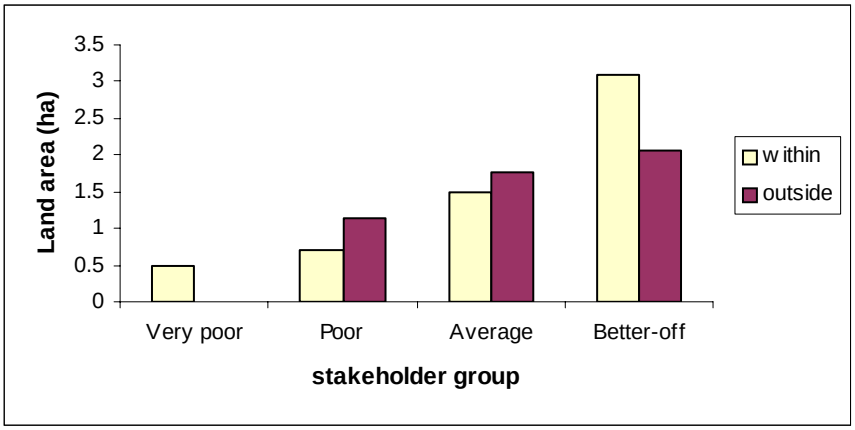



**Fig. 3.2 Mean area of land per household for economic production by stakeholder group inside and outside protected areas**

Since year 2000, the government has policy in transfering agriculture structure that makes increasing land area used for shrimp production. Figures 3.3 shows the the ratio of land used for the economic production of rice and aquaculture in the hamlets surveyed outside and inside protected areas. For inside the protected areas, the ratio of land used for rice occupies 46% and for shrimp 50.3%. Contrarily, at the outside protected areas, the ratio of

land used for rice is only 10%, while of that for shrimp and other aquaculture are 90%, indicating that more farmers outside protected areas are using shrimp farming.

Figures 3.4 and 3.5 shows mean land area per household for shrimp production by hamlet and stakeholder group inside and outside protected areas. For inside protected areas, no shrimp land is found in the freshwater region (e.g. hamlet 21 and Ninh Dinh). In both outside and inside protected areas, mean land area per household for shrimp production varies from 1.2 to 1.85 ha with the exception of Chu Chot (2.85 ha per household). Figure 3.5 indicates that wealth affects conversion to shrimp culture. More land has been converted to shrimp farming is found for better-off group.

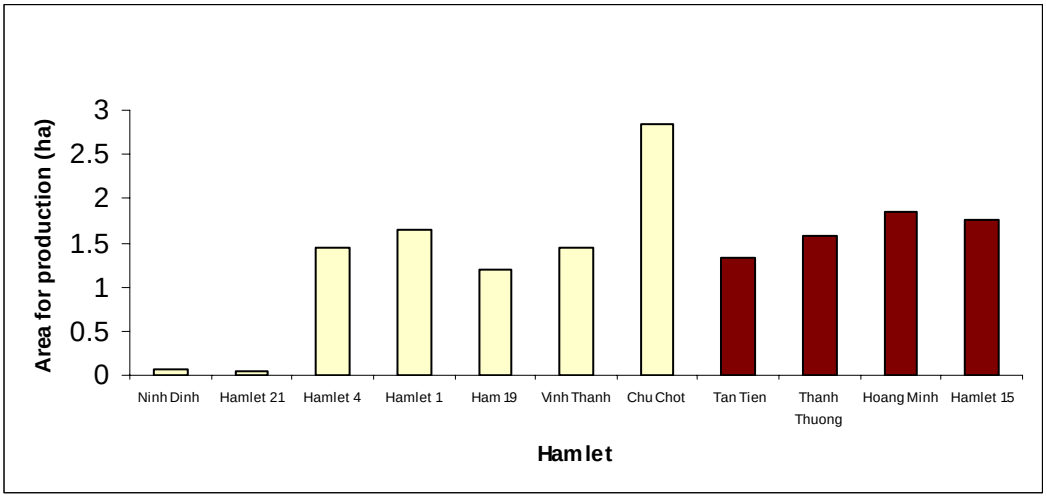



**Fig. 3.4 Mean land area per household for shrimp production by hamlet inside and outside protected areas**

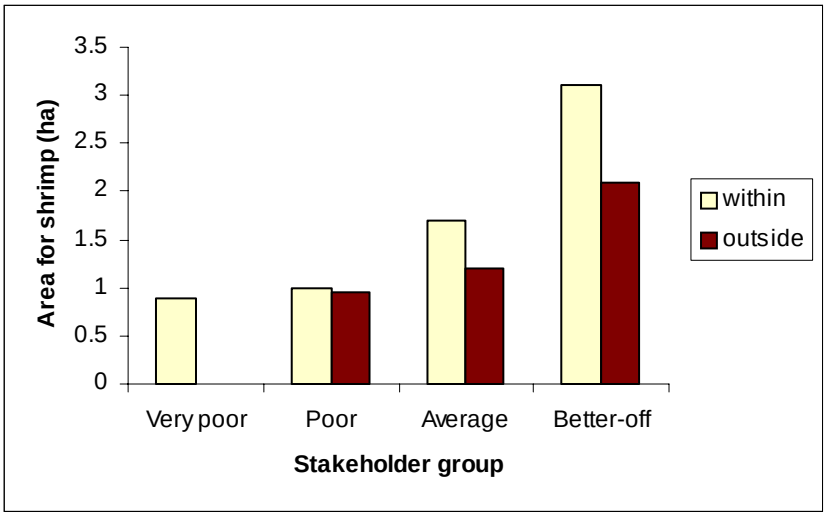



**Figure 3.5 Mean area per household for shrimp production by stakeholder group**

As expected, rice land is found mainly in the fresh water zones inside protected areas (Ninh Dinh and Hamlet 21). For outside protected areas, a few area of rice land is found in Vinh

My A village (e.g. Tan Tien, Hamlet 15). Figure 3.6 shows the mean land area per household for rice production by stakeholder group. The better-off group has more rice land than average and poorer groups. Referring to Figure 3.5, it is true that the better-off having more land for shrimp, they also maintain more rice land because they practiced rice - shrimp farming.

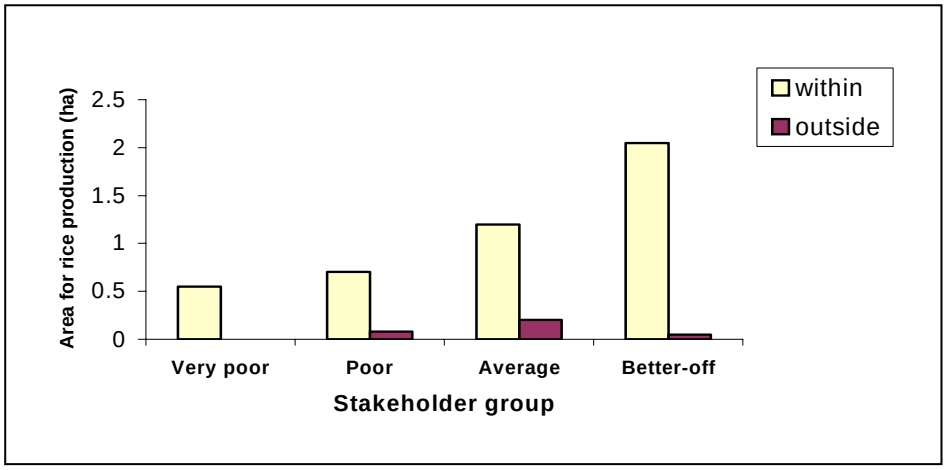



**Fig. 3.6 Mean land area per household for rice production by stakeholder group**

### 3.1.2 Land ownership

Land ownership is one of important indicators reflecting the household economic status. In this study area, land ownership is classified into five different categories: landless, less than 0.5 ha, less than 1 ha, between 1 and 2 ha and more than 2 ha of land per household. Landless households are classified as those households with less than 500m$^2$ of economic production land. Figures 3.7 and 3.8 show land ownership classification in outside and inside salinity-protected areas. There are number of of landless households was found among hamlets outside (e.g. Thanh Thuong, Hoang Minh, Hamlet 15) and inside (Hamlet 21, Ninh Dinh, Hamlet 19, Vinh Thanh). Households with >2 ha occupy a significant proportion.

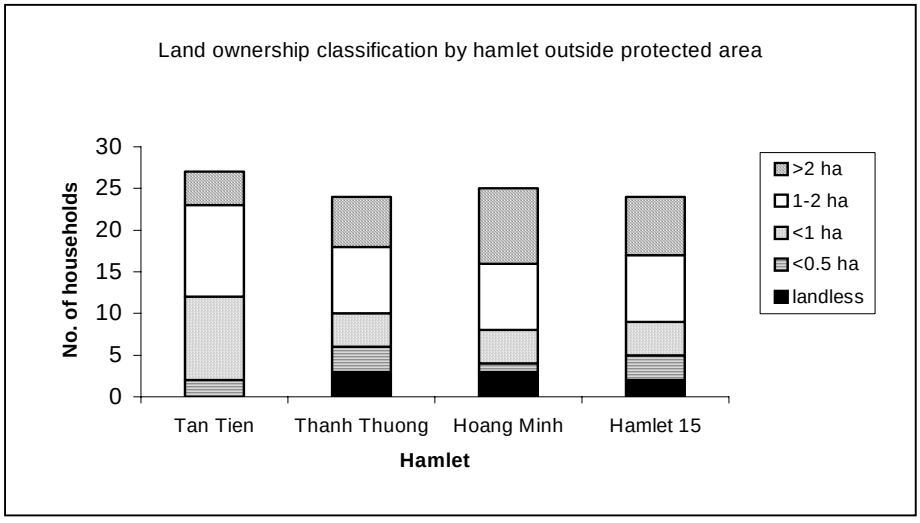



**Fig. 3.7 Land ownership classification by hamlet outside salinity-protected areas**

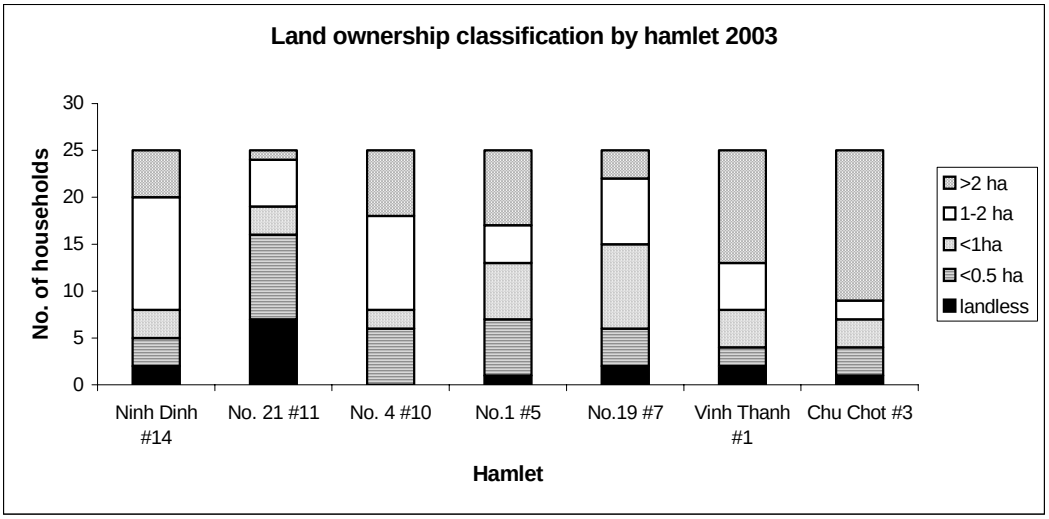



**Fig. 3.8 Land ownership classification by hamlet inside salinity-protected areas**

Figures 3.9 and 3.10 show land classification by stakeholder group outside and inside salinity-protected areas. As indicating, the poorer group has the greatest number of landless households in both regions. The rich households with >2 ha also share the greatest proportion in both surveys.

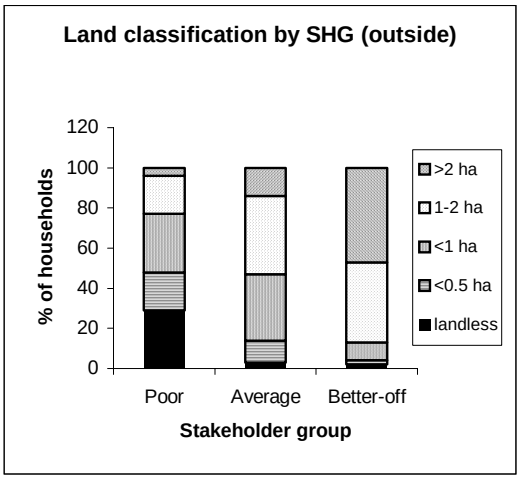



**Fig. 3.9 Land ownership classification by SHG outside salinity-protected areas**

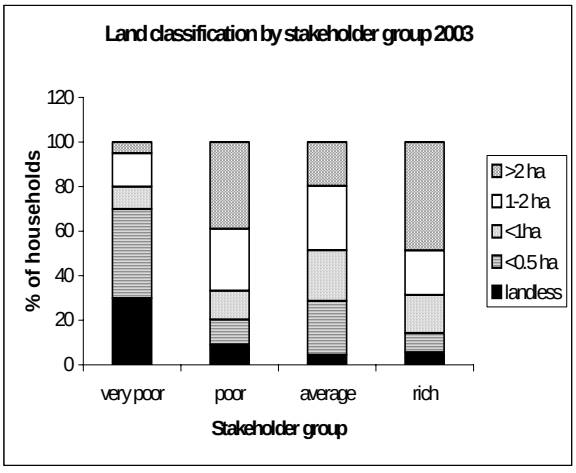



**Fig. 3.10 Land ownership classification by SHG inside salinity-protected areas**

Land is an important possession form of farmer. Very often that farmers have land for economic production but have no "land ownership certificate". The land ownership certificate indicates the right of land use and is determined by the authority. Households holding "land ownership certificate", they can deposit as a pledge to borrow money from the bank. In the study areas, if borrow more than 10 million VND, farmers need to have land

to mortgage. Figure 3.11 shows the number of households in each hamlet that have their land ownership certificate. It is generally above 50% for inside and 85% for outside.

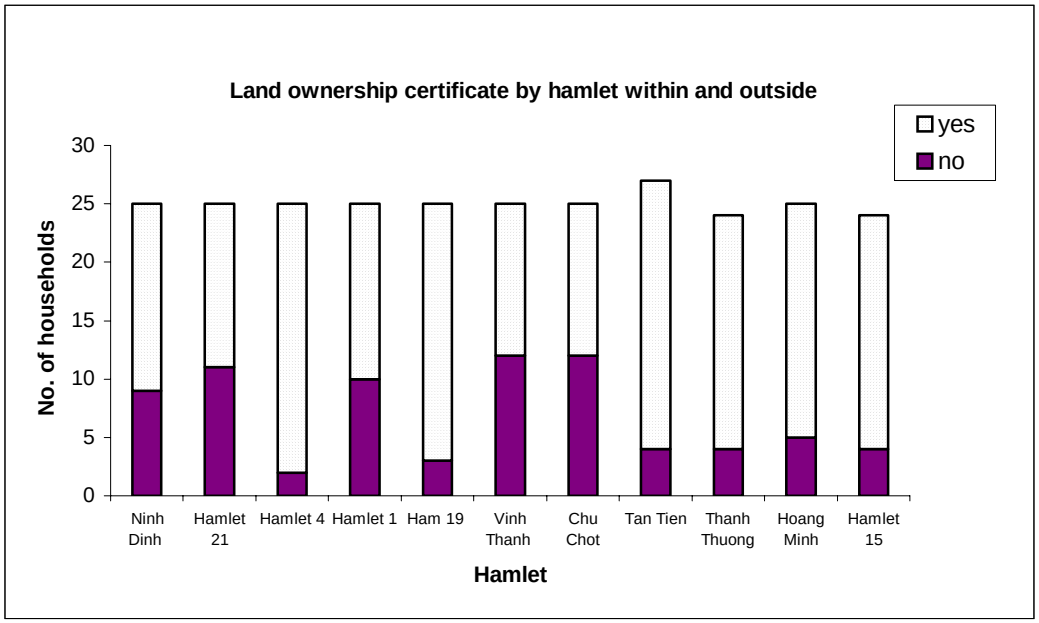



**Fig. 3.11 No. of households in possession of their land ownership certificate by hamlet**

### 3.1.3 Farming systems

Farming systems among hamlets under surveyed outside and inside salinity-protected areas are diverse and various. Changes in land use policy and water management scheme have influenced farming systems in the study area. Figure 3.12 shows the number of households producing rice, rice & shrimp or shrimp in each hamlet.

Households in the four hamlets under surveyed outside protected areas, currently practise with mainly shrimp farming, some with rice-shrimp and very fews with mono rice. In Thanh Thuong and Hoang Minh, there are 100% households have converted to mainly shrimp farming since 2000. In Hamlet 15, around 14% households remain two rice crops per year, while in Tan Tien only 3% households remain double rice cropping.

Farming systems of households inside salinity-protected areas are more diverse and influenced by water management scheme. Households in Ninh Dinh have reverted to mainly double rice cropping. Previously in Ninh Dinh households could produce three rice crops per year, and now only grow two rice crops due to constraints posed by the present water management scheme where the third season is affected by saline water in the fields. Similarly, in Hamlet 21 most farmers are currently practsing two rice crops per year, while previously they practised triple cropping. Contrary to households in two hamlets mentioned above, households in Hamlet 1 and Chu Chot are currently practising only shrimp or rice-shrimp farming though these areas located within protected areas. Households in Hamlet 1 where all of the rice production area has been converted to shrimp production as a result of saline water coming from Ho Phong sluice, and Chu Chot with available of saline water from west sluices.

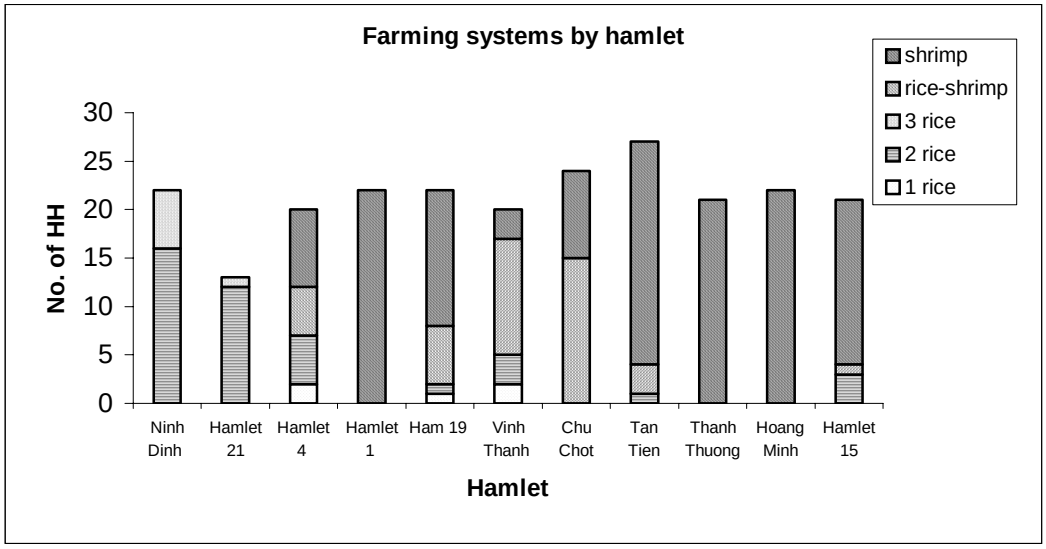
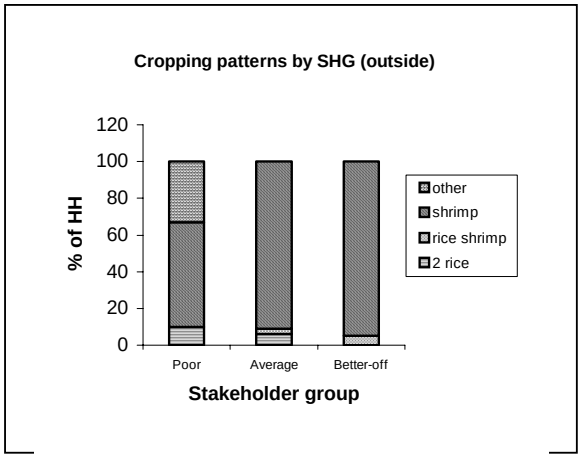



**Fig. 3.12 Farming systems 2003 by hamlet**

Figures 3.13 and 3.14 describe household cropping patterns by stakeholder group. In outside salinity-protected areas, households in all groups have converted to shrimp farming. The better-off group grows shrimp more intensively than others. While within protected areas many households in all groups have also converted to shrimp and rice-shrimp systems. This conversion to shrimp farming within protected areas is due to declining rice productivity in areas with saline water.



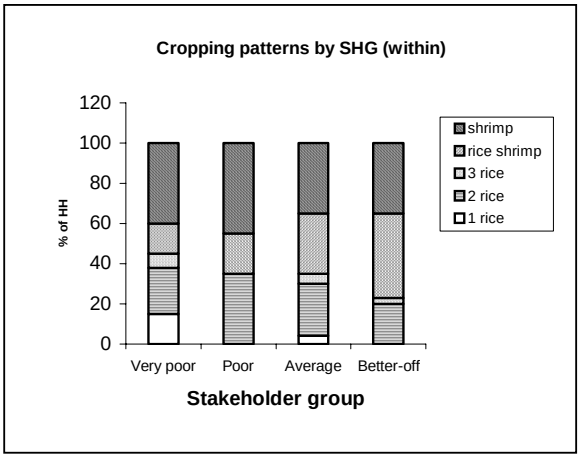




**Fig. 3.13 Cropping patterns by stakeholder group (outside salinity-protected areas)**

**Fig. 3.14 Cropping patterns by stakeholder group 2003 (inside salinity-protected areas)**

### 3.1.4 Rice production

Rice yields in 2003 are presented in Figures 3.15. It is noted that households in outside protected areas produced rice in the rice-shrimp system and achieved a good yield (4.5 to 6.0 t/ha/season). It is also noted that some other households outside protected areas they grew rice in order to maintain "good environment" for shrimp and not for the purpose of high yielding. For within protected areas, yields were generally low except in Ninh Dinh,

Hamlet 21 and Hamlet 4, where they are non-acid soil, rice yield was highest. In other hamlets the rice yields were low due to affected by saline water.

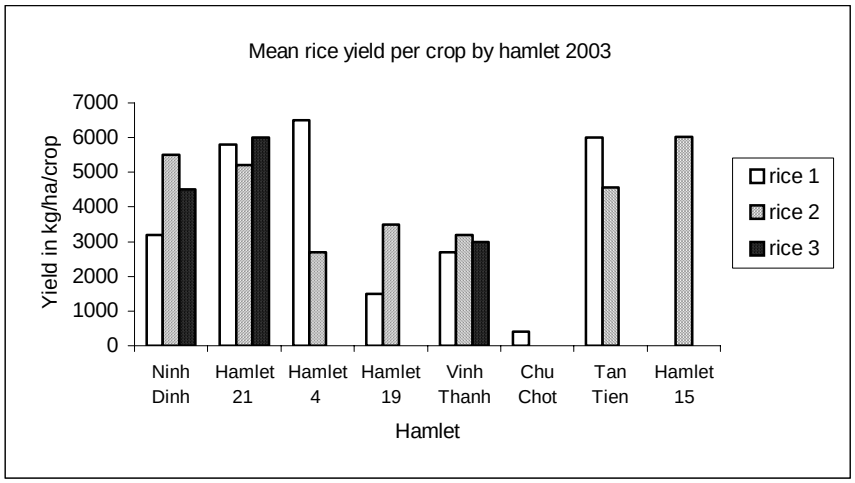



**Fig. 3.15 Mean rice yield per crop by hamlet 2003**

*(Rice 1 refers to Dong-Xuan crop; Rice 2 refers to He-Thu crop; Rice 3 refers to Mua crop).*

Figures 3.16 and 3.17 show mean rice yield by stakeholder group outside and inside salinity protected areas. In both outside and inside protected areas, the poorer and average groups produced rice with higher yield than better-off group. This can be explained that the better-off paid more attention to shrimp production, while rice received less.

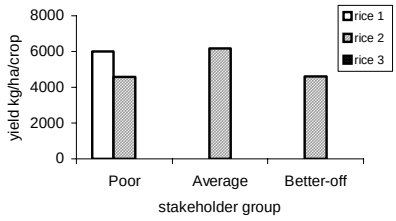



**Fig. 3.16 Mean rice yield per crop by stakeholder group 2003 (outside protected areas)**

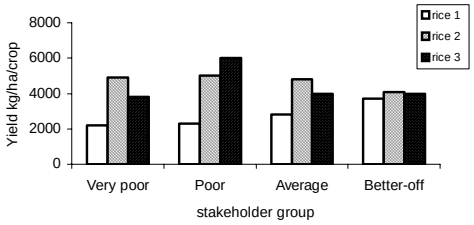



**Fig. 3.17 Mean rice yield per crop by stakeholder group 2003 (inside protected areas)**

### 3.1.5 Shrimp production

Figures 3.18 and 3.19 show the share of total shrimp production (kg) outside and inside protected areas by hamlet for 2003. Production is dominated by Chu Chot hamlet for inside protected area, and Hamlet 15 and Tan Tien for outside protected area. The contribution from other hamlets is small (5 to 12%).

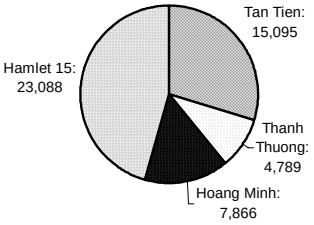



**Fig. 3.18 Share of total shrimp production (kg) outside protected area by hamlet 2003.**

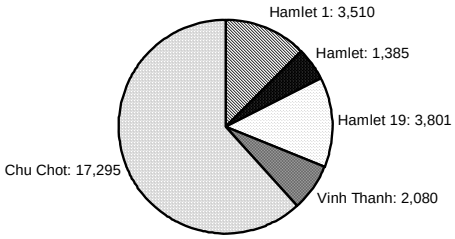



**Fig. 3.19 Share of total shrimp production (kg) inside protected area by hamlet 2003.**

The overall contribution from better-off and average households is highest (68 and 22% for outside, and 48 and 42% for inside protected area, respectively) (Figures 3.20 & 3,21). The contribution from poorer households is small (<10%) as their farming were not sucessful.

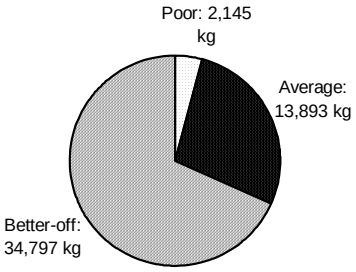



**Fig.3.20 Share of total shrimp production (kg) outside protected area 2003 by stakeholder group**

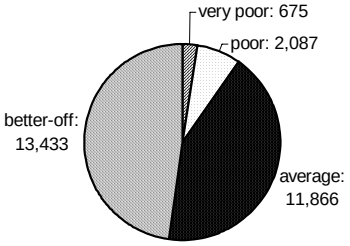



**Fig.3.21 Share of total shrimp production (kg) inside protected area 2003 by stakeholder group**

Tables 3.2 and 3.3 show the number of households who aim to produce at least one shrimp crop per year inside and outside salinity protected areas by hamlet and by stakeholder group. Ninh Dinh and hamlet 21 where fresh water is available, no households shift into shrimp production. Other hamlets with availability of saline water, most of households aim to produce shrimp. In both outside and inside protected areas, the shifting to shrimp production is dominated by better-off and average households. Poorer households may lack of conditions for investment of shrimp production.

**Table 3.2 Number of households in each hamlet who aim to produce at least one shrimp crop per year**

| Hamlet | HH of shrimp 2003 (within) | | | Hamlet | HH of shrimp 2003 (outside) | | |
|---|---|---|---|---|---|---|---|
| | No | Yes | Total HH | | No | Yes | Total HH |
| Ninh Dinh | 25 | 0 | 25 | Tan Tien | 1 | 26 | 27 |
| Hamlet 21 | 25 | 0 | 25 | Thanh Thuong | 8 | 16 | 24 |
| Hamlet 4 | 15 | 10 | 25 | Hoang Minh | 3 | 22 | 25 |
| Hamlet 1 | 7 | 18 | 25 | Hamlet 15 | 7 | 17 | 24 |
| Hamlet 19 | 8 | 17 | 25 | | | | |
| Vinh Thanh | 7 | 18 | 25 | | | | |
| Chu Chot | 4 | 21 | 25 | | | | |
| | **91** | **84** | **175** | | **19** | **81** | **100** |

**Table 3.3 Number of households in each SHG who aim to produce at least one shrimp crop per year**

| SHG | HH of shrimp 2003 (within) | | | SHG | HH of shrimp 2003 (outside) | | |
|---|---|---|---|---|---|---|---|
| | No | Yes | Total HH | | No | Yes | Total HH |
| Very poor | 14 | 6 | 20 | | | | |
| Poor | 30 | 24 | 54 | Poor | 10 | 11 | 21 |
| Average | 31 | 35 | 66 | Average | 5 | 31 | 36 |
| Better-off | 16 | 19 | 35 | Better-off | 4 | 39 | 43 |
| | **91** | **84** | **175** | | **19** | **81** | **100** |

Figures 3.22 and 3.23 show the mean shrimp yield per household by hamlet and stakeholder group in 2003. Yields are highest in outside protected area and generally low inside protected area. This reflects in part incidence of low levels of intensity. Households outside protected area produce shrimp more intensive than that households within protected area and the poorer households getting low yield.

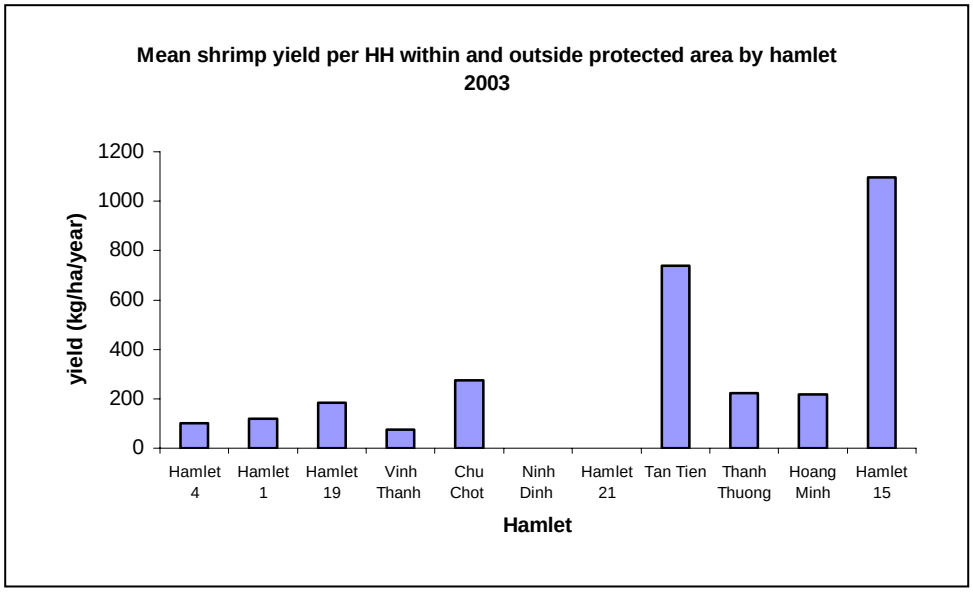



**Fig. 3. 22 Mean shrimp yield per household by hamlet (2003)**

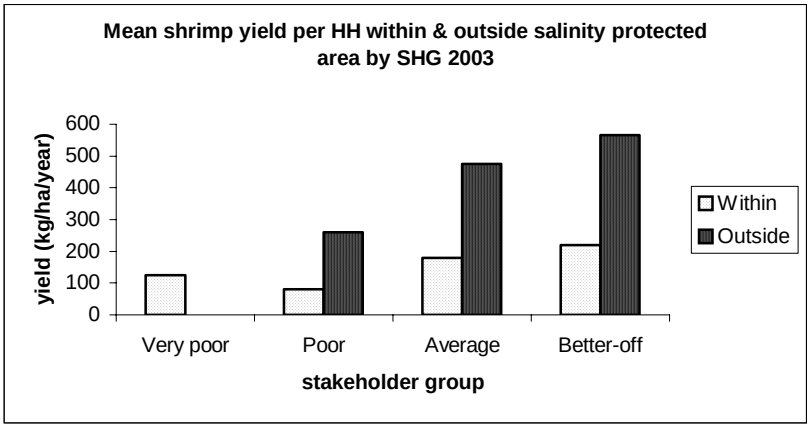



**Fig. 3.23 Mean shrimp yield per household by stakeholder group (2003)**

### 3.1.6 Capture fisheries

Number of households involved in capture fisheries is presented in Table 3.4. This shows a small number of households outside protected area involved in fisheries in 2003 (25% of total). The number of households and total catch was much higher for inside protected area. Mean catch per household was lowest in the outside protected zone and highest at Chu Chot hamlet.

**Table 3.4 Number of households involved in fisheries in 2003 by hamlet**

| Within protected area | | | | Outside protected area | | | |
|---|---|---|---|---|---|---|---|
| Hamlet | No. of HH | Total catch (kg) | Mean catch/HH (kg) | Hamlet | No. of HH | Total catch (kg) | Mean catch/HH (kg) |
| Ninh Dinh | 12 | 3937 | 328 | | | | |
| Hamlet 21 | 7 | 2748 | 393 | Tan Tien | 6 | 1590 | 265 |
| Hamlet 4 | 12 | 5769 | 481 | Thanh Thuong | 10 | 2140 | 214 |
| Hamlet 1 | 17 | 6150 | 362 | Hoang Minh | 4 | 860 | 215 |
| Hamlet 19 | 8 | 3700 | 463 | Hamlet 15 | 5 | 586 | 117 |
| Vinh Thanh | 10 | 2417 | 242 | | | | |
| Chu Chot | 14 | 9675 | 691 | | | | |
| | **80** | **34396** | **430** | | **25** | **5176** | **207** |

Fish captured to be sold or for home consumption depended on households and presented in Table 3.5. In general the level of catch per household outside protected area is lower for all groups. This reflects in part of less attention of this activity. For inside protected area, it is apparent that the highest level of total catch is the average households and they sell about half of their catch (49%). The level of catch per household is lower for better-off and poorer groups and they sell a greater proportion of their catch (65%).

**Table 3.5 Levels of consumption and sale of fish**

| Within protected area | | | | Outside protected area | | | |
|---|---|---|---|---|---|---|---|
| Stakeholder group | Total catch (kg) | % consump- tion | % sold | Stakeholder group | Total catch (kg) | % consump- tion | % sold |
| Very poor | 1476 | 66 | 33 | | | | |
| Poor | 7982 | 35 | 65 | Poor | 1181 | 52 | 48 |
| Average | 20525 | 49 | 49 | Average | 1860 | 70 | 30 |
| Better-off | 4413 | 52 | 49 | Better-off | 2135 | 20 | 80 |

### 3.1.7 Seasonality

Table 3.6 and 3.7 present data on monthly basis of catch that showing seasonality patterns of household catch at inside protected area and there are not available data of that at outside protected area for comparison. The catch is highest at Chu Chot hamlet, especially high in July. Hamlet 1 and hamlet 4 show consistently catch around the year (512 and 480 kg/month, respectively). Ninh Dinh, hamlet 21 and Vinh Thanh show peaks of catch in September-October. Other sites show less seasonal variation. By analyzing stakeholder groups, poor and very poor households derive greatest benefit in the period June-October, whereas rich households show little variation. Remarkably, average households show a greatest of catch with the peak in July.

**Table 3.6 Mean monthly household catch (kg) by hamlet inside protected area**

| *Hamlet* | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ninh Dinh** | 213 | 203 | 193 | 183 | 315 | 365 | 395 | 507 | 533 | 541 | 318 | 171 | **3937** |
| **Hamlet 21** | 22 | 22 | 22 | 22 | 22 | 167 | 174 | 194 | 682 | 772 | 627 | 22 | **2748** |
| **Hamlet 4** | 635 | 535 | 567 | 435 | 435 | 435 | 435 | 480 | 453 | 453 | 453 | 453 | **5769** |
| **Hamlet 1** | 389 | 561 | 536 | 559 | 549 | 533 | 573 | 583 | 568 | 523 | 403 | 373 | **6150** |
| **Hamlet 19** | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 325 | 325 | 305 | 305 | **3700** |
| **Vinh Thanh** | 59 | 49 | 49 | 64 | 79 | 199 | 394 | 437 | 494 | 445 | 101 | 47 | **2417** |
| **Chu Chot** | 821 | 810 | 811 | 909 | 783 | 808 | 1731 | 841 | 766 | 675 | 380 | 340 | **9675** |
| **Total** | 2444 | 2485 | 2483 | 2477 | 2488 | 2812 | 4007 | 3347 | 3821 | 3734 | 2587 | 1711 | ***34,396*** |

**Table 3.7 Mean monthly catch (kg) by stakeholder group inside protected area**

| *Stakeholder group* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *Jun* | *Jul* | *Aug* | *Sept* | *Oct* | *Nov* | *Dec* | *Annual catch* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **very poor** | 74 | 74 | 64 | 54 | 44 | 184 | 179 | 204 | 227 | 244 | 84 | 44 | **1476** |
| **poor** | 570 | 588 | 589 | 601 | 555 | 700 | 772 | 911 | 843 | 797 | 548 | 508 | **7982** |
| **average** | 1334 | 1359 | 1334 | 1458 | 1525 | 1560 | 2688 | 1860 | 2399 | 2326 | 1714 | 968 | **20,525** |
| **rich** | 466 | 464 | 496 | 364 | 364 | 368 | 368 | 372 | 352 | 367 | 241 | 191 | **4413** |
| **Total** | **2444** | **2485** | **2483** | **2477** | **2488** | **2812** | **4007** | **3347** | **3821** | **3734** | **2587** | **1711** | ***34,396*** |

## 3.2 Physical Capital

Tables 3.8 and 3.9 show the percentage of households with access to TV, radio, pump, motorboat, rowing boat and motobyke by hamlet and by stakeholder group.

**Table 3.8 Percentage of households in each hamlet with access to TV, radio, pump, motorboat, rowing boat and motobyke within and outside protected areas**

| Hamlet | % HH with access to physical assets | | | | | |
|---|---|---|---|---|---|---|
| | TV | Radio | Pump | Motoboat | Rowingboat | Motobyke |
| Within protected area | | | | | | |
| Ninh Dinh | 68 | 44 | 44 | 28 | 28 | NA |
| Hamlet 21 | 44 | 36 | 8 | 12 | 12 | NA |
| Hamlet 4 | 76 | 64 | 52 | 8 | 8 | NA |
| Hamlet 1 | 76 | 56 | 64 | 12 | 12 | NA |
| Hamlet 19 | 80 | 64 | 24 | 12 | 12 | NA |
| Vinh Thanh | 56 | 48 | 40 | 20 | 20 | NA |
| Chu Chot | 80 | 72 | 60 | 8 | 8 | NA |
| Outside protected area | | | | | | |
| Tan Tien | 100 | 81 | 93 | 19 | 0 | 11 |
| Thanh Thuong | 86 | 75 | 75 | 54 | 8 | 4 |
| Hoang Minh | 84 | 68 | 78 | 68 | 0 | 20 |
| Hamlet 15 | 88 | 63 | 67 | 4 | 8 | 29 |

NA = not available

**Table 3.9 Percentage of households in each stakeholder group with access to TV, radio, pump, motorboat, rowing boat and motobyke within and outside protected areas**

| SHG | % HH in each SHG with access to physical assets | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TV | | Radio | | Pump | | Motoboat | | Rowingboat | |
| | in | out | in | out | in | out | in | out | in | out |
| very poor | 40 | NA | 25 | NA | 10 | NA | 35 | NA | 10 | NA |
| poor | 48 | 76 | 41 | 47 | 20 | 43 | 28 | 14 | 15 | 10 |
| average | 83 | 94 | 65 | 83 | 56 | 67 | 50 | 25 | 12 | 6 |
| better-off | 88 | 97 | 74 | 74 | 66 | 76 | 74 | 56 | 20 | 0 |

From the analysis by hamlet, two clear differences emerge. Firstly, all assets such as TV, radio, pump and motoboat are high in area outside protected zone. Secondly, the % of households with access to rowing boat is higher in within protected zone. In general, physical capital appears to be high in area outside protected zone. Analysis by stakeholder group, better-off and average groups show a predominant in accessing to physical capital, while others (poor and very poor groups) showing less.

## 3.3 Human Capital

### 3.3.1 Occupation of household heads

Table 3.10 shows the main occupation of household heads within and outside protected areas. There are three remarkable differences of household heads occupation. Firstly, the % of household heads with on-farm is high in the outside protected zone. Secondly, off-farm (selling labour) is high in within protected zone. Thirdly, diversity of employment is found in within protected zone.

**Table 3.10 Main occupation of household heads within and outside protected zones 2003**

| Type of employment | Main types of occupation | % of HH (175 HH within protected area) | % of HH (100 HH outside protected area) |
|---|---|---|---|
| No job | Old person, sickness, house affairs, no job | 1.2 | 9.0 |
| On-farm | Shrimp farmer, rice farmer, rice-shrimp farmer, shrimp and fish farmer | 71.3 | 81.0 |
| Off-farm | Selling labor | 13.7 | 3.0 |
| Cottage industry | Basket making, wine processing, handicrafts, making Nipa roofs, sedgee making | 8.0 | 0.0 |
| Non-farm employment | Carpenter, construction worker, worker in factory, fisher man, motobyke driver | 2.0 | 5.0 |
| Salary employment | Teacher, hamlet official, village officical, guard, medical doctor | 2.0 | 0.0 |
| Small service industry | Small sell and buy, retailer | 1.9 | 2.0 |

### 3.3.2 Ages, experiences and education of household heads

Table 3.11 and 3.12 show percentage of household heads with age, years experiences in shrimp culture and levels of education by stakeholder group for outside protected zone. Household heads with ages 21-60 are predominant for all stakeholder groups. Poor group shows less experience in shrimp farming and low levels of education (grade 0-9). This reflects in part of failures and doing badly in production.

**Table 3.11 % of household heads with age, number of years experience in shrimp culture by SHG**

| Stakeholder group | Age | | Year experience in shrimp culture | | |
|---|---|---|---|---|---|
| | 21-60 | >60 | 0 | 1-5 ys | >5 ys |
| poor | 81 | 19 | 19 | 43 | 38 |
| average | 89 | 11 | 5 | 67 | 28 |
| better-off | 79 | 21 | 5 | 56 | 39 |

**Table 3.12 % of household heads with levels of education by SHG**

| Stakeholder group | Level of education of head HH | | | |
|---|---|---|---|---|
| | 0 grade | grade 1-5 | grade 6-9 | grade 10-12 |
| poor | 19 | 48 | 19 | 14 |
| average | 3 | 44 | 47 | 6 |
| better-off | 2 | 54 | 37 | 7 |

## 3.4 Financial Capital

### 3.4.1 Diversity of income sources

Table 3.13 describes the diversity of income sources by stakeholder groups for within and outside protected areas in 2003. The percentage of households with 1, 2, 3, 4 or 5 sources of income are calculated for each stakeholder group. There is little difference between

inside and outside protected areas and groups with about 70% in each case having either 2 or 3 sources. The differences are also reflected by figures 3.24 and 3.25 which indicate the most important source of household income of each stakeholder group. There is a remarkableness that shrimp and employment being most important source of household income in both cases for all groups and poorer groups whose income sources have become more diversified.

**Table 3.13 Diversity of household income by stakeholder group**

| No. of income sources | % of HH within protected area | | | | % of HH outside protected area | | |
|---|---|---|---|---|---|---|---|
| | very poor | poor | average | better-off | poor | average | better-off |
| 1 | 10 | 11 | 11 | 11 | 19 | 14 | 9 |
| 2 | 40 | 35 | 33 | 31 | 38 | 44 | 56 |
| 3 | 30 | 39 | 36 | 37 | 29 | 31 | 28 |
| 4 | 20 | 13 | 18 | 14 | 14 | 11 | 7 |
| 5 | 0 | 0 | 2 | 3 | 0 | 0 | 0 |

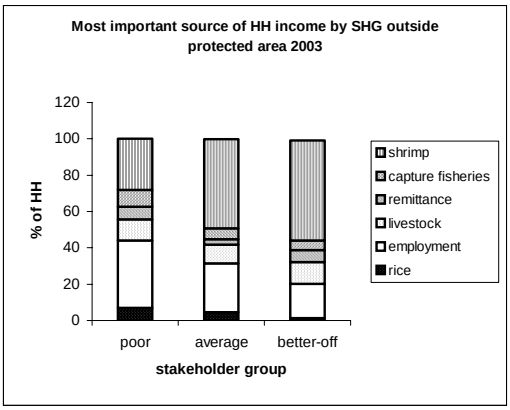



**Fig. 3.24 Most important source of household income by stakeholder group outside protected area**

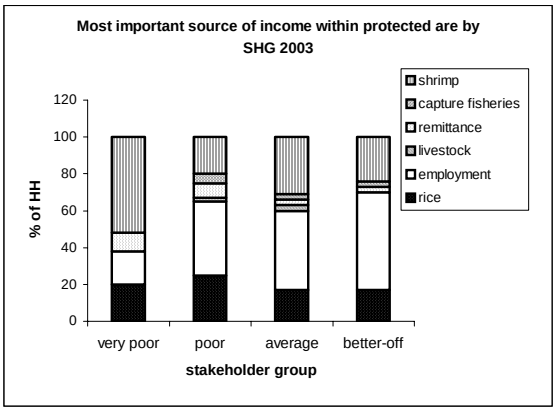



**Fig. 3.25 Most important source of household income by stakeholder group inside protected area**

### 3.4.2 Household income

Table 3.14 shows mean household income by hamlet. Hamlet 15 (outside protected area) and Chu Chot (Chu Chot is unaffected by protected system) show a greatest income from shrimp. Ninh Dinh and hamlet 21 (fresh water zone) show highest income from rice.

**Table 3.14 Mean HH income (VND million) for rice, shrimp, employment, livestock, capture fisheries and aquaculture other than shrimp by hamlet**

| Hamlet | Mean HH income (x 1 million VNĐ) | | | | |
|---|---|---|---|---|---|
| | Rice | Shrimp | Employment | Fisheries | Aqua. other shrimp |
| Within protected area | | | | | |
| Ninh Dinh | 9.20 | 0.00 | 3.20 | 0.78 | NA |
| Hamlet 21 | 7.90 | 0.00 | 6.50 | 0.30 | NA |
| Hamlet 4 | 9.21 | 8.95 | 10.87 | 1.53 | NA |
| Hamlet 1 | 0.00 | 18.61 | 8.80 | 1.61 | NA |
| Hamlet 19 | -0.67 | 17.04 | 8.23 | 1.22 | NA |
| Vinh Thanh | 2.76 | 6.61 | 8.56 | 1.37 | NA |
| Chu Chot | -1.21 | 60.63 | 13.23 | 1.91 | NA |
| Outside protected area | | | | | |
| Tan Tien | 3.09 | 14.47 | 8.23 | 0.00 | 0.95 |
| Thanh Thuong | 7.48 | 8.42 | 4.35 | 0.55 | 0.83 |
| Hoang Minh | 0.00 | 24.83 | 4.81 | 0.44 | 7.56 |
| Hamlet 15 | 0.00 | 92.65 | 7.33 | 0.19 | 1.39 |

Table 3.15 indicates the mean household income in VND million by stakeholder group for the main sources of income: rice, shrimp, employment, livestock, capture fisheries and aquaculture other than shrimp. In both cases, within and outside protected areas, average and better-off groups show highest income from shrimp while the poor lowest. By analyzing risk of failure, the poor and average group show a high risk of failure in shrimp production, that causing less income (Table 3.16).

**Table 3.15 Mean household income for rice, shrimp, employment, livestock, capture fisheries and aquaculture other shrimp by stakeholder group.**

| Source of income | poor | | average | | better-off | |
|---|---|---|---|---|---|---|
| | within | outside | within | outside | within | outside |
| Rice | 2.20 | 2.51 | 5.86 | 9.57 | 10.46 | 2.94 |
| Shrimp | 5.71 | -6.65 | 31.30 | 20.06 | 42.20 | 65.41 |
| Employment | 9.85 | 5.98 | 6.12 | 3.67 | 9.32 | 8.49 |
| Livestock | 0.80 | 0.16 | 1.41 | 0.02 | 2.31 | 0.48 |
| Fisheries | 1.42 | 0.55 | 1.49 | 0.13 | 1.01 | 0.29 |
| Aqua. other shrimp | NA | 0.10 | NA | 3.10 | NA | 3.67 |

**Table 3.16 Number of household with failure in shrimp production by SHG**

| Stakeholder group | No. of HH failure | % HH failure |
|---|---|---|
| poor | 8 | 38 |
| average | 12 | 33 |
| better-off | 12 | 28 |

### 3.4.3 Net household income

Net household income is calculated from from total household incomes subtract to total household expenditures. As mentioned in prior section, major sources of household income in both cases within and outside protected areas are from shrimp and rice production, non-

rice crops such as pineapple, melaleuca and nipa production, capture fisheries, employment, livestock, aquaculture (other than shrimp). Income from leasing land out, non-farm and off-farm has been included under employment.

Mean net household income by stakeholder group and hamlet in 2003 is presented in Figures 3.26 and 3.27. Hamlet 15 (outside) and Chu Chot (inside) show the highest net household income. It is noted that shrimp production in both cases is more intensive. Analysis by stakeholder group, better-off has the highest net household income, while others show less. Remarkably, there is a big gap in net household income amongst the poor and better-off group.

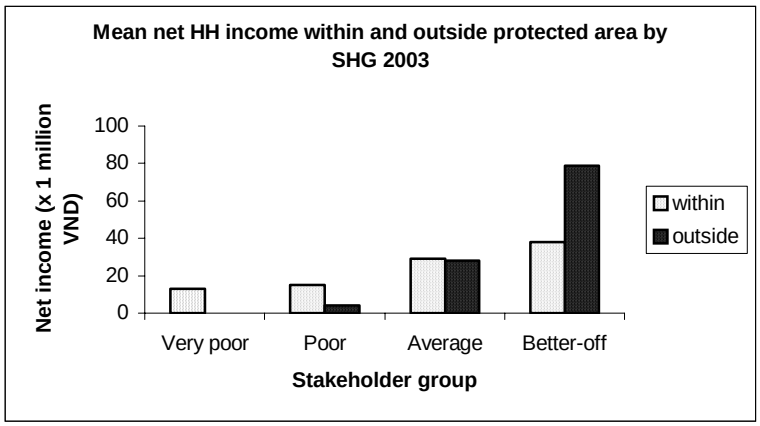



**Fig. 3.26 Mean net household income by stakeholder group**

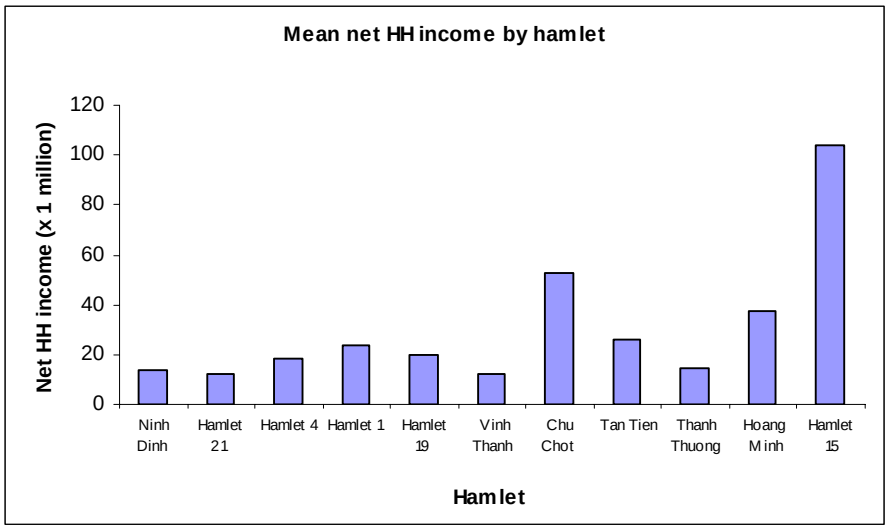



**Fig. 3.27 Mean net household income by hamlet**

# 4. Conclusions

This working paper is based upon two surveys, the DFID-R7467c end-of-project survey (2003) and additional survey (2004), analysis focusing on area outside the salinity protected zone, and therefore some details analysis from 2003 survey may not be repeated in this report.

- **Natural capital:** Land under economic production per household is not different between outside and inside protected zone. Better-off group owns larger of land holdings while others less. About 90% area of land used for shrimp and aquaculture production for outside protected zone but only 54% for inside protected zone. Farming systems of household focus more on shrimp production for outside but more diverse for inside. Rice yield and shrimp yield are high for outside protected zone but low for inside, except rice yield in fresh water area.

- **Physical capital:** Clear differences in physical resources of households outside and inside protected zones. Physical resources such as TV, radio, pump and motoboat are high for area outside protected zone but low for inside. Better-off and average groups show a predominant in accessing to physical capital, while others showing less.

- **Human capital:** Little differences in main occupation of household heads outside and inside protected zones. Occupation of household heads inside protected zone is more diverse. Poor group shows less experience in shrimp farming and low levels of education, reflecting in part of failures and doing badly in production.

- **Financial capital:** Household income is much higher in hamlets outside protected zone, but lower in rice zone and higher in Chu Chot. Better-off group shows highest income from shrimp while the poor lowest. Poor and average group show a high risk of failure in shrimp production, that causing less income. Net household income is much higher in hamlet 15 (outside) and Chu Chot (inside). Better-off has the highest net household income but others show less. There is a big gap in net household income amongst the poor and better-off group.

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