Constraints of Agricultural Development in the context of Environmental Conservation in Protected Areas of Vietnam

Nhung Nguyen Thi Trang, Cuong Tran Huu and Lebailly Philippe

1. Introduction

1.1. Objectives of the core zone: conservation.
1.2. Objective of the core zone livelihood development and micro enterprises.
1.3. There are 44,287 inhabitants in 14,076 households living in five buffer zones of CTNP (Giao Thuy district Statistical Office, 2018).

1.4. There are 2,198,71 ha (Giao Thuy district Statistical Office, 2018) and 1,699 ha (Ha, H.T, 2018) in total of 15,100 ha of the park.

1.5. Various kinds of synthetic fertilizers and pesticide are broadly used by 100% respondents. There are unsure of area and imbalance rate of chemical fertilizers in this projection.

1.6. ISH: Cultivars apply monoculture with two raising cycles/year. White leg pawns (Lupinana nummata) are reared with crabs in mangrove forests. Besides crabs and crabs, co-products such as wild-catch shrimp (metapenaeus ensis) & fishes, seaweed are harvested. This system relies mainly on ephemera going from the coast. No fertilizers and lime are utilized. Eight-month production cycle lasts from April to November annually.

2. Materials and Methods

2.1 Data collection:
The initial in-depth interviews were conducted with 12 staffs from local authorities (managers of communal people’s committee (CPC), headers of communal agricultural board (CAB) and communal agricultural cooperative (CAC), managers of CTNP board management and officials of department of agriculture & rural development (DARD)). Then 234 farmers living in buffer areas of CTNP were chosen this study.

2.2 Data analysis:

2.2.1 Production stability (PSI) is estimated by an index of farmers’ responses to production trends in recent five years as:

\[ PSI = \left( \frac{1}{n} \right) \sum_{i=1}^{n} \left( \frac{Q_i}{Q_{max}} \right) \]

Where Q_i is the production of the year i, Q_{max} is the highest production in the past five years, and n is the number of respondents.

2.2.2 Reduced water conflicts (RWF) can be evaluated by multiplying the responses with scoring value and divided by total number of respondents and divides total number of respondents. The scores of wild-catch habitats are classified as > 50%: 0.25; 20 - 49%: 0.5; < 20%: 0.75; and no natural fry use = 1.

2.2.3 Farmers’ opinion on the effective level of AAS was evaluated by weighted average index (WAI):

\[ WAI = \sum_{i=1}^{n} \left( \frac{P_{i}}{P_{max}} \right) \]

Where P_i is the production of the year i, P_{max} is the highest production in the past five years, and n is the number of respondents.

3. Results

3.1 Farm management and inputs

3.1.1 Rice based (RB)

3.1.2 Intensive shrimp (ISH)

3.1.3 Integrated aquaculture - mangrove (IAM)

3.2 Constraints of agricultural development toward environmental protection

Farmers rank conservation at least important while cultivating:

- Bird protection
- Household consumption
- Maintaining mangroves
- Creating jobs
- Land ownership
- Profit

3.3 Outputs of farmers

3.3.1 With private input dealers

3.3.2 With irrigation companies

4. Implication

4.1 Heightening awareness of farmers on the conservation through the public education.

4.2 Improving stability of production through application of sustainable practices.

4.3 Reducing wild-capture in IAM; (2) lower antibiotics, improving recycling and lower water exchange system in ISH; (3) restraint of area abuse and synthetic fertilizer imbalance and pesticide in RB.

4.4 Developing certification for farm products applying environmentally friendly practices.

4.5 Promoting specific policies/programs and the enforcement in agricultural aquaculture for buffer zones of protected areas.

4.6 Strengthening capacity of local authorities in translating advanced technologies of conservation agriculture and problem solving.

4.7 Strengthening collaboration of local authorities with farmers.

4.8 Stimulating experts of CTNP involve in agri. development of buffer zones.

For farmers

For environment

Production stability
Reduced water conflicts
Reduced dependence on agrochemicals
Reduced waste/contaminants from agriculture
Protected mangrove forest
Increased market preference

Fig. 1: Benefits of agricultural development and environmental protection in CTNP

Table 1: Farm outputs and impacts

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice-based (RB)</th>
<th>Intensive shrimp (ISH)</th>
<th>Integrated aquaculture - mangrove (IAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Eco.</td>
<td>Production of targeted product (kg/ha)</td>
<td>68.89</td>
<td>3,745</td>
</tr>
<tr>
<td>2. Environmental</td>
<td>Production changes (no. of respondents)</td>
<td>Increase</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Remaining</td>
<td>78</td>
<td>2</td>
</tr>
<tr>
<td>3. Production stability index (PSI)</td>
<td>0.64</td>
<td>0.35</td>
<td>0.91</td>
</tr>
<tr>
<td>4. Wild-catch use (no. of respondents)</td>
<td>&gt;50</td>
<td>72</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>25-49%</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>&lt;25%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>5. Biodiversity loss index (BLI)</td>
<td>0.28</td>
<td>1.00</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Fig. 2: Farming activities or three main farming systems

- RB: Rice is cultivated by two mono-crops/year. Farmers no longer use rotational cropping or integrated pest management (IPM). Diverse kinds of synthetic fertilizers and pesticide are broadly used by 100% respondents. There are unsure of area and imbalance rate of chemical fertilizers in this projection.

- ISH: Cultivars apply monoculture with two raising cycles/year. White leg pawns (Lupinana nummata) are reared with crabs in mangrove forests. Besides crabs and crabs, co-products such as wild-catch shrimp (metapenaeus ensis) & fishes, seaweed are harvested. This system relies mainly on ephemera going from the coast. No fertilizers and lime are utilized. Eight-month production cycle lasts from April to November annually.

Fig. 3: Objectives of farmers

Fig. 4: Collaboration between farmers and local organizations in agri. development:

- Carb and CAC have more collaboration with RB than IAM & ISH
- Private inputs dealers focus more on selling companies’ products than promoting conservation.
- CTNP have no collaboration with farmers in agriculture

Fig. 5: Effective levels of advisory service providers

- CAC and CAB concentrate more on promoting food security and productivity for buffer inhabitants than conservation perspectives.

Fig. 6: Constraints of agri. development toward env. protection

- Policies/regulation of agriculture: Farming activities are under regulated by DARD of district but are not enforced.

- Shortage of conservation agriculture programs: there are no environmentally friendly programs in the protected area in recent three years (2017-2019).

- No reliable economic gain for conservation activities.

- Lack of guidelines for conservation agriculture in this area.

- No certification supports for organic products in this area.

Fig. 7: Collaboration between farmers and local organizations in agri. development:

- Carb and CAC have more collaboration with RB than IAM & ISH
- Private inputs dealers focus more on selling companies’ products than promoting conservation.
- CTNP have no collaboration with farmers in agriculture

- Lack of effective mechanisms in solving environmental problems: disease outbreak in ISH, un-controlling exotic snail in RB and water conflict from pesticide in RB for IAM & ISH and sluage disposed is ISH and IAM

Fig. 8: Effective levels of advisory service providers

- CAC and CAB concentrate more on promoting food security and productivity for buffer inhabitants than conservation perspectives.

- Policies/regulation of agriculture: Farming activities are under regulated by DARD of district but are not enforced.

- Shortage of conservation agriculture programs: there are no environmentally friendly programs in the protected area in recent three years (2017-2019).

- No reliable economic gain for conservation activities.

- Lack of guidelines for conservation agriculture in this area.

- No certification supports for organic products in this area.