Case Study:

Converting waste to cooking fuel in Vietnamese coastal communities

Overview

In its efforts to contribute to the diversification of fishers’ livelihoods and improving the income of local fishing communities, the Regional Fisheries Livelihoods Programme has provided support to improve pig rearing techniques, in combination with using the pig wastes generated to produce methane for cooking in biogas digesters, in three central provinces of Viet Nam.

Key lesson learned

- There is strong demand and potential for the introduction of pig rearing / biogas in coastal communities to support livelihoods.
- The implementation of biogas activities should only be done with technical oversight and monitoring by a biogas expert and should involve beneficiaries as much as possible.
- Refresher training courses should be provided on biogas model operation and maintenance in order to ensure correct operation and safety.
Background

In the coastal communes of Quang Nam, Quang Tri and Thua Thien Hue provinces, inshore capture fisheries using motorised boats with small engines (12-20 horse power) is the most important livelihood and income source. Apart from marine capture fisheries, coastal households also rear pigs and chickens, dry fish, process fish sauce and conduct other fishery related services like net making and repair.

With regards to small-scale pig rearing, the absence of proper husbandry techniques leads to low net profit margins. In addition, pig wastes can cause environmental pollution, contamination of groundwater and foul odours.

To improve this situation, the Regional Fisheries Livelihoods Programme (RFLP) provided technical and financial support for improved pig rearing in combination with biogas production in Quang Nam, Quang Tri and Thua Thien Hue provinces, through collaboration with the provincial Departments of Agriculture and Rural Development. The biogas units provide methane gas for cooking, while the processed pig wastes from the biogas unit are odourless and can be used as an organic fertilizer. This intervention was aimed at livelihoods diversification for inshore fishing households and reduction of their vulnerabilities. In particular, the activity was targeted at women members of commune Fisheries Associations.

Beneficiary profile

Selected beneficiary households were all Fisheries Association women members with husbands involved in inshore capture fisheries. Most of them were housewives who were doing other income generation activities including small trading, animal husbandry (chicken and pig rearing) and other agriculture activities with incomes ranging from VND 400,000 – 2 million per month (US$ 20-100). The average monthly income from inshore fisheries was about VND 2 million (US$ 100). Capture fisheries activities conducted by the men are carried out year round except when extreme weather prevented fishing. However, this level of income was insufficient for household expenditures, and most of the households were classified by the Commune People’s Committee as poor.

The specific criteria for selection of beneficiaries were:

- Being a female member of the Fisheries Association, with her husband engaged in inshore capture fisheries and the family has a low income;
- Motivated to develop husbandry and willing to share the production cost;
- Capable of contributing to the sustainable development of local agriculture;
- Having adequate area for pig-sty or biogas plant construction;
- Having resources to construct a pig sty;
- Having relatively good knowledge of sand leek culture and pig rearing;
- Keen to learn, with good communication skills and the ability to share knowledge and experiences with others; and,
- Being hard-working and diligent in following the technical husbandry recommendations.

1 The Government of Viet Nam criteria for categorizing a rural household as poor is that the average income was VND 400,000/person/month or below. This was applicable for the period 2010-2015.
RFLP’s support

RFLP support consisted of payment for and the delivery of five piglets or two adult breeding sows directly to each beneficiary. For biogas, RFLP supported a total budget of VND 6.5 million (308 USD) per household as partial payment for the construction of the biogas unit, equipment, and other materials including plastic pipes, and valves.

Apart from the financial assistance, study tours were organized for interested community members to learn from successful models in another commune. Participants were shown an operational biogas unit of similar design to the type supported by RFLP with a mixing tank, digesters, and compensation tank that had not leaked or seeped in over two years of operation. The gas produced by the biogas plant at the household visited was plentiful, with sufficient for both cooking and lighting.

After the study tour, a one-day training course was conducted for the beneficiaries on pig rearing and biogas operation. The trainees were also provided with techniques for building a biogas plant, the advantages of building the biogas combined with pig husbandry and biogas operation, and the minimum requirements to ensure the production of sufficient amount of biogas for domestic use. They were encouraged to exchange information and share their experiences on husbandry techniques and related issues in facilitated discussions during the training course.

Beneficiary contribution

In order to obtain the full commitment of the beneficiaries to implement the activity, the RFLP, the commune Fisheries Association and the selected households agreed that the following other costs would be met by the beneficiaries:

- Pigsty improvement (5 m$^2$);
- Feed and veterinary medicines;
- Labour for waste sump digging, backfilling and construction materials equivalent to VND 5.5 million/biogas plant.

In addition, each beneficiary agreed that after pig harvest or operation of the biogas that they would repay an amount equivalent to 15% of the total investment by RFLP to the commune Fisheries Association fund to allow other members to benefit from Fisheries Association supported livelihoods and to contribute to Fisheries Association management activities.
Technical requirements

The national biogas consultant advised RFLP to use the KT2 design, with a digester volume of 6.6 m$^3$ in order to accommodate a maximum manure intake load of 50 kg per day, 50% manure solution, and with a 30 day composting time. This meant that each household had to have a pigsty area of 6-8 m$^2$ and a vacant land plot of at least 20 m$^2$ (3.5 x 5.5 m) for construction of the biogas unit. The national consultant provided the detailed drawings (shown below), reference cost estimates and technical requirements for the local builders who were selected by the provincial Department of Agriculture and Rural Development based on their proven track record of biogas plant construction.

Factors contributing to success

The rearing of fattening pigs combined with biogas plants has not only solved environmental pollution from pig wastes but has also provided methane for household cooking. This was a win-win situation for the beneficiary households and their neighbors, who are now less troubled by foul smells and flies caused by the pig wastes. The well constructed and efficiently operated biogas units are helping the households save money on fuel costs, saving time collecting and cutting wood as fuel and reducing environmental pollution. Although it is still too early to make the final assessment of the economic efficiency of the model, it is expected that the model will provide profits, savings and benefits for the beneficiaries. The successful biogas models can serve as demonstration sites for other fishers in the communes who may be interested in the system.
<table>
<thead>
<tr>
<th>Province</th>
<th>No. of biogas plants constructed</th>
<th>Average biogas plant volume (m³)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quang Tri</td>
<td>14</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Quang Nam</td>
<td>6</td>
<td>8.2</td>
<td></td>
</tr>
<tr>
<td>Thua Thien Hue</td>
<td>21</td>
<td>6</td>
<td>Plus 16 households involved in pig rearing combined with waste treatment sump repair</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41</strong></td>
<td></td>
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</table>

The first key factor to the success of this activity was the recruitment by RFLP of a capable biogas and husbandry expert as a national consultant who oversaw the technical aspects of the activity and trouble shooting. He was involved in all the steps of the model implementation process including critically participating in beneficiary selection when he explained the technical requirements so that community members were then able to make an informed decision on whether the model was appropriate for their situation.

Later on, the national consultant visited each selected household to ensure that they fully met the selection criteria set by the project and replaced those that did not fully meet the project requirements with other households that did. It also became apparent that a number of beneficiary households were not writing notes in the logbook provided by the agriculture extensionists. The national consultant emphasized the importance of keeping records to the beneficiary households and requested that the project management unit staff pay more attention to assisting the beneficiary households to record their data.

During a follow-up mission in December 2012, the national consultant identified that the builders were not following the design when constructing the biogas unit and as a result the biogas plants in Binh Hai and Tam Tien communes were leaking. Thanks to the technical support provided by the consultant these problems were quickly rectified. Before bringing the biogas units into operation, the consultant oversaw leak testing of each unit and as a result all 41 biogas units supported by RFLP in all three provinces are operating well.

Secondly, the pig rearing component of the model was implemented by technical staff from provincial Extension Centres who were sub-contracted by the project management units. These centres are in charge of transferring technology advances and best practices to local communities in order to improve productivity, quality and effectiveness of production activities. It was admitted by some staff that this was the first time they had implemented biogas in combination with pig rearing model in coastal communities. As they were exposed to the actual needs and had seen the feasibility of the model in these areas, they were now motivated and enthusiastic about expanding the same pig-biogas model to other coastal areas with a similar context.

**Difficulties encountered**

There were times when the national consultant was unable to provide technical assistance when needed by the beneficiaries. The situation in the field sometimes required the presence of technical support by the national consultant at very short notice (1-2 days). However, as the expert had to obtain prior approval from FAO before field visits could be made (and this took time), there were occasions were the consultant was unable to make field visits in a timely manner.

During the implementation process, some households withdrew their names from the beneficiary list because they could not afford to contribute their share of the biogas plant construction cost. Before operation of the models, most of the beneficiaries doubted that the activity would be a success. Pig rearing and biogas plant operation are best conducted in combination. Nevertheless, when combined, the high investment required for the biogas plant construction and pig feeds is probably beyond the capacity of most poor households in coastal fisher communities.
Lessons learned and Recommendations

- The construction of biogas plants should be conducted outside the monsoon or rainy season to minimize the risk that high ground water levels will hinder earth work activities.
- RFLP and other similar projects/programmes should provide refresher training courses on biogas model operation and maintenance and prevention of explosion, facilitated by experienced experts to further enhance the knowledge and skills of beneficiaries and to ensure system safety.
- Biogas should be promoted in coastal communities as a means of supporting livelihoods. Pig rearing should also be supported (in conjunction with biogas) where appropriate.
- Agricultural extensionists should place greater emphasis on providing non-fisheries related support to coastal communities.

![Casting of a concrete biogas lid](image)

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About RFLP

The Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP) sets out to strengthen capacity among participating small-scale fishing communities and their supporting institutions in Cambodia, Indonesia, the Philippines, Sri Lanka, Timor-Leste and Viet Nam. The four-year (2009 – 2013) RFLP is funded by the Kingdom of Spain and implemented by the Food and Agriculture Organization of the United Nations (FAO) working in close collaboration with the national authorities responsible for fisheries in participating countries.