Rice and duck farming as means for contributing to climate change adaptation and mitigation in the Bicol Region, Philippines

Source: FAO, Strategic objective 5 - Resilience, in FAO

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Country of first practice: Philippines

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Sustainable Development Goals: No poverty and life on land

Summary
The rice duck farming system aims to facilitate environmental adaptation in the cultivation of rice, and to contribute to food and economic security in the region by reducing the use of pesticides, increasing yield and generating an additional income for farmers.

Description
In many irrigated rice areas in Bicol farming communities rely heavily on the use of molluscide and other synthetic pesticides, to eliminate golden apple snail (GAS), and get better rice yield. But time has shown that existing practice is expensive, implies health-hazards, and is environmentally-unfriendly.

Integrating ducks into rice farming, also known as the “aigamo method” developed in 1989 by Takao Furuno, was replicated as one among other adaptation options in the Bicol project to reduce the costs of farm and labour inputs by replacing fertilizer, pesticides and weed control through duck raising.

The wider replication of this already known, integrated adaptation practice was supported in 6 municipalities (Masarawag, Guinobatan, Ariman, Gubat, Igbac, Buhi) in three provinces in Bicol region during dry season between December 2010 and April 2011 in lowland irrigated farming systems in the Philippines.

1. Implementation of the technology
The implementation of this practice is suitable for farmers with about 1 000 m² of land for the cultivation.

1.1 Land preparation
Prepare the rice field as required based on the farmers existing practice. In general the land should be well prepared by ploughing and harrowing 3 to 4 times. For sandy loam to silty loam soil, 2 to 3 ploughing to and cross ploughing with subsequent 3 to 4 laddering are required so that the soil has a good tilt. For a clay type of soil, soil preparation requires more tillage operation at appropriate soil moisture status. During this period, allow ducks to range and feed on golden snail for two weeks.

1.2 Fertilizer dose
Synthetic fertilizer will not be applied in the 1 000 m² area. Fertilizer supply for the rice will come from the available rice straw left in the farm (sprayed with trichoderma) for organic fertilizer.
1.3 Seedling, sowing and spacing
Tested suitable rice varieties were NSIC Rc-194; NSIC Rc-132 / NSIC Rc-158. Based on the Experiment Station - Research of the Department of Agriculture in Bicol (DA RFU-5) the minimum germination should be 85 percent, the maximum moisture content is 14 percent and the minimum varietal purity 98 percent. The total weed seed / other crop seed / inert matter should not extend more than 0.10 percent.

Establish a seedbed (1 m x 2 m), where the rice seeds will be grown. Use the modified dapog system using banana leaves as bedding material (links: http://www.pinoyrkb.com; Philrice). If rice hull are present, spread a 2 cm thick rice hull, cover it with a fine-mesh fish net or mosquito net. The soaked seeds should be evenly spread on the net and covered with rice straw. Ensure that it is moist within 3 to 5 days. After this 3 to 5 days remove rice straw and allow the seedling to grow until 8 to 10 days. The recommended planting distance is minimum 20 cm x 20 cm to allow enough space for the ducks and avoiding damages.

1.4 Transplanting time
Based on weather forecast, transplanting can either be done on the 4th week of December 2010 or 1st week of January 2011 (location specific). The seedlings should be transplanted within 30 minutes after pulling them off from the dapog seedbed to avoid injury and desiccation of seedlings. While the transplanted rice is establishing its root system keep the ducks in its shelter for a week (5 to 7 days). After this time allow ducks to range again in the field during the vegetative stage of rice (45 days).

1.5 Duck raising
The farmers constructed a simple 10 m² duck shelter, surrounded by a used-nylon fence, where the ducks rested and took refuge from rain, and protection from other animals. Four (4) to eight (8) laying-ducks, owned by the women farmer were used as model purposely to document the dynamics of integrating ducks in the rice farms.

The ducklings when release onto the fields should be between one to three weeks old to ensure they are able to pick up small insects and weeds without damaging the crop. The duckling can be release to the rice paddy two weeks after transplanting. The field should be surrounded by a protection measures to prevent the ducklings from moving outside the plots and avoid other animals to enter the field.

To avoid high mortality, the ducklings should only stay two to four hours on the rice field in the first three to five days and might need additional care especially to the effects of weather changes. For the night the ducklings need a shelter to find protection and rest. After this initial week the duckling can remain from the morning to the evening on the rice paddy, but should not be release any more on the rice paddy when flouring time has started. Recommendation for ideal stocking density of ducklings vary to a large extent in literature ranging from 20 to 400 ducklings per ha. The project after testing recommends for one hectare of land around 150 ducks (note: the project provides less ducks during pilot testing).

1.6 Rice harvesting
While the 80 to 85 percent of grains a ripe, the harvesting can be initiated. Get three sample crop cuts of 2 m x 5 m area before
harvest. Get the data immediately after threshing (yield and moisture content).

2. Results and findings from test replications
The rice duck farming system proved suitable in typhoon-, flood-prone and even salt-affected areas. Ducks help the rice seedlings grow by eating both insects and weeds that get in the way. The farmers grow rice without using pesticide or herbicide. They earn extra money when the fully grown ducks are sold or when they start laying eggs. Thus field documentation showed that duck integration in irrigated rice field and flood prone area is a value added livelihood and food security adaptation option as compared with the local farmers practice of mono-crop rice cultivation (Table 1).

Farmers observed that already by allowing 10 ducks to freely range in the rice field over a period of 8 months, the population of golden apple snail (GAS) has been reduced. Moreover, farmers had set aside mollucides and insecticides spray application. Finally, protein-rich food (egg) has become a part of the family’s daily food item. Excess eggs are sold to stores in the locality, as additional source of cash. To improve technical and procedural aspects of rice + duck these issues need critical considerations:

1. FC homestead is not within the rice farm: under this condition, ducks were stressed, thus, the egg-laying ability is delayed by more than three months.
2. FC homestead is right in the farm: this situation offers less stress on the ready-to-lay ducks delivered. The location of ducks to feeding area facilitated easy access to feed, such as, golden kohol and rice grains; thus, egg-production is facilitated and assured.
3. Disinterested unlisted / absent farmers during planning session became suddenly interested while the ducks were being distributed to the intended

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameters</th>
<th>location</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Buhi</td>
<td>Guinobatan</td>
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<tr>
<td>1</td>
<td>Cost of practice: (Php)</td>
<td>3,878</td>
<td>3,278</td>
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<td></td>
<td>Rice production</td>
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<tr>
<td></td>
<td>ducks</td>
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<tr>
<td>2</td>
<td>Total yield or product</td>
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<tr>
<td></td>
<td>Rice (kilos)</td>
<td>720</td>
<td>720</td>
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<tr>
<td></td>
<td>Eggs (pcs)</td>
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<tr>
<td>3</td>
<td>Economic benefits received</td>
<td>7,380</td>
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<td></td>
<td>in one season (Php)</td>
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</tr>
<tr>
<td></td>
<td>Rice</td>
<td>3,780</td>
<td>3,780</td>
</tr>
<tr>
<td></td>
<td>Eggs</td>
<td>3,600</td>
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</tr>
</tbody>
</table>

Source: FAO 2013
FCs; thus, LGU-DA extension workers close supervision in the final list and distribution plan, is very important.

The result have encouraged the Department of Agriculture RFU-5 management to replicate this practice with additional 50 farmers, and procured 500 ready-to lay ducks. Especially women farmers were interested in replicating this practice.

You manipulate and / or use pesticides? Make inquiries before! Pesticide can be harmful to your health, the health of your family, of the consumers and of the environment. Use pesticides safely. Click on the following link for more information concerning reducing risks while manipulating pesticide.

3. Further reading
- De La Torre. 2010. Detailed Implementation Guidelines, GPOs Lowland Irrigated Agro-Eco Zone;
- Report for TCP PHI 3203 (http://foris.fao.org/static/data/nrc/bicol/Report_Implementation_guidelines_lowland.pdf);
- Philippine Rice Research Institute (http://www.philrice.gov.ph/); and

4. Agro-ecological zones
- Tropics, warm

5. Related/Associated Technologies
- 7722;
- 7719; and
- 8348.

6. Objectives fulfilled by the project
- Women-friendly;
- resource use efficiency; and
- Pro-poor technology.