

Livestock Waste Management in East Asia **LWMEA** (GCP/RAS/215/WBG)

The World Bank

Global Environment Facility

The Food and Agriculture Organization

The technical demonstration in Vietnam of the LWMEA Project (GEF, WB, FAO, MONRE)

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LIVESTOCK WASTE MANAGEMENT IN EAST ASIA PROJECT IN VIETNAM (GEF, WB, FAO, MONRE)

The technical demonstration in Vietnam of the LWMEA Project (GEF, WB, FAO, MONRE)

Two provinces are selected to be the pilot areas of the project. They are Ha Tay province in the North and Dong Nai province in the South. The key player in this project is Ministry of Natural Resources and Environment (MONRE) with joint management from World Bank (WB), Ministry of Planning and Investment (MPI), Ministry of Agriculture and Rural Development (MARD), Ministry of Health (MOH) and local governments.

The project goals

The main goals of the Livestock Waste Management Project in Vietnam are reducing the negative local and global environmental impacts of rapidly increasing animal production in the selected watersheds. Project replication would lead to a reduction of land-based pollution from livestock production of the international water of the South China Sea. In particular, the proposed project would lead to an environmentally sound geographic distribution of animal production and thereby have the following global and regional environmental benefits:

- A consequent reduction of livestock waste load (animal waste currently contributes more than half of the total organic waste loads) that is currently polluting international water (South China Sea)
- More effective conservation of freshwater and coastal marine aquatic biodiversity as a result of reduced wastewater discharges into riverine and other wetland habitats
- A reduction of land degradation from excessive nutrient contents in the locations surrounding intensive livestock production farms
- A significant reduction of greenhouse gas emissions (methane, nitrous oxides) and other gas (ammonia) released from livestock waste
- Reduction of public health hazards and a more equitable distribution of benefits generated from the rapidly growing livestock industry, and
- To increase the knowledge, skill, and capacity building among farmers in order to facilitate economic and environmental status in animal production

The Vietnamese map with two project areas of the LWMEA project



Animal number in Vietnam (2007):

- Pigs: 27.3 mills.
- Cattle: 6.7 mills.
- Buffaloes: 2.9 mills.
- Poultry: 226.0 mills.

(Source by Ministry of Agriculture and Rural Development, 2007)

With most pig production from small farms raising fewer than 10 pigs, the need for joint schemes is particularly important. Fortunately, the structure of Vietnamese rural society into “communes” will make this degree of cooperation easier. Limited land availability is another regional distinction (average of 0.01 ha per capita in some areas). However, the use of manure for crops is the main opportunity to remove the nutrient of concern. The management strategy is thus one of reducing the nutrient load prior to land spreading to ensure that crop needs are not exceeded. Livestock wastewater will be treated by covered lagoons or cylinder biodigesters. Then effluent of biodigestres will be used for crops or fish ponds. For the farmer and his neighbors, the principle reward would be the reduction of odor and the biogas production, the environmental rewards; especially reduced health risks will also be appreciated.

The pictures showed about pig production in Vietnam (small farms, and medium size farms):







Pictures showed about environment pollutions from pig production,









Pig production in Vietnam and pollution from pig waste discharge.

27.3 millions of pigs have been raising in Vietnam in 2007. An estimate is that about 30% of pig manure has been discharging and polluting environment. It means that there is 10.5 million tons of pig manure, which are discharging environment annually. The quantity of discharged manure can be converted into 158,000 tons of urea fertilizer or 3.15 million m³ of biogas per year.

Number of pig in two project provinces:

Ha Tay province has	1.3 million of pig, (in North Vietnam),
Dong Nai province has	1.1 million of pig, (in South Vietnam),

Summary about background of Ha Tay province and Thuong Tin district in the North Vietnam (Project area)

Socio-Economic Data of Ha Tay province

Ha Tay is located in the Red River delta, in the north of Vietnam, immediately south - west of the Hanoi Capital. Administratively, Ha Tay province is divided into 12 districts, and has a population of 2.4 million, in which rural population is 2.2 million. The average population density is 1,091 people / km².

The labor force is approximately 1,422,000 persons, which are distributed as follows:

- In Agriculture: 1,280,000 persons
- In Industry: 93,700 persons
- In Services and Tourism: 29,000 persons

The number of animal in Ha Tay is following:

- Cattle: 98,000 heads
- Buffalo: 28,600 heads
- Poultry: 9,920,000 birds
- Pig: 1,300,000 heads

Socio-Economic Data of Thuong Tin district (Ha Tay province):

Following the project plan, Thuong Tin district is chosen for the project implementation.

Thuong Tin district is located in the south of Hanoi and borders with Red River in the east. The natural area of the district is 12,770 hectares, of which 8,015 ha is agricultural land. There are 28 communes and one town, which have a total population of 201,100. There are 120 traditional professional villages in the district, producing woodwork, embroidery. Industries include factories for the production of beer, Coca Cola, bags, cans and cement.

Agricultural sector contributes 34% of total GDP of the district. The livestock production contributes 15.0% of agricultural GDP. Land used for paddy production covers 6865 ha, maize 15 ha, sweet potato 200 ha, and peanuts 200 ha. Rice yield averages 12.15ton/ha/year (two crops per year) and maize yield is 3.7 ton/ha/crop.

There are 557 ha of aquaculture land and 140 ha of garden land.

The animal number in the district as following:

- Pig: 101,300 heads
- Cattle and buffalo: 3,200 heads
- Poultry: 724,000 birds

Most pig farms are small with raising 5-10 pigs, but they are located inside villages, so that pollution in the villages is evident. There are also over 200 farms keeping 50 – 300 pig.

Eight communes have the largest population of pigs in Thuong Tin, of which To Hieu, Van Phu, Van Tao, Chuong Duong, Le Loi, Thang Loi are heavily polluted due to the lack of animal waste treatment.

Animal waste treatment includes small cylinder biodigesters, composting, and selling manure for feeding to fish. The main problem is the treatment of liquid waste. As there is no sewage system, the domestic waste, animal waste and rain water flow together to ponds and canals in the district.

Five communes have been selected for project implementation as following To Hieu, Van Phu, Van Tao, Chuong Duong, Le loi.

Summary about background of Dong Nai province and Vinh Cuu district in the South Vietnam (Project area)

Socio-Economic Data of Dong Nai province

Dong Nai province is located in the south of Vietnam, immediately north- east of the Ho Chi Minh City. This province has 8 districts and one city. The total population in the province is 2.15 million, of which almost 1.48 million (68.5%) live in rural areas. Most people are Kinh nationality.

Agricultural sector contributes 19.2% of the total GDP of the province. The livestock production contributes 26.2% of agricultural GDP.

The number of animal in Dong Nai province is following:

- Cattle: 61,300 heads
- Buffalo: 6,100 heads
- Poultry: 15,500,000 birds
- Pig: 1,100,000 heads

Over 40% of total pigs are raised in medium and large farms (medium farm keeping 100- 1000 pigs, large farm raising over 1000- 5000 pigs).

Various waste treatment technologies are applied on livestock farms throughout Dong Nai province. Most of solid manure is collected for crops or selling. However, in medium and large farms only 20- 30% of solid manure is collected and the rest is directly discharged to the environment, mainly into streams or onto land. This makes a major problem for the environment. For liquid waste, the potential to create environmental problems is even higher, with about 65% of pig farms discharging animal wastewater into streams or onto the land. However there are some small cylinder biodigesters in few farms, but each farm keeps hundreds of pigs with a large volume of wastewater. So that, this wastewater could not be completely treated in the small biodigesters.

Socio-Economic Data of Vinh Cuu district

Vinh Cuu district is located in the north- west of Dong Nai province and borders with Dong Nai River in the west and Bien Hoa City in the south. The Dong Nai River is one of the two biggest rivers in Southern Vietnam. This river supplies water for over 10 million people in Ho Chi Minh City and Dong Nai Province.

The socio-economic data of Vinh Cuu district is as following:

- Natural area (ha) 109,225
- Population (people) 108,995
- Number of pigs (head) 100,500
- Number of cattle and buffalo 9,600
- Number of poultry 500,000

There are one town and 11 communes in Vinh Cuu.

Number of pig in these communes is as follow:

- Binh Hoa commune (head) 400.
- Tan Binh commune (head) 650.
- Binh Loi commune (head) 674.
- Thanh Phu commune (head) 4,500.
- Thien Tan commune (head) 15,500.
- Tan An commune (head) 18,000.
- Tri An commune (head) 1,350.
- Vinh An town (head) 25,061.
- Vinh Tan commune (head) 28,000.
- Phu Ly commune (head) 650.
- Ma Da commune (head) 3,417.
- Hieu Lien commune (head) 2,300.
- Total: 100,502

The farm size of pig production in Vinh Cuu district is 30-1000 pigs. There are some large farms, which raise 1000 – 5000 pig.

Solid manure treatment includes composting and selling for crops or feeding to fish. The main problem is the treatment of liquid waste. Livestock effluent, domestic sewage and rain water are not separated and discharged to streams or to surrounding environment.

The project activities on the technical demonstration in Vietnam

In the North of Vietnam:

- The meetings and discussions with farmers in the Tu duong village have been done to explain the project and to encourage them attending the project.
- Survey animal production in the Tu Duong Village
- Making mini PIP and preparing technical design
- Training for local staffs and farmers about technical solutions
- Making agreement letters with farmers and local authorities
- Describe detail technical design for construction and for tender

In January 2008 the treatment systems in the Tu Duong village have been started to build. Three wastewater treatment systems: the communal system, the treatment system for three farms, and an individual system are being installed in this village in the first quarter of 2008.

In the South of Vietnam:

- The meetings and discussions with farmers in the Tan An commune and local staffs have been done to explain the project and to encourage them attending the project.
- Survey animal production

- Choose 5 swine farms for technical demonstration
- Total pig (head): 7,050
- Collect documents for making mini PIP

In the year 2008 the technical demonstration is going to be implemented in the Tan An commune (Vinh Cuu district).

Background of Tan An commune

(Vinh Cuu district, Dong Nai province, South Vietnam)

The distance from Ho Chi Minh City to Tan An commune is over 60 km. This commune is bordered with Dong Nai River in the north-west. This river supplies water for over 10 million people in Ho Chi Minh City and Dong Nai Province. There is Rach Dong stream flowing through the Tan An commune and running to Dong Nai River. During rainy season there are often strong showers, that make some local floods which take animal waste flowing into Rach Dong River and then running to Dong Nai River. So, Vinh Cuu district and Tan An Commune have been trying to manage better animal waste.

The agricultural statistical data of Tan An commune is as following:

Items	unit	Number
Total natural area	ha	5,270.1
Agricultural land	ha	2,463.0
Vegetable land	ha	15.0
Orchard land	ha	371.0
Area of fish pond	ha	213.0
Population	people	8,279.0
Households	unit	1,925.0
Pig farms	unit	450.0
Number of pig	head	18,000.0
Number of cattle and buffalo	head	2,100.0
Number of poultry	head	122,000.0

Farm size of pig production ranges from 30 to 3000 pigs. An estimate is that about 30 – 40% of solid manure is collected for sale or for crops. Liquid waste, domestic sewage and rain water are not separated and discharged to surface water. The environmental pollution from animal waste is evident. There are some small biodigesters in some farms, but each farm keeps hundreds of pigs. So that the animal wastewater could not be treated completely in these biodigesters.

Proposed demonstration systems:

- Collect much more solid manures for sale or for crops
- Separate rain water and liquid waste
- Set up a new covered lagoon

- Effluent stored in one or two ponds
- Effluent will be used for crops and fish ponds
- Gas use:

Cooking fuel

Power engine (for a medium electrical generator)



PMU makes meeting with local staffs



PMU and international experts make the discussion with local authorities and staffs



PMU makes meeting with local staffs