

# Environmental Issues at Seafood Processing Villages in the North Region, Vietnam: Perception and Behaviour of Business Owners

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*Received July 20, 2021; revised and accepted August 30, 2021*

**Abstract:** The present study reviews and evaluates some characteristics of seafood processing villages in the Northern region. Where most of the craft villages are concentrated. They contribute to creating jobs and increasing incomes for rural people. From the data published by state agencies and case studies at some seafood processing villages in the North, the study shows that the seafood processing villages are facing the situation of serious environmental pollution. The reason comes mainly from production and business activities. Although aware that the production and discharge of waste violate regulations, causing impacts on the environment and public health, business owners do not have any specific measures to reduce environmental pollution. Therefore, to ensure the environment of these villages, research suggests that it is necessary to promote monitoring the implementation of environmental protection measures by business owners in addition to formulating a reasonable economic development policy for this area.

**Key words:** Seafood processing villages, Northern region, Vietnam, environmental pollution, business owners.

## Introduction

The Northern region is used to refer to the geographical area in the North of Vietnam, including provinces and cities located in the north of Thanh Hoa province. This consists of 25 provinces and cities divided into three sub-regions. Depending on each historical moment and usage habits, this region concept has a different name. This is also a diverse and complex topography area, which include hills, plains, coastlines and continental shelves. It is also a large market in Hanoi and Haiphong the two big cities in Vietnam.

With a dense system of rivers and streams, a long coastline and continental shelf create favourable

conditions for human and business activities. The craft villages developed strongly in this region, with many different occupations. People's living standards have been improved in recent years. However, these areas are affected heavily by environmental pollution.

Pollution originates from many different activities. It is not difficult to realize that enterprise and household activities are the main causes. Therefore, understanding and assessing the perception and behaviour of polluters at seafood processing villages help to explain in practice why the pollution problem is not the same among areas. This is an important basis to help managers and policy makers come up with appropriate solutions.

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This paper will analyze and evaluate the characteristics of seafood processing villages and the perception of leaders of private enterprises and individual business households about environmental pollution in these villages. It also makes some recommendations to promote their role in environmental protection.

This study was based on the survey results from the activities of some seafood processing villages and the perception of business owners about the environmental problem in three sea border provinces of the North region, namely Quang Ninh, Thai Binh, and Thanh Hoa, where most of the seafood processing villages are concentrated. The study was based on report data from the Ministry of Natural Resources and Environment (MONRE), People's Committees of provinces and cities and reports of Vietnamese craft village associations. With 150 samples total are officially surveyed. Respondents all answered independently, based on their own personal knowledge. The questionnaire was coded and processed by Excel software.

### Overview of the Seafood Processing Village in the Northern Region

Up to now, the concept of craft village has many different interpretations in Vietnam. It can be a place with a large population, organised activities, with its own rules and customs in a broad sense. A craft village is not only a village that specializes in professions but also people with the same occupation living in harmony to develop and create jobs in leisure time. The characteristics of these villages are both economic development and national identity preservation, and they have distinct local characteristics compared to other localities (Pham Con Son, 2004).

A craft village can be a physical and mental entity that is geographically fixed, occupationally stable, or a group of closely related occupations to produce a product. Craft villages often have a long history and are preserved and have been handed down in folklore (Trinh Thi Hoa, 2007).

In this study, craft village is understood according to the legal provisions of Vietnam. Decree No. 66/2006/ND-CP dated 7/7/2006 of the Government stipulates that a craft village is one or more residential clusters at the village level, hamlet, phum or similar residential areas in a commune or town. It has rural business activities, producing one or more different types of products (Nguyen Nhu Binh, 2017).

Seafood processing village is a craft village where people are professionally producing seafood to serve the people's demand, such as fish sauce, fishmeal, frozen aquatic products and seafood, dry bulk, steamed fish and others.

Table 1 shows that these villages are concentrated on six coastal provinces, in which Thanh Hoa is the highest number (Nguyen Thom, 2017). Although the Northern provinces have many large lakes, rivers and streams and have a rich freshwater aquatic reserve, there are no freshwater aquatic processing villages. The reasons are freshwater aquatic products with unstable catches; industrial extraction methods cannot be applied; only small and rudimentary exploiting methods can be used; the terrain where there are rivers and streams is often steep, bends, and uneven, so it is difficult to build a port for exploitation, etc.

Coastal seafood processing villages in the North were born and developed in association with national building and defense history. They provide a large amount of seafood for local, region, and even nation. They have some main characteristics.

**Table 1: Number of seafood processing villages in some coastal provinces in the Northern region**

<i>Province</i>	<i>Seafood processing</i>		<i>Others</i>		<i>Total</i>
	<i>Number</i>	<i>Percentage</i>	<i>Number</i>	<i>Percentage</i>	
Thanh Hoa	18	11.61	137	88.39	155
Quang Ninh	6	30.00	14	70.00	20
Hai Phong	4	11.11	32	88.89	36
Thai Binh	7	2.76	247	97.24	254
Ninh Binh	2	2.47	79	97.53	81
Nam Dinh	11	26.83	30	73.17	41
Total	48	84.78	539	515.22	587

*Source:* Author's statistics in 2020

They were born in association with the people living in rural areas, attracting a large number of labour force, and providing the main income for people. In coastal areas, farming activities are not favourable, so seafood processing is considered an important profession, ensuring people's life.

The Northern region is a large population, an abundant labour force and a large market for seafood products. This is a favourable initial condition for the seafood processing villages to develop in recent years, making an important contribution to poverty alleviation and raising the incomes of local people.

The seafood processing profession is closely associated with the fishing process in the ocean, so it requires a lot of labours. If business owners use traditional seafood processing, the investment capital is not much, the capital turnover is fast, but if they use the modern way, it requires a large investment. When the consumption market expands, it is difficult for traditional processing methods to meet the customer's requirements. However, the traditional way creates "distinctive features" for products, so in recent years, business owners invest a part of the equipment, important stages are still carried out in the traditional way, so the products still retain their "distinctive features".

The production organisation in these villages is still mainly at a household scale, some of them have developed into cooperative organisations and private enterprises. Previously, the household scale mainly mobilised family members. Now, they can hire more workers. This form is suitable for small-scale production but it limits many possibilities for business development. To overcome that situation, private enterprises with legal status and stricter forms are gradually formed. This is a favourable condition for villages to develop more strongly in the coming time.

Seafood processing villages are still small and scattered. Production facilities are mixed with residential areas. Coherence in production and consumption among villages is almost nonexistent.

The technology used is still backward and causes serious environmental pollution. Most of them do not have exhaust gas and wastewater treatment systems. Wastewater is poured directly into the environment. Currently, the construction of drainage and wastewater treatment systems is difficult and expensive because of their location in residential areas. Some products and production processes are not guaranteed, do not meet the requirements of food safety and hygiene (Lam Nguyen, 2019).

### **Perception and Behaviour of Business Owners on Environmental Protection at Some Seafood Processing Villages in the Northern Region**

Awareness of environmental pollution is related to the process of acquiring knowledge and understanding through thoughts, experiences and senses about this problem, its impact on human health and production activities. These include the processes of knowledge, attention, memory, evaluation, estimation, reasoning, calculation, problem solving, and making appropriate decisions.

Currently, seafood processing villages are facing many problems such as economic development, people's income, education, crime, inequality, environmental pollution, etc. Environmental pollution is taking place quite seriously. Water pollution is mostly organic pollution. The typical pollution parameters as BOD<sub>5</sub>, COD, TSS, total N, total P, and Coliform exceed the allowable limits (MONRE, 2019). The quality of wastewater has exceeded Vietnamese' standards at some production facilities in Thanh Hoa, Thai Binh and Quang Ninh province. For instance, the SS content exceeded from 1.03 to 1.81 times; COD exceeds from 1.02 to 4.45 times; BOD<sub>5</sub> exceeds from 1.4 to 5.23 times; NO<sub>2</sub><sup>-</sup> exceeds 7.5 times, and Coliform exceeds from 1.18 to 4.78 times (Hai Ha, 2016; Vu Hai Dang, 2016). Wastewater from facilities makes the ponds and rivers flowing through these places turn yellow-gray, black (Kenh Than river, Thanh Hoa). Basically, the pollution level depends on the seafood season (from October to December every year), hydrological conditions, weather and waste sources control (PV, 2018).

Besides, air pollution is quite serious. Especially on sunny, dry days, the stench from fish rises up in the wind, such as raw materials, solid waste and fish carcasses, shells, heads, bones and skin are decomposed and wastewater, etc., which impacts seriously on residential areas.

To assess the level of environmental pollution, a survey result is shown in Table 2.

The results of Table 2 show that most business owners agree that water pollution is taking place seriously, with the average point being 4.35. And in particular, they also agree that wastewater has a bad smell, especially unpleasant, with the average point being 3.77. The wastewater is pitch black, filled with skin, scales, bones, shells of shrimp, fish, etc., with an average point as 4.23. The wastewater volume is very large, with the average point being 4.19. Wastewater is discharged directly into the environment, with the average point as 3.75. Living

Table 2: Level of agreement with statements about environmental pollution at seafood processing villages

Issues	Number of surveys	Agreement level							
		Strongly disagree		Disagree		Neutral		Agree	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Water pollution is taking place seriously in seafood processing villages	150	1	0.67	11	7.33	15	10.00	30	20.00
Wastewater has a bad smell, especially unpleasant	150	7	4.67	7	4.67	40	26.67	55	36.67
Wastewater is pitch black, filled with skin, scales, bones, shells of shrimp, fish, etc.	150	1	0.67	9	6.00	22	14.67	40	26.67
The total volume of wastewater from facilities in seafood processing villages is very large	150	2	1.33	4	2.67	28	18.67	45	30.00
Wastewater is discharged directly into the environment (channels, ditches, rivers, etc.) around the facility	150	9	6.00	7	4.67	40	26.67	50	33.33
								44	29.33
									3.75

Note: Strongly disagree- 1 point; Disagree- 2 point; Neutral – 3 point; Agree - 4 point and strongly agree- 5 point

The answer on the level is the subjective and personal opinion of the respondent.

Source: Author's survey data for the year 2020-2021

in an area where wastewater has an unpleasant odour, the human body will gradually adapt and often tend to “ignore” that odour, so the average point is lower than the rest of the opinions. In addition, some facilities have treatment systems with simple biological settling tanks before discharging wastewater, so the average rating score is lower.

Pollution comes mainly from production, people’s daily and industrial activities. Wastewater is mostly concentrated downstream of rivers. The seafood processing technology is still rudimentary. For enterprises exporting raw products, only about 60% is used, the rest is thrown away. Wastewater is mainly generated from washing and preliminary processing of raw materials. Wastewater contains pieces, blood and viscera of seafood, fish’s scales, bones and fat, etc. Therefore, wastewater has a foul and fishy odour. In addition to enterprises and business households in industrial zones, there are many small facilities located in residential areas that also contribute significantly to pollution. They discharge directly into the environment and are not invested much in technology.

According to statistics of the Rural Development Sub-Department of Thanh Hoa, Thai Binh, Quang Ninh provinces at the end of 2018, each province has more than 100 enterprises, but there are more than 1,000 business households. The main products are fish sauce, fish meal, frozen seafood, dry seafood, steamed fish and others. The Tinh Gia district has the largest number of processing facilities (Hai Ha, 2016).

In addition, pollution from fresh seafood processing points at the coast, close to the water’s edge, has been a worrying situation in some localities. Most of them discharge wastewater directly to the coast, causing pollution of seawater.

The causes of environmental pollution are also shown by the survey results in Table 3.

Table 3 shows that 73.33% of the surveyed answer believe that the main source of environmental pollution comes from the processing, production and business activities of enterprises and households. Next, pollution sources come from industrial production, people’s daily activities, agricultural activities, commercial activities and others.

In more detail, the majority of business owners believe that the pollution level from production and business activities is very high (accounting for 63.64% of surveys answered), causing moderate pollution (accounting for 22.73%), causing low pollution (accounting for 13.64%). For other sources, most of the respondents said that the pollutant level was

at an average level. This is also consistent with the characteristics of production and business activities of these villages presented above.

So, business owners have the correct awareness of the pollution situation. This is an important basis for mobilising their participation in environmental protection activities in the future.

According to the business owners, in order to protect the environment in these villages, management agencies and business owners need to implement some specific solutions as follows:

Table 4 shows that most business owners are aware of the environmental protection role. The highest average score for assessing the necessity of implementing environmental protection measures by business owners is “It is necessary to closely inspect, supervise and strictly punish cases of pollution” and “It is necessary to support enterprises and business households to innovate processing and production technologies”; next is “the State needs to have stricter regulations to control waste water and polluting emissions” and “The State, business owners and people need to share in the construction of drainage and wastewater treatment systems efficiently and transparently”; finally “Communication and education to strengthen the responsibility of environmental protection of enterprises and business households” and “It is necessary to build a fund to protect the local water environment”. The average score of each solution does not differ much, in the range of 3.6–3.8. This shows that these are very necessary solutions to protect the environment. This is a point to note when proposing and implementing the solutions in the following section.

### **Some Solutions Reduce Environmental Pollution at Seafood Processing Villages in the Northern Region**

As the survey results, business owners are aware of the true environmental situation as well as the necessity of each solution. This shows a “positive” signal that these villages can solve environmental pollution if there is close coordination of the state, businesses and people.

Firstly, management agencies, local authorities, business owners and people need to put the priority of environmental pollution solving at the top. The state reports and survey results show that environmental pollution, especially water and air pollution is a prominent problem in these areas. The main pollution source needs to be thoroughly contained. So, local management agencies need to conduct a regular

Table 3: Sources of environmental pollution at seafood processing villages

Source of pollution	Number of surveys	Number of surveys answered	Percentage	Pollution level					
				Low		Medium		High	
				Number of surveys selected	Percentage	Number of surveys selected	Percentage	Number of surveys selected	Percentage
From processing, production and business activities of enterprises and households in seafood processing villages	150	110	73.33	15	13.64	25	22.73	70	63.64
From people's activities	150	30	20.00	9	30.00	13	43.33	8	26.67
From agricultural production	150	14	9.33	3	21.43	7	50.00	4	28.57
From industrial production	150	35	23.33	11	31.43	14	40.00	10	28.57
From commercial activities	150	12	8.00	3	25.00	6	50.00	3	25.00
From other sources	150	5	3.33	1	20.00	3	60.00	1	20.00

*Note:* The answer on the level is the subjective and personal opinion of the respondent

*Source:* Author's survey data for the year 2020-2021



**Table 4: Assessment of the necessity to carry out environmental protection activities at the seafood processing villages in the Northern region**

Environmental protection activities	Number of surveys	Agreement level							
		Strongly disagree		Disagree		Neutral		Agree	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
The state needs to have stricter regulations to control waste water and polluting emissions	150	10	6.7	12	8.0	40	26.7	39	26
It is necessary to closely inspect, supervise and strictly punish cases of pollution	148	6	4	15	10	35	23.3	39	26
The State, business owners and people need to share in the construction of drainage and wastewater treatment systems in an efficient and transparent manner	150	11	4	16	10.7	31	20	46	30.7
Strengthening communication and education about the responsibility of environmental protection for business owners	150	10	6.7	20	13.3	31	20.7	44	29.3
It is necessary to build a fund to protect the local environment	150	15	10	17	11.3	29	19.3	44	29.3
It is necessary to support enterprises and business households to innovate processing and production technologies	150	8	5.3	13	8.7	28	18.7	46	30.7
								45	30.0
								55	36.7

*Note:* Strongly disagree – 1 point; Disagree– 2 point; Neutral – 3 point; Agree - 4 point and strongly agree - 5 point  
The answer on the level is the subjective and personal opinion of the respondent

*Source:* Author's survey data for the year 2020-2021.

and continuous inspection and monitoring of waste discharge activities from facilities. At the same time, subject guidelines reduce wastewater by water-saving production processes, limiting waste water, and environmentally friendly production. In addition, it is necessary to deal decisively, thoroughly and transparently in cases of violations of discharge into the environment surrounding.

Secondly, it is necessary to improve the legal system and regulations on environmental protection management for seafood processing villages. Survey results showed that so far the state has issued strict regulations on environmental pollution control, but according to them, strict regulations are still needed more in order to control the source of wastewater, emissions from different craft villages. Vietnam has a national standard on industrial wastewater, domestic wastewater... but for craft village's wastewater, there are no regulations or guidelines. In fact, in the Northern region, the supervision of the management agency plays an important role in controlling the environmental protection behaviour of business owners. Therefore, management agencies need to pay attention to the development of annual inspection and supervision plans, combined with unexpected inspection of environmental protection activities at enterprises, especially in the production season, regularly take samples to check water and air quality at enterprises, efforts to build automatic environmental monitoring stations, cooperate with local political and social organisations to monitor environmental protection behaviour of enterprises, such as residential groups, women's unions, local youths, etc.

Thirdly, it is necessary to promote the use of economic solutions in environmental protection by using administrative solutions combined with management solutions in taxes and fees for wastewater, waste and emissions. Support enterprises improve production technology in order to save water, save raw materials and reduce emissions. Support facilities build and install exhaust gas treatment systems specialised wastewater. In fact, the survey also shows that business owners also want to do but are still limited by capital. Therefore, the implementation of support programmes from environmental protection funds is very necessary.

Fourthly, it is necessary to raise more awareness of business owners in craft villages about environmental protection in the locality, turning awareness into concrete actions. Local environmental polluters need to come up with initiatives and solutions and participate enthusiastically in general environmental protection

activities in the region. This is also the responsibility and obligation that management agencies, business owners are awareness. Through the sharing of funds, construction workers, and operation of the drainage and wastewater treatment systems in craft villages from the state, businesses owners, production facilities and local people, the improvement of environmental quality in craft villages in a positive direction is completely possible.

## Conclusion

From the analysis above, some conclusions observed are as follows:

- Sea food processing villages in the North region are concentrated mainly in six coastal provinces. They were born and developed in association with the nation's history of building and defending.
- Business owners are aware of the serious environmental pollution taking place in these villages. The main causes of pollution come from enterprise and household activities, people's activities, industrial production and other activities.
- Environmental protection measures are basically clearly recognised by business leaders. In order to have a healthy living environment and ensure the people's health at these villages in the near future, it requires close cooperation and action of the state and enterprises, individual business households and people in the implementation of the above measures. They should be implemented simultaneously to create an "environmental protection wave" in the region.

## Acknowledgement

This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant numbers: 603.99-2018.301.

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