Actual situation of dealing with environmental law violations and building of a legal system in the state management of environment in the agricultural sector in Vietnam

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Abstract. Environmental pollution is a global problem. Environmental pollution, leading to extremely difficult consequences. It has affected the health and life of humans and the creatures living on the earth. In addition, it also directly harms the race, the next generation of humans. Especially, agricultural environmental pollution also directly threatens Vietnam's food security. Therefore, will directly affect the sustainable development of agriculture. In the context of the article, the author analyses the situation of pollution and handles violations of the law on environmental pollution in Vietnam. At the same time, propose solutions to improve the state management efficiency in the protection of clean and sustainable agriculture.

1. Introduction

Environmental pollution, climate change, biodiversity loss, deforestation and land degradation, water resources and declining ocean health ... continue to be major and comprehensive issues changing natural ecosystems, socio-economic life around the world, becomes one of the biggest challenges for humanity. The world has really entered the industrial revolution 4.0, the trend of interdependence among countries is becoming more and more deep, especially for developing countries like Vietnam. Vietnam faces the risk of becoming a world-class, backward and polluted technological waste dumping site without the active prevention and control measures.

Vietnam is a country that comes mainly from agriculture. Agriculture has always been an active contributor to the country's socio-economic development. However, at present, Vietnam has about 11 million hectares of land being degraded and the risk of degradation, quality, productivity, affecting agricultural development, leading to the risk of not ensuring food security. national and ecological ecosystems [1-2].

2. Current situation of agricultural pollution in Vietnam

2.1. Predict the level of water pollution under the impact of agricultural activities

In the research, the author took samples and observation at 35 stations on estuary area of Red River of North Vietnam (figure 1) for determining the level of water pollution under the impact of agricultural activities, and then predict the possibility of water pollution in the following years [3-7].
For determining the level of water pollution under the impact of agricultural activities and predicting the possibility of water pollution in the following years we used the calculation, that was based on the formula [3-7]:

$$TWQI = 100 \left( 1 - \frac{\sum_{i=1}^{m_1} W_i q_i - 1}{\sum_{i=1}^{m_1} W_i q_i + \sum_{i=1}^{m_2} W_i (1 - q_i) + \sum_{i=1}^{k} W_i (q_i - 1)} \right)$$

where:

- TWQI - general water quality index;
- $W_i$ - the weight coefficient of the indicator, $q_i$ – a particular quality indicator, $m_1, m_2, k$ – the number of parameters respectively having $q_i$ is equal to less than and greater than 1;
- $q_i$ - individual quality indicators value for each ingredient (parameter).

Results of the research were presented in table 1 [3-7].

**Table 1.** The weight coefficients of the indicators of TWQI and WQI.

| №  | Parameters | $C_i$ | $C_0$ (A) | $C_0$ (B) | $q_i$ (A) | $q_i$ (B) | $W_i$ (A) | $W_i$ (B) | $W_i^*$ | $W_i^*$ |
|----|------------|------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|
| 1  | pH         | 8.1  | 6-8.5     | 5.5-9     | 0.84      | 0.74      | 1.20      | 0.09      | 0.86    | 0.11    |
| 2  | DO         | 6.8  | 5         | 4         | 0.74      | 0.59      | 1.11      | 0.08      | 0.89    | 0.11    |
| 3  | BOD₅       | 8    | 6         | 15        | 1.33      | 0.53      | 1.75      | 0.13      | 0.70    | 0.09    |
| 4  | NO₃⁻       | 0.58 | 5         | 10        | 0.12      | 0.06      | 1.50      | 0.11      | 0.75    | 0.09    |
| 5  | PO₄³⁻      | 0.1  | 0.2       | 0.3       | 0.50      | 0.33      | 1.25      | 0.09      | 0.83    | 0.10    |
| 6  | Dry residue| 113  | 30        | 50        | 3.77      | 2.26      | 1.33      | 0.10      | 0.80    | 0.10    |
| 7  | Pb         | 0.04 | 0.02      | 0.05      | 2.00      | 0.80      | 1.75      | 0.13      | 0.70    | 0.09    |
| 8  | Cd         | 0.008| 0.005     | 0.01      | 1.60      | 0.80      | 1.50      | 0.11      | 0.75    | 0.09    |
| 9  | Fe         | 6.8  | 1         | 1.5       | 6.80      | 4.53      | 1.25      | 0.09      | 0.83    | 0.10    |
Based on results of the research, the author determined the map of water pollution on the North of Vietnam for period 3 years from 2017 to 2020 (figure 3) [3-7].

Figure 2. Map of water pollution in the estuary area of the Red River in 2016 by TWQI.

2.2. Predict the level of water pollution under the impact of agricultural activities

To increase crop yields, people often use chemical fertilizers such as nitrogen (N), P₂O₅, K₂O. But among the inorganic fertilizers, most notably fertilizer N, which provides the most important efficiency for crop yield, but it is also very easy to pollute the soil environment due to its residues due to use in high doses. When applying N, the plant uses up to 30% of the fertilizer on the soil. The rest, the taste leach away, the rest in the soil will pollute the soil. When applying N to normal soil, there are 2 types of soil: NH₄ and NO₃⁻, the plants absorb both, if the tree absorbs more N, the tree will have high NO₃⁻ retention in leaves, fruits, and excessive seeds will harm consumers. The amount of residual N in soil in the form of NO₃⁻ is easily washed down into rivers, streams or directly into groundwater, causing groundwater pollution. According to WHO standards, groundwater contains> 45 mg/l NO₃⁻, cannot be used as drinking water [8-11]. The nitrification process increases the acidity of the soil environment because the soil exists in HNO₃.

Some other chemical fertilizers pollute the soil environment such as phosphate. Super phosphate is usually 5% free acid (H₂SO₄), making the soil acidic. Phosphate fertilizers also contain other heavy metals such as As, Cd, Pb, which also accumulate these metals in the soil. The other chemical fertilizers are mostly salts (NH₄SO₄, KCL, K₂SO₄, KNO₃...) of acids, so when applied to the soil, it makes the soil acidic.

Usually organic fertilizers include manure and compost. The composition of manure depends on the processing source. The source of organic fertilizer causing soil pollution can be caused by its use and source used for processing.

Manure if not properly composted, such as farmers using composting, irrigating crops containing a lot of microorganisms (Coliform, E.coli, Clostridium perfingens, Streptococcus, Salmonella, Vibrio for lera), parasites (Acaris) in agricultural production, especially on vegetables, makes vegetables unsafe, toxic to users.

The current types of organic fertilizer from pigs, chickens, etc., which are raised from the synthetic feed are no longer safe for agricultural products as before, because in their composition there are many trace minerals (Cu, Zn, Fe, Mn, Co, ...). The heavy metal content in feces can be a source of infiltration into the soil and stored in farm produce, especially leafy vegetables. Using a lot of organic fertilizer in anaerobic conditions, the reducing process predominates, will create many organic acids to make acid soil, and create many toxins H₂S, CH₄, CO₂.
Pollution caused by the use of plant protection drugs includes pesticides, diseases (fungi, nematodes...), herbicides. Growth stimulants are all organic or inorganic chemicals. It is necessary to kill pests, diseases and weeds to protect the plants, but because the nature of these substances is biocidal, they are more or less affecting the soil environment. These chemicals pollute the soil environment and their activity will be toxic to animals and humans. It can survive long in the soil, penetrate into plant components, especially accumulated in parts of the tree, humans using these products will cause poisoning.

The characteristic of pesticides is their durability in the ecological environment. After invading, the environment and persisting for a long time in various biochemical structure forms or creating associated compounds in the soil environment. These new compounds are often more toxic than themselves. For example, after a period of use, it creates DDE, 2-3 times more toxic than DDT. Aldrin pesticides persist for a long time in soils classified as Dieldrin, whose properties are many times more toxic than Aldrin. Plant protection products often contain heavy metals such as As, Pb, Hg. Some kinds of diseases such as CuSO₄, Zineb, Macozeb... contain heavy metals such as Zn, Cu, Mn which are used much and will store metals in the soil.

Another harmful effect of insecticides is its penetration into the soil environment, which reduces the physical and chemical properties of the soil, the level of harm is similar to that of chemical fertilizers. But the ability to kill bacteria is high, pesticides also kill many useful microorganisms that reduce the biological activity of the soil.

Soil pollution by oil. Soil pollution by hydrocarbures from petroleum sources. The basic components of petroleum: Carbon 82 - 87%, hydrogen 11 - 14%, sulfur 0.1 - 0.5%, oxygen and nitrogen < few parts per thousand. Oil and petroleum products that spill on the ground will contaminate the soil because:

- Just a layer of oil covering the ground, although very thin (0.2 - 0.5 mm) is enough to make the soil "suffocate" because of lack of air, the gas exchange process is cut off. As a result, all animals, plants and microorganisms lack oxygen, eventually leading to death. This oil layer also prevents the process of exchanging solar energy of the soil environment. Oil is a hydrophobic substance, when absorbed into the soil; oil pushes water out, making the soil environment almost no water and taking up all the air in the soil, making the soil minimize oxygen and water, causing damage to the ecosystem.

- When penetrating into the soil, oil changes the structure and physicochemical properties of the soil, making soil colloidal particles inert and no longer able to absorb and exchange. Oil seeps through the ground into groundwater, contaminating groundwater. Oil is a high molecular weight organic compound with bactericidal properties.

| Parameter | Vietnamese standards | Content (mg/kg) |
|-----------|----------------------|-----------------|
|           | Year 2018            | Year 2017      | Year 2016 | Year 2015 |
| Oil       | 100                  | 6.5 – 16.3     | 8.6 – 23.4 | 6.5-22.1 | 8.7-35.9 |
| Xyanua    | <0.1                 | <0.1           | <0.1      | 0.01-0.03 |
| Zn        | 271                  | 12.1-132.2     | 7.2-73.4  | 11.5-85.3 | 7.5-69.1 |
| Cu        | 108                  | 1.9-29.1       | 5.2-29.1  | 5.1-33.3 | 3.0-25.7 |
| Pb        | 112                  | 2.2-50.7       | 1.4-30.9  | 3.8-36.6 | 2.4-43.1 |
| Cd        | 4.2                  | 0.1-3.6        | <0.1      | <0.1     | 0.1-0.3 |
| As        | 41.6                 | 1.5-16.9       | 2.9-17.0  | 3.8-19.0 | 1.6-8.6 |
| Hg        | 0.7                  | 0.1-0.2        | <0.1      | <0.1     | <0.1    |
| Fe        | 1180-36370           | 800-25200      | -         | -        |
| Cr        | 160                  | 4.3-87.6       | 6.5-35.2  | 4.8-14.3 | 5.9-43.0 |
| Phenol    | <0.001               | <0.001         | -         | -        |

Table 2. Analysis results of concentrations of oil, phenol, cyanide, and heavy metals in coastal sediments in Central Vietnam.
3. Actual situation of handling environmental law violations

Vietnam has developed many new regulations with the discharge of waste causing environmental pollution in general and agricultural environment in particular. Specifically, increase the fine for acts of 10% - 50% of the fine frame. Application of additional sanctions and severe remedial measures, in addition to compensation for damages, remedying consequences of violations, forced to stop operation...

Vietnam has also actively implemented the implementation. In particular, most localities have strengthened professional training for staff working in handling violations; promote the propagation, dissemination and education of laws through the mass media to help people understand and raise awareness of environmental protection; resolutely handle environmental violations.

The inspection results of the Ministry of Natural Resources and Environment show that the rate of establishments violating environmental laws has decreased over the years, specifically in 2014 was 77.4%; in 2015 this rate was 65.6%; in 2016 it was 40.7%; in 2017, 36.5%; In 2018, it was 40% (down about 2 times compared to 2014). In 2019, 22,535 cases of environmental law violations were handled, down 11.36% compared to the same period in 2018, with 2,782 organizations and 20,663 violating individuals. Investigation agencies have just prosecuted 355 cases, 395 defendants, and handled 19,600 cases. In particular, the violations of waste discharge exceeding technical standards have been significantly reduced, mainly the violations of administrative procedures.

In addition, the regulation of the authority to make records and sanction violations on discharge in urban areas, residential areas, amusement parks, entertainment areas ... has contributed to raising the awareness and awareness of people collect, classify, dispose of rubbish, and preserve the environment in urban areas, residential areas and public places.

In particular, the determination of competence to sanction administrative violations in the field of environmental protection and the responsibility and coordination mechanism in the inspection, inspection and sanctioning of administrative violations in the field of protection environmental protection has brought about positive effects such as: reducing overlap in planning inspection and annual inspection; ensure one year only one inspection team or inspectorate in the field of environmental protection at an establishment or enterprise, except for cases of unexpected inspection or inspection prescribed by law. Therefore, the people's police force has brought into play its strengths and strengths, can conduct scouting and monitoring at night time and outside working hours to focus on detecting and preventing , handling violations of discharging, stealing, transporting, dumping, disposing and burying solid wastes and hazardous wastes in contravention of regulations.

Along with that, the inspection and examination work of the state management agencies has been raised one-step, the inspection work has been concentrated in the direction of reducing the number of inspection facilities as planned and strengthening inspection. Unexpectedly, focusing on large-scale establishments, which are likely to cause high environmental pollution, strictly sanction violators to deter and create public opinion forcing establishments currently engaged in production and business activities. Businesses must pay attention to and invest in the environment.

However, the handling of agricultural environmental pollution in Vietnam is not enough to deter, the number of criminal cases is not much compared with the number of detected violations, only 1.58%. The main reason is because the environmental crime is difficult to identify damage so it is very difficult to handle.

Wastewater standards applied to agriculture, especially in husbandry and aquaculture activities, are not reasonable. The Ministry of Natural Resources and Environment has issued Technical Regulation on animal waste water No. QCVN 62-MT: 2016/ BTNMT. This regulation stipulates the maximum allowable value of livestock wastewater pollution parameters when discharging to the receiving water, only applicable to livestock wastewater. For example, individual farms, the maximum allowable value for the total wastewater is greater than or equal to 5m3/day. The treatment of livestock wastewater to achieve QCVN62-MT:2016/BTNMT requires huge environmental treatment costs for farm owners and
businesses, especially smallholders and difficulties in Utilizing treated livestock waste as organic fertilizer.

Wastewater from aquaculture is again applied by state management agencies according to the Industrial Waste Regulation QCVN 40: 2011/BTNMT (for industrial production facilities ...), causing difficulties in management and difficulties for businesses. QCVN 40: 2011/BTNMT was developed and issued to apply for wastewater of industrial plants, so there are 33 pollution parameters to control, too complicated when choosing to apply to aquaculture wastewater. Aquaculture is not located in the industrial zone. The set standards need to meet the requirements of integration, but they must also conform to practical requirements, harmonize the interests of producers and national interests, and protect the environment and public health.

In addition, businesses also encounter another obstacle related to wastewater from catfish ponds. At present, the Natural Resources and Environment sector does not agree to apply the QCVN 02-20: 2014 / BNNPTNT standard of the Ministry of Agriculture and Rural Development on the National technical regulation on fish farming facilities in ponds, ensuring conditions, veterinary hygiene, environmental protection and food safety, which requires wastewater from catfish farming activities to meet the pollution criteria in accordance with the limits specified in column A QCVN 40: 2011/BTNMT Technical regulation National Technical Regulation on Industrial Wastewater is issued with the Circular No. 47/2011/TT-BTNMT dated December 28, 2011 of the Ministry of Natural Resources and Environment. Wastewater treatment conditions in the process of raising Pangasius are not suitable and feasible for investment plans for wastewater treatment systems according to the process of treating with industrial equipment like those in aquatic processing factories. Therefore, the quality of wastewater from pangasius ponds before being discharged into the external environment requires polluting parameters according to the limit of column A of QCVN 40: 2011/BTNMT which is very strict and difficult to achieve.

Therefore, it is necessary to have a unified legal framework, to help the subjects subject to the adjustment do not have to learn and apply too many related legal documents; At the same time, environmental management agencies are also more convenient in management; avoid overlap and lack of close cooperation between ministries, branches and localities.

4. Proposal to improve the legal system of agricultural environment

Based on the analysis and evaluation of some environmental management models in the world, the author proposes a number of solutions suitable to the situation of Vietnam in general and Vietnam's agriculture in particular.

Firstly, Vietnam needs to have a common orientation as well as perfect the legal system of natural resource management in the coming time. By evaluating international experience and comparing it with Vietnam, it can be seen that the requirement to improve the system of legal documents on environmental protection is becoming an urgent and urgent request. Now, to enhance the effectiveness of this legal system.

Secondly, it is necessary to finalize the national standards and technical regulations on environment. Environmental standards and regulations are one of the important management tools in order to accomplish the objectives and requirements set out in each period of the State management of the environment. The compulsory application of environmental standards and regulations is one of the basic measures to ensure environmental protection requirements. Through the experience of Canada as well as India, national standards and technical regulations on environment should be formulated according to the general principle: to be suitable with development level, educational level, suitable with the current status of the economy, creating favorable conditions for state management of the environment and ensuring sustainable socio-economic development. In addition, it is also necessary to consider the regulations to encourage the application of environmental standards of countries in the world to Vietnam as well as the application of modern international standard systems.

Thirdly, the need to finalize regulations on environmental impact assessment. Lessons learned from international experience have shown that the regulations on environmental impact assessment in
Vietnam need to be amended and supplemented. Like the promulgation of specific, feasible regulations on environmental impact assessment for strategic projects, socio-economic development plans and plans. On the other hand, for the regulation of responsibility for coordination among state agencies in environmental impact assessment, avoiding the situation that projects that have not yet been assessed for environmental impacts are still approved, expressing inadequacy, tightness between state agencies. This regulation must be in the direction that “the project will only be approved after the decision on approval of environmental impact assessment report has been issued.”

Fourthly, Vietnam needs to complete the regulations on waste management soon, especially wastes in urban and industrial areas, causing pollution of cultivated land. In particular, it is necessary to specify clearly the responsibilities of each agency and unit that competes with overlapping functions and duties on environmental management.

Fifth, like Canada, India or many other countries in the world, Vietnam needs to improve the regulations on soil, water and air environment protection, such as developing regulations on protection fees environment.

There are policies to establish and manage high-tech application agriculture areas. High-tech application agriculture means the application of advanced technologies and techniques to the stages of agricultural production in order to create commodity products with productivity, quality, efficiency and safety. Food safety and competitiveness compared with traditional products. Include the following main contents:

Select advanced technologies on plant varieties and animal breeds, advanced farming and breeding technologies, irrigation technologies, post-harvest, preservation and processing technologies, and step by step apply bio-technology and technologies information on management, branding and market promotion. High-tech agricultural production creates products that are specific to each ecological region, achieving high productivity and economic efficiency per unit of area, highly competitive in terms of product quality of the same type on the market, having conditions to expand production scale when required.

High-tech agricultural areas are concentrated agricultural production areas, applying the advances of science and technology in the production of a commodity agricultural product.

High-tech agricultural park means a hi-tech park focusing on the application of research and high-tech achievements to perform the task of selecting, breeding and propagating plants and animal breeds for productivity, quality and disease prevention and treatment. plan, pets; creating materials, machinery and equipment used in agriculture, preserving and processing agricultural products, developing agricultural enterprises applying high technologies and hi-tech services in service of agriculture.

Hi-tech agricultural park is a closed area from producing - processing - consuming agricultural products; is one of the new forms of agricultural territorial organization; the role is the nucleus of agricultural development in the direction of high-tech applications, is an agricultural organizational model towards sustainable development, support, guidance and orientation for investors and cooperatives, individual farmers study and apply research results into production. In the early 1980s, the United States had more than 100 high-tech agricultural zones; In the UK, in 1988, there were 38 gardens of science and technology with more than 800 enterprises participating. In Finland, in 1996, there were nine high-tech agricultural science zones. In the 1980s, Israel built the first 10 hi-tech agricultural zones, China now has more than 500 zones and 4,000 hi-tech application centers across the country.

High-tech agricultural production activities in these areas have advantages such as ensuring uninterrupted uniformity in activities; centralized goods, control of agricultural quality, reduce infrastructure investment costs per unit area; enjoy preferential policies of the State such as low land rental cost and export tax of agricultural products, scientific and technological support, and labour support. In addition to the advantages, the establishment and development of hi-tech agricultural parks face difficulties such as high investment capital, slow recovery, and low-capital-based enterprises that are difficult to participate in and inappropriate. with some seedling objects require a large amount of isolation space.
High-tech agricultural production area, also known as hi-tech agricultural area, is defined as concentrated agricultural production area, applying high-tech research and development achievements in the field of agriculture to realize present the task of producing one or several strategic agricultural commodities and commodities for export based on the results of breeding and propagating plants and animals for high productivity and quality; disease prevention and control; planting, raising animals with high efficiency; use of modern materials, machinery and equipment in agriculture; preserving and processing agricultural products and high-tech services in agricultural production, in order to create a large and concentrated volume of agricultural commodities.

5. Conclusion
Depending on different socio-economic conditions, different organizational structures, institutions, institutions, legal systems, policies and legal regulations of the countries in the world on the same environmental issues is different. However, basically, the principles and directions of environmental protection of countries in the world and Vietnam have in common, towards green growth and sustainable development. Vietnam is in the period of increasing integration with the global, participating and implementing many commitments and international agreements, so, considering, updating and learning to apply in accordance with the conditions the fact is very important.

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