

Evaluating environment protection and sustainable agriculture: Case studies in Vietnam and recommendations for public (state) administration

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ABSTRACT

The purpose of this study was to present several environmental case studies in Vietnam and public (state) administration for environment protection. Authors also evaluated environment protection in industrial parks under the governed law. Theoretical framework was in accordance with applicable regulations/law and practices. Issues related to environmental management will make best use of opportunities (or all potentials) to achieve/set best objectives. This study used qualitative and analytical methods, descriptive method, while combined with case studies, historical and synthesis methods. This study also presented some cases of environmental pollutions, which authorities resolutely organized the implementation of measures to handle violations of the law on environmental protection. In conclusion, It would suggest that relevant ministries and branches need to review and amend a number of relevant laws, such as the Law on Sanctions of Administrative, the Law on Inspection, the Law on Water Resources, the Law on Science and Technology, etc. State management of the environment is understood as the process by which the State, through the performance of its responsibilities, duties and powers to issue measures, laws, economic, technical and social policies appropriate society in order to protect living environment and to develop the country's socio-economic sustainability.

Key words: Public management, Environmental law, Regulations, Environmental pollutions, Urban wastes.

Article type: Research Article.

INTRODUCTION

The concept of environmental management

Environmental management is an activity of a competent State agency to organize, implement as well as supervise activities of protecting, improving and developing environmental conditions and exploiting and using natural resources properly optimal. Environmental management is understood as the continuous and organized impact of environmental management subjects in accordance with applicable regulations/law and practices. Issues related to environmental management will make best use of opportunities (or all potentials) to achieve/set best objectives. Thus, according to the above concept, we realize that environmental management includes many different forms as follows:

- + State management of the environment.
- + Environmental management by NGOs.

Second, sustainable agriculture depends on many factors. The country's fertilizer-based intensive agriculture has been around for decades (Trung *et al.* 2020). Many research achievements have been transformed into technical advances and effective applications in production (Nižetić *et al.* 2019; Ayinla *et al.* 2019; Kapoor *et al.* 2020). It is the achievements in research that have helped farmers to cultivate more efficiently and contributed to increasing the amount of fertilizer used for many years at the highest rate in the world. Fertilizers play an increasingly important role in improving the productivity and value of agricultural products. After a long time, research was

performed to meet the requirements of production conditions for organic fertilizers and other fertilizers as prescribed in Decree 202/2013/ND-CP and Circular 41/2014/TT-BNNPTNT. In early 2016, Vedan Vietnam Joint Stock Company was one of the few enterprises granted the License to produce organic and other fertilizers by the Department of Crop Production - Ministry of Agriculture and Rural Development including: Bio-organic fertilizers - Vedagro liquid, Mineral-organic fertilizers - Vedagro pellets and Fertilizers with added performance enhancers - Venatto PGA Broth 350 with license number 061.08.0116. Fertilizer is a product of conditional production and business, managed according to Decree No. 202/2013/ND-CP dated November 27, 2013 of the Government and Circular 41/2014/TT-BNNPTNT dated 13/11/2014 of the Ministry of Agriculture and Rural Development. As a growing company based on natural raw materials from agriculture, Vedan Vietnam Joint Stock Company wishes to contribute back to the development of Vietnam's agriculture a new look with innovative products. Quality and advanced products based on the investment in research and development of products with modern scientific technologies.

Hence we choose this topic with research questions

What are evaluation of environment protection and sustainable agriculture: Case studies in Vietnam and recommendations for public (state) administration?

Previous studies

Table 1. Summary of related studies.

Authors	Year	Contents, Results
Roy <i>et al.</i>	1999	Solving used tires by Landfilling or directly discarding will contaminate land and other problems caused such as mosquitoes (a lot) and diseases, etc.
Sprecher <i>et al.</i>	2014	in 3 rd World many residents. People conspire to burn hundreds of used tires to reduce huge amount of scrap tires in many towns , which can prevent high dangers for the environment, and even life.
Gajdzik <i>et al.</i>	2019	By new technology, areas that previously operated in enterprises as separate systems can be combined and create new opportunities for industrial production (modernization of production methods and reduce employment). Industry 4.0 brings with it a number of new challenges for producers in the field of environmental protection, and related to the inclusion of cybernetic technology in physical production processes as well as distribution.
Czajczyńska <i>et al.</i>	2020	Automobile sector develops more and more which create growth (steady) in tires used which need to be utilized. After their lifespan and then, there comes pyrolysis as a solution, which undertaken at three different temperatures (400, 500 and 600 °C).
Wang <i>et al.</i>	2020	Due to the growing population and consequent pressure of use, agricultural soils should maintain adequate levels of quantity and quality to produce food, fiber, and energy, without falling victim to a negative impact on their balance of nutrients, health, or their ability to function. The use of mineral fertilizers has long been a key tool to offset nutrient outputs and thus achieve increased yields.
Hang <i>et al.</i>	2020	Through pyrolysis stage, waste tires converted to valuable products and prevent what called as "black pollution", that's difficult to degrade and it solved difficulty of global rubber sector.

Beside, Chinese law has undergone progressive changes over the past decade, typically with the introduction of a law that provides for the "swapping of the burden of proof" of litigants in environmental disputes. Article 65 of China's 2009 Law on Adjusting Civil Violations states: "For any damage caused by environmental pollution, the person causing the damage should bear the legal responsibility for the violation" or Article 66 of this law stipulates: "For any dispute about environmental pollution, the polluter will be responsible for proving the allegations are unfounded or giving the right to release from liability. By specific cases prescribed by law with the proof that, there is no connection between the damage occurred and the conduct of this subject" (source: Tort Liability Law of the People's Republic of China, Dec. 26, 2009).

METHODS

This study uses qualitative and analytical methods, descriptive method, while combined with case studies, historical and synthesis methods. Case examples used from Vietnam such as Thi Vai River pollution and waste tire pyrolysis projects.

RESULTS

Evaluation of environment protection in industrial zones in Vietnam case

We evaluate both limitations and advantages as follows:

Table 2. Evaluation of environment protection in industrial zones

Limitations	Advantages
<p>Regarding wastewater: Most industrial zones and EPZs have developed multi-industry and multi-field production, so they emit many different types of wastewater. Collecting and general processing is difficult. Although the number of centralized wastewater treatment plants has increased, according to the reports of the Management Boards of the IZs, in the area around the IZs and EPZs in some localities, some wastewater standards exceed the regulations. The reason is that the operation and inspection of wastewater treatment plants do not have specific legal regulations, as well as no high deterrent sanctions, so some industrial parks do not operate wastewater treatment stations. Continuous wastewater treatment.</p> <p>Regarding emissions: Although businesses have consciously implemented, the equipment for this work is mainly sketchy, simple, and has not thoroughly minimized the impact of emissions on the surrounding environment around. The quality of the air environment in industrial zones, especially those established on the basis of existing enterprises with outdated production technology or without investment in exhaust gas treatment systems, is declining. In addition, the issue of air pollution in the production facilities of industrial zones is also a matter of concern. Specifically, seafood processing and chemical production units are causing pollution at those production facilities and have had a significant impact on the health of workers.</p> <p>Regarding hazardous waste and solid waste: Some enterprises in IZs and EPZs do not register waste sources according to regulations. Some enterprises store their own wastes, causing local pollution. In some localities, there are still no hazardous waste collection and treatment enterprises for secondary enterprises in IZs and EPZs. So hazardous wastes are not managed and treated according to regulations, creating risks about environmental pollution.</p>	<p>Regarding wastewater treatment: The construction of a centralized wastewater treatment station in the IZ has been interested and promoted by the competent authorities. In some areas, the proportion of industrial zones with wastewater treatment plants built and put into operation is high, such as the Red River Delta and the Southeast; at the same time, the number of enterprises in industrial zones and export processing zones connected to concentrated wastewater treatment plants reached a high rate (about 85%).</p> <p>Regarding emissions: Due to the concern, evaluation and consideration right from the stage of making investment projects, many enterprises in IZs and EPZs have invested in building exhaust gas treatment systems. Some industries with high emission levels, such as construction material production and mechanics, have actively taken preventive measures. Therefore, the pollution of exhaust gas and noise is limited.</p> <p>Regarding solid waste and hazardous waste: The implementation of regulations on solid waste treatment is strictly observed by most businesses. Most of the enterprises in the IZs and EPZs have taken measures to classify and temporarily store them before collecting them for treatment. Some IZs and EPZs have organized centralized waste collection and treatment. Therefore, basically, the collection and treatment of solid waste is guaranteed.</p>

(*source: author analysis and synthesis).

Case study for sustainable agriculture in Vietnam

The main raw material for the production of Vedagro pellets is GA-CMS solution. The product retains all the nutritional components of molasses and has a characteristic smell of molasses. In addition, the product also contains amino acids necessary for plants to be produced during fermentation such as: Aspartic acid, Threonine, Serine, Glutamic acid, Glycine, Alanine, etc. By technology and advanced management systems such as: ISO 9001, ISO/IEC 17025, ISO 14001, OHSAS 18001 fertilizer products: Vedagro liquid, Vedagro pellets, Venatto PGA Broth 350 will help plants. Planters can directly absorb nutrients, increase resistance, enhance tolerance to harsh weather, etc. to help plants grow quickly. These products can supplement potassium for plants and replace manure and nitrogen fertilizers. The most important thing is that Vedagro Mineral Organic Fertilizer in pellet form meets the best growth and development for plants, in all production conditions, especially when climate change is taking place harshly in Vietnam as our country (source: baotainguyenmoitruong.vn).

Case studies of public (state) management for environment protection

Many case examples in Vietnam are related to environmental pollution (on river, for ex.) which require prevention activities in order to prevent and limit adverse impacts on the environment and to overcome pollution as well as environmental degradation, improve environmental quality; rational use of natural resources. Hoa Binh Sugar Factory polluting the Buoi River or the suspected discharge of waste in Ha Tinh are just two of many scandalous environmental violations involving businesses in Vietnam in recent years. From news of local community (complaints) related to wastewater discharge into environment after 3-months monitoring, on September 13, 2008, the interdisciplinary inspection team caught red-handed. Vedan Company (Taiwan, China FDI enterprise) in Long Thanh dist, Dong Nai discharges a large amount of untreated wastewater into Thi Vai River. The fact that Vedan Company discharges untreated wastewater according to regulations and contains many toxic substances seriously affects the outside living environment, especially the Thi Vai River, which is not surprising to the public and public opinion around this area, decades ago. Since the 90s of the last century, specifically the years 1994 - 1995, Vedan Company has installed a deliberate "treatment system": a multistage pump system with flexible opening and closing valves, leading to a "secret" pipe that is dug deep in the ground directly pointing to Thi Vai River.

With a gentle process, all the wastewater, which should have entered the operating system, will pour directly into the innocent river, which is difficult to detect with the naked eye. Recorded of 10 violations by investigation of the Ministry of Natural Resources and Environment, this enterprise had the wastewater exceeded 10 times the permitted standards for factories producing modified starch, monosodium glutamate, lysine.



Fig. 1. Vedan and Thi Vai River pollution; Vedan discharges waste into Thi Vai River (source: nhandan.vn).



Fig. 2. Thi vai River pollution (source: internet).

At the end of that year, the chief inspector of the Ministry of Natural Resources and Environment issued a decision to sanction Vedan for administrative violations of environmental protection with a total fine of 267.5 million VND, forcing the arrears and payment of environmental protection fees more than 127 billion VND.

Hyundai: Vinashin discharge waste into Van Phong Bay

In April 2011, in the case of Van Phong Bay, the Police Department for Environmental Crime Prevention (PC49), Khanh Hoa Provincial Police caught the Hyundai. Vinashin Shipyard Co., Ltd. (HVS), a joint venture between Hyundai Group (Korea) and Vietnam Shipbuilding Industry Corporation, discharging liquid waste that has not yet been treated by the treatment system. During the inspection at HVS, the environmental police force discovered that there was no waste treatment system in the canteen area 4 (used for about 1,000 workers; source: vnexpress.net). The adverse impacts of Thi vai pollution need investigation as well as transparency and actions to take to limit similar negative impacts on our environment in future.



Fig. 3. VEDAN and Thi Vai river pollution; (source: internet).

Hence, actions needed to take by the Company, requested by The Ministry of Natural Resources and Environment:

- (i) They have to install flow measurement equipment and automatic monitoring of some environmental parameters.
- (ii) The company has to ensure typical contamination in wastewater after treatment, periodically record measurements for monitoring and supervision.

DISCUSSION

Environmental protection is activities that keep the environment clean and beautiful in general term. Relevant ministries and branches need to review and amend a number of relevant laws, such as the law on sanctions of administrative violations, the law on inspection, the law on water resources, the law on science and technology, the law on standards and technical regulations, the law on environmental protection tax, the law on investment, etc. to promote the effectiveness and efficiency of the provisions of the law on environmental protection (Basiago *et al.* 1998; Gunningham *et al.* 2004; Mursaliev & Ogli 2021; Mikhailovna *et al.* 2021). Moreover, according to study, environmental pollution is due to increase in domestic waste. According to statistical results, garbage collection in Hanoi has not been thoroughly effective, still about 15% of the amount of waste is not collected and treated but thrown at the garbage disposal sites, canals or vacant lots in the city (Yoda *et al.* 2004; Mihai *et al.* 2022). Currently, this percentage is on an increasing trend. On average, there are about 7,000 tons per day, of which 10-15% are not collected. This amount of waste is enough to cause quite serious environmental pollution (Chattopadhyay *et al.* 2009; Mohsin *et al.* 2020). The collection, transportation, treatment and disposal of solid waste has become a dilemma for urban managers in Hanoi (Thi 2020). The competent authorities in Hanoi have proposed options to treat solid waste by separating solid waste at source (Thi & Phuong 2022). However, due to limited resources and human resources, this program has not been able to be widely deployed throughout the city. The backlog problem of waste has been polluting the environment, causing unsightly beauty for the process of urbanization. Environmental pollution due to the amount of domestic wastewater, currently, in Hanoi in particular and in urban areas in our country in general, most of the domestic wastewater is not treated, but dumps directly into rivers and lakes in urban areas. The total daily wastewater volume of Hanoi is about 320,000 m³, of which 1/3 is industrial wastewater. In fact, there are rivers in Hanoi that have become dead rivers due to severe pollution, such as To Lich River, etc., seriously affecting the quality of life of the people in that area (Nguyen Thuy 2022).

A Case of waste tire recycling for environment protection

There are many negative/adverse impacts on environment such as being a place to live and transmit diseases of organisms (flies, mosquitoes, and cockroaches), the risk of fire and smoke, etc. The problem of car waste tires need to be solved and becoming one of the alarming problems of global solid waste. Therefore pyrolysis factories can be opened for recycling waste into useful products. Then Renewable Energy Factory was born as a responsibility and mission to solve the burden of waste treatment for the environment. Waste tires will be put under pyrolysis process and generate finished products below:

Table 3. Pyrolysis of waste tires.

Pyrolysis Product	Applications
Pyrolysis oil FO-R from tires (37%)	Boiler fuel oil, replacing furnace oil. If applied additional distillation fractions are obtained (gasoline, diesel, grease, and bitumen).
Carbon black (36%)	This kind of product can be used as a solid fuel, which is a component used in the process of making rubber products, paint pigments, cemented.
Gas (Hydrocarbon; 11%)	Can be reused for saving energy during the pyrolysis process; Recirculated used for heating at the waste pyrolysis equipment,
Scrap steel (16%)	Contains high quality steel components, a component for making steel and used as raw materials for billet smelting.

(*source: authors).

Environment protection law

Pursuant to Clause 1, Article 148 of the Law on Environmental Protection 2020, regulations on environmental protection resources are as follows:



Fig. 4. Regulations.

From what sources does the social capital for environmental protection come from?

Pursuant to Clause 4, Article 153 of Decree 08/2022/ND-CP stipulating on socialized capital for environmental protection as follows:

Resources to carry out the task of environmental protection

Resources for implementation of the planning specified at Point d, Clause 9, Article 151 of this Decree shall be decided by the competent authorities in accordance with the law on public investment and the law on the state budget; the tasks specified at point o clause 9 Article 151 and point m clause 9 Article 152 of this Decree shall be decided by the Prime Minister. Sources of social capital for environmental protection:

- a) Capital sources of enterprises, organizations and individuals participating in environmental protection activities;
- b) Sources of donations, sponsorships and aid from organizations and individuals as prescribed by law;

Some environment protection model

We look at below model: In this model administrators will evaluate environment factors (pollution, depletion) based on the base year toward criteria of sustainable development, resource conservation and environment protection.

DISCUSSION AND CONCLUSION

We would suggest some technological and technical solutions following for solving above environmental cases: Drainage system and domestic wastewater treatment:

- (i), Wastewater (domestic) need to follow QCVN 14:2008/BTNMT before discharged
- (ii), Wastewater need to be stored at lakes to check and reused for fire prevention of other needs (irrigation, street /tree washing, etc.)
- (iii) Need a mechanism for inspection and monitoring industrial sludge.

- **Industrial wastewater treatment system**
- (i) Wastewater system need to be followed QCVN 40:2011/BTNMT, before they discharged.
- (ii) We need to separate wastes at sources, esp. harzadous wastes, need to be managed strictly.

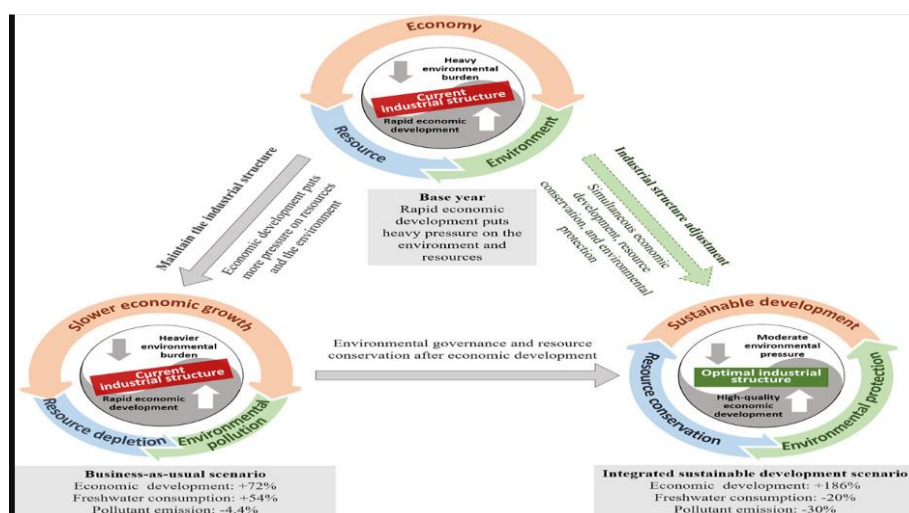


Fig. 5. Environmental governance in Vietnam (Source: Hu et al. 2021).

Besides, According to the Torture Law of the People's Republic of China, when any dispute arises about environmental pollution, it is the responsibility of the polluter to prove that he is not liable that the responsibility of their actions may be mitigated under certain circumstances as required by law or to demonstrate that there is no cause and effect between the subject's conduct and the harm caused to the environment. In case of environmental pollution caused by two or more polluters, the degree of burden of proof of each polluter shall be determined according to the type of pollutant, emission volume and other factors (source: Winners Law Firm – Shen Jinzhong, Environmental law in China). Moreover, in the condition that natural resources are increasingly depleted, environmental quality is seriously affected by the speed of industrial development and urbanization, the reuse of waste in production is a necessity to what needs to be done, because in addition to reducing the burden of environmental pollution, protecting resources for future generations, it also helps businesses save a large amount of costs in production, lower costs products, since at present, compared to other natural fuels, the cost to buy FO-R oil products from used rubber is much lower.

ACKNOWLEDGEMENT

Thank you editors, friends to assist this publishing

Conflicts of interest

There is no conflict of interest.

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Bibliographic information of this paper for citing:

Thuan, KH, Ngoc Huy, DT, Diep, NT 2023, Evaluating environment protection and sustainable agriculture: Case studies in Vietnam and recommendations for public (state) administration. *Caspian Journal of Environmental Sciences*, 21: 779-786.
