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Research Article

Community Perspectives On Environmental Crimes In Laguna And Quezon, Philippines: Toward Proposed Natural Resource Protection Strategies

Gelbert A. Llanto [1] | Jennifer A. Valdez [2]

[1-2] Laguna State Polytechnic University, Laguna, Philippines

Correspondence
Gelbert A. Llanto, Laguna State Polytechnic, Philippines
Email:gelbert.llanto@lspu.edu.ph

Abstract

Introduction: Environmental crimes worsen the risks linked to climate change. Unsustainable urbanization and industrial growth, driven by technological and economic ambitions, add pressure on fragile ecosystems and the communities that depend on them.

Objective: This study examined community perspectives on environmental crimes and issues, measured respondents' level of awareness of the effects of these crimes, tested differences between respondents from Laguna and Quezon, and proposed natural resource protection strategies.

Methods: The study used a descriptive-comparative quantitative design. An expert-validated, researcher-made questionnaire gathered responses from 420 residents (327 from Laguna and 93 from Quezon) selected through purposive and convenience sampling. Data were analyzed using weighted means and independent samples t-tests.

Results: Respondents showed strong average agreement that quarrying, illegal logging, kaingin, open burning, smoke belching, wildlife exploitation, and unpermitted fish pens are environmental crimes (category means 3.28 to 3.44 on a four-point scale). They reported a high level of awareness of the effects of these crimes (M = 3.51). Respondents from Laguna and Quezon did not differ significantly on any of the seven variables (all $p > .05$). Smoke belching, sand dredging, and quarrying received the lowest ratings.

Conclusions: Residents of both provinces hold high and comparable knowledge and awareness of environmental crimes and their perceived effects, with weaker recognition of less visible offenses. These findings support community-based education campaigns on environmental laws, stricter monitoring by local government units and the Department of Environment and Natural Resources, and a community watch and rapid reporting system.

Keywords: Environmental crimes, natural resource protection, community perceptions, environmental degradation, climate change, quarrying.

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1. Introduction

The growing concern over environmental issues is a critical problem that humanity must address (Marpa, 2020). Environmental crimes pose complex challenges, with diverse causes and ambiguous definitions of their nature (Altopiedi, 2019) and threaten all forms of life on Earth due to the effects of climate change (Pacoma, 2019). Rapid urbanization has led to increasingly unsustainable development patterns, disproportionately benefiting the wealthy while marginalizing the poor. Although sustainable development is often suggested as a possible solution to balance economic growth with ecological responsibility, its practicality remains uncertain (Constantino-David, 2001). Today, humanity faces many challenges, and environmental protection is among the most urgent issues. Environmental crimes not only harm communities but also pose serious risks to human life. The collective effort of individuals, along with strong state laws, is essential in fostering a culture of environmental stewardship and ensuring effective protection measures (Kashkoulian et al., 2019).

Kramer (2020) expressed concern about the detrimental effects of greenhouse gas emissions, along with land issues like deforestation, which is often called 'ecocide.' These environmental violations have persisted for many years and are among the most widespread environmental crimes of the twenty-first century, significantly contributing to global warming. Both government agencies and private corporations are involved in these activities; however, governments' failure to put effective regulations in place often makes the situation worse. Furthermore, climate change and environmental destruction have forced people to migrate from their native areas, rendering those places uninhabitable. This displacement often leads to economic collapse, which can increase social instability and raise crime rates (Khavarian-Garmsir et al., 2019). Despite strong evidence of the harmful effects of profit-driven industries, such as the destruction of indigenous communities and ecosystems, these industries continue to expand (Castellino, 2024).

The ongoing expansion of these industries has important implications for marine environments. Bueger and Edmunds (2020) describe blue crimes as actions that harm marine life, including the overexploitation of aquatic resources and the construction of structures in oceanic areas that disrupt ecosystems. The unsustainable development of beaches and other water bodies for tourism often leads to beautification. However, this can sacrifice environmental cleanliness and sustainability, as seen in Boracay, where lawmakers have not prioritized proper planning and policy development (Ong et al., 2020). Additionally, managing food waste contributes to environmental problems such as pollution, the greenhouse effect, and global warming. Despite these serious issues, authorities still lack adequate regulations and policies on waste management, especially regarding eco-friendly food packaging (Faishal, 2022). A similar situation exists in Israel, where a major challenge for lawmakers is the illegal disposal of construction and demolition waste. This problem is worsened by slow and ineffective prosecution of such offenses, along with minimal penalties, leading to significant economic losses (Seror & Portnov, 2020). Industries and modern corporations are vital to economic development; however, excessive exploitation of natural resources driven by rapid industrial growth poses serious threats to the environment. For example, improper disposal of hazardous waste further endangers ecological stability (Tofik & SH, 2023). This issue is linked to air pollution, one of the most persistent global problems today.

Air pollution not only harms human health by contributing to various diseases, including cancer, but also causes significant environmental damage and plays a key role in climate change. In severe cases, it can worsen the effects of natural disasters (Manisalidis et al., 2020). Furthermore, Glencross et al. (2020) noted that air pollution has several adverse effects on health, including the development of chronic lung conditions and other illnesses linked to a weakened immune system. According to Sofia et al. (2020), air pollution is now widely recognized as having a profound impact on human health, highlighting the need for effective strategies to create a healthier, more sustainable environment. Furthermore, Burkhardt et al. (2019) found a link between air pollution and increased crime rates, especially violent crimes and aggressive behavior. This connection is seen both within households and in public spaces, as air pollution can raise temperatures that may influence aggression. Moreover, Bondy et

al. (2020) discovered that air pollution is positively associated with the commission of offenses across different settings. Evidence indicates that these effects continue even when pollution levels are below legal standards, suggesting that reducing air pollution in cities can be an effective way to prevent crime. Besides pollution, other environmental violations, such as illegal logging, also threaten communities and national resources.

Illegal logging remains a persistent international issue, causing estimated losses of hundreds of billions of dollars for some countries. Scholars have proposed various strategies to prevent or reduce its effects, including measures like gating access roads, installing informative signage, and limiting forest access (Thompson & Magrath, 2021). In the European Union, enforcement methods such as bilateral agreements and partnerships are commonly used to combat illegal timber trade. While there is evidence that these strategies can be effective, they do not fully address issues of injustice and might negatively impact the legal timber market (Polo Villanueva et al., 2023). Despite global efforts to combat illegal logging, the issue persists and remains a significant international concern due to its damaging impact on natural resources and national economies. Contributing factors include limited economic and institutional development, weak law enforcement, and corruption, all of which continue to pose significant challenges (Bösch, 2021).

Furthermore, crimes against wildlife are rapidly increasing, worsening the biodiversity crisis (Didarali et al., 2022). The environmental and socioeconomic impacts of quarrying activities also warrant attention, as they cause dust, land, and noise pollution, which are linked to health problems in affected communities (Opondo et al., 2023). In the Philippines, as discussed by Briones (2005), while farming provides income and supports community development, it also threatens natural resources. These threats include water pollution, habitat destruction, and biodiversity loss, highlighting the need for sustainable agricultural practices to protect ecosystems.

Environmental damage now serves as a catalyst for serious criminal activity, a key focus of green criminology, which recognizes crimes against animals and natural resources (Brisman & South, 2019; Lynch, 2020). As natural assets decrease in many countries, organized crime groups are increasingly involved in various illegal activities, such as illicit trade in timber, poaching of endangered species, and illegal mining, alongside their typical monopolistic criminal enterprises (van Uhm & Nijman, 2022). Moreover, environmental advocates often face violence, intimidation, and harassment; notably, attacks targeting forest rangers and volunteers in Palawan, Philippines, have become alarmingly common (Dressler, 2021).

These threats persist due to weak enforcement mechanisms, which contribute to disparities in the prosecution of environmental crimes, as noted by Golubev et al. (2020). This issue is worsened by challenges within criminal law, making it hard to prove the guilt of the accused. Seifeldin (2024) supports this view, noting that the right to prosecute environmental offenses is hindered by the complexity of existing legal frameworks, particularly because such offenses are often international and require adherence to bilateral agreements. This highlights the need for decisive action on environmental and humanitarian crises and emphasizes the importance of adopting sustainable strategies to protect them. Additionally, Araújo (2020) stresses the crucial role of environmentalists in legislative processes, advocating for the inclusion of knowledgeable stakeholders in policy development, particularly given that some policies are subject to congressional oversight.

Building on the need for informed policy advocacy, Seror and Portnov (2020) emphasized that strong environmental policies, strict penalties, and prompt case resolution are crucial for deterring environmental crime. Additionally, incorporating environmental awareness into the Philippine education system is a key strategy for instilling essential values of environmentalism among Filipinos, especially in social sciences and environmental studies, through green programs and related initiatives (Marpa, 2020). Finally, environmental restorative justice emerges as a potential comprehensive approach to addressing environmental offenses by sharing legal frameworks and practices best suited to specific local contexts, thereby protecting communities and ecosystems while addressing law enforcement gaps (Forsyth et al.,

2021). Existing studies on environmental crime tend to focus on national enforcement, transnational trade, or single offense types such as illegal logging, waste dumping, or air pollution (Bösch, 2021; Seror & Portnov, 2020; van Uhm & Nijman, 2022). Far fewer studies ask residents of affected areas how they view these offenses and their effects. This gap matters in Laguna and Quezon, where the Sierra Madre, Mt. Banahaw, Laguna de Bay, and the Tayabas Bay coast host forest, mineral, lake, and coastal resources under pressure from quarrying, logging, and waste. The authors found no published community survey documenting residents' perspectives across several categories of environmental crime in these two provinces at once. Without such data, local governments and universities lack an evidence base for designing education and enforcement programs. This study responds to that gap.

Two frameworks guide the study. Green criminology treats harms against ecosystems, animals, and natural resources as matters of criminological concern, including harms current law punishes weakly or not at all (Brisman & South, 2019; Lynch, 2020). The knowledge, attitude, and practice (KAP) model holds that people's knowledge shapes their attitudes and, in turn, their practices, and it remains a common basis for survey instruments used in program planning (Launiala, 2009). Following these frameworks, the questionnaire grouped offenses into six thematic areas drawn from Philippine environmental laws: general environmental crimes such as quarrying and open burning, forest-related crimes (Revised Forestry Code of the Philippines, 1975), air pollution (Clean Air Act of 1999, 1999), crimes against wildlife and waste management (Ecological Solid Waste Management Act of 2000, 2001; Wildlife Resources Conservation and Protection Act, 2001), crimes related to bodies of water (Philippine Fisheries Code of 1998, as amended, 2015), and local environmental issues. Part 1 of the instrument captured knowledge and attitude through agreement with each offense and issue. Part 2 captured awareness of the effects of environmental crimes. The study did not measure practices directly.

This study examined community perspectives on environmental crimes in Laguna and Quezon as a basis for proposing natural resource protection strategies. Specifically, it sought to answer the following research questions: (1) What are the community's perspectives on environmental crimes and issues? (2) Is there a significant difference between respondents from Laguna and Quezon in their assessment of environmental crimes and issues? (3) What is the community's level of awareness of the effects of environmental crimes? (4) What natural resource protection strategies arise from the findings?

2. Materials and Methods

2.1. Research Design

The study employed a descriptive-comparative quantitative research design. Descriptive research aims to gather the perceptions, opinions, attitudes, and beliefs of the respondents about the current issues. The description is summarized by reporting the number or percentage of each response (Lodico et al., 2006). The survey instrument was utilized to gather the responses of the respondents through Google Form and face-to-face surveys. In addition, the responses were tallied, tabulated, and summarized for proper interpretation and analysis. The design is comparative because the study also tested differences between the Laguna and Quezon respondent groups.

2.2. Respondents and Sampling Procedure

The study involved 420 community residents: 327 from Laguna and 93 from Quezon. The target population consisted of adult residents of the two provinces. Based on the 2020 Census of Population and Housing, Laguna had 3,382,193 residents and Quezon, excluding Lucena City, had 1,950,459 residents (Philippine Statistics Authority, 2021). No complete list of eligible residents was available, so the study did not use a probability sampling frame. Slovin's formula at a 5% margin of error yields a minimum of 400 respondents for the combined population of 5,332,652, and the total sample of 420 exceeded this minimum. This formula applies to estimating a proportion at 95% confidence (Tejada & Punzalan, 2012), so the study treats the computation as a guide to overall precision and not as evidence of representativeness. The two provincial samples were not allocated in proportion to population. The larger Laguna sample reflects the location of the researchers' university and the greater number of eligible residents reached in Laguna during data collection. Sampling proceeded in two stages.

First, purposive sampling set the eligibility criteria: respondents had to reside in the province and must have lived in their community for at least three years, which ensured familiarity with local environmental conditions. Second, among eligible residents, the researchers used convenience sampling and invited those available and willing to respond during the data collection period, both face-to-face and online (Etikan et al., 2016).

2.3. Research Instruments

The survey questionnaire was the primary data gathering instrument. The researchers developed it from the literature, theories, informal interviews, and Philippine laws on environmental protection. The self-structured questionnaire also included open-ended questions to gather respondents' personal views on the subject. Appendix A presents the structure of the instrument. The instrument underwent content validation by three experts in the fields of environmental law, criminology, and research and statistics. The experts rated each item for relevance and clarity, and items were revised or removed based on their ratings and comments. The research instrument was evaluated by the validator using a structured rubric checklist, with all items and indicators deemed acceptable.. A pilot test with 30 residents who were not part of the final sample checked item clarity before full data collection. Reliability was tested using Cronbach's alpha. Part 1 covers the community perspective on environmental crimes (α = .927, .751, .937, and .968 for the crime subscales) and environmental issues (α = .979). Part 2 covers respondents' awareness of the effects of environmental crimes (α = .941). All values exceeded the .70 benchmark for acceptable internal consistency (Tavakol & Dennick, 2011).

2.4. Data Collection and Analysis

Respondents answered self-administered questionnaires, either face-to-face or through Google Forms. The questions covered their understanding of environmental crimes, their effects, and respondents' assessments and experiences. The researchers collected and organized all completed questionnaires, and the data were tabulated, analyzed, statistically treated, and interpreted. During face-to-face administration, the researchers also held brief informal interviews with respondents willing to explain their answers, and asked about local programs and mechanisms for environmental protection. These interviews supplemented the survey and did not form a separate qualitative strand. The researchers recorded their statements as handwritten field notes and grouped them by questionnaire area, such as quarrying, open burning, and fish pens. The discussion uses these statements only to illustrate and interpret the survey results, and labels them as respondent accounts. Before data collection, the University Board of Regents of Laguna State Polytechnic University approved the study as part of the university's funded research program. This approval is an institutional and administrative approval and not a research ethics review. At the time of this study, Laguna State Polytechnic University (LSPU) was in the process of establishing its Institutional Ethics Review Board (IERB). Consequently, a formal institutional ethics review framework was not yet operational during data collection. All respondents gave informed consent before participating by signing a consent form on the first page of the questionnaire. Participation was voluntary, and the researchers handled all responses and demographic data confidentially in line with the Data Privacy Act of 2012 (2012). The weighted mean was used to describe respondents' perspectives on environmental crimes and issues and their awareness of the effects of these crimes, based on the four-point Likert scale of the questionnaire. An independent samples t-test compared the assessments of the Laguna and Quezon groups. Levene's test checked the equality of variances, and the Welch t-test was used for any variable with unequal variances (Delacre et al., 2017). Skewness and kurtosis values supplemented the formal normality tests (Kim, 2013).

2.5 Ethical Considerations

Tables 1 to 6 present community perspectives on environmental crimes and issues, and Table 8 presents awareness of their effects. The discussion reads these results through the two frameworks of the study. The KAP model treats agreement ratings as indicators of knowledge and attitude toward each offense, while recognizing that knowledge and attitude do not guarantee practice (Launiala, 2009). Green criminology treats the offenses as social harms whose recognition depends on their visibility, their legal labeling, and how routine they are in daily life (Brisman & South, 2019; White, 2008).

3. Results and Discussion

Tables 1 to 6 present community perspectives on environmental crimes and issues, and Table 8 presents awareness of their effects. The discussion reads these results through the two frameworks of the study. The KAP model treats agreement ratings as indicators of knowledge and attitude toward each offense, while recognizing that knowledge and attitude do not guarantee practice (Launiala, 2009). Green criminology treats the offenses as social harms whose recognition depends on their visibility, their legal labeling, and how routine they are in daily life (Brisman & South, 2019; White, 2008).

Table 1. Community Perspective on Environmental Crimes.

Indicator	Mean	Descriptive Interpretation
I am aware of all types of environmental crimes.	3.18	Agree
throwing or burning garbage is an environmental crime.	3.51	Strongly Agree
Open pit mining in protected areas is a crime	3.35	Strongly Agree
Sand and stone quarrying on rivers and coastal areas are prohibited.	3.20	Agree
I am aware that quarrying is a crime.	3.18	Agree
Overall Mean	**3.28**	**Strongly Agree**

Legend: *3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree*

Table 1 shows strong average agreement among residents that mining, quarrying, and garbage burning are environmental crimes (overall M = 3.28). Throwing or burning garbage received the highest rating (M = 3.51), followed by open pit mining in protected areas (M = 3.35). Quarrying along rivers and coastlines (M = 3.20) and awareness of quarrying as a crime (M = 3.18) received the lowest ratings. The gap between strong condemnation of garbage burning and weaker recognition of quarrying fits a pattern described in green criminology. Harms tied to visible, everyday acts are easier to label as wrongdoing than harms embedded in economic activity with a legitimate face, such as extraction for construction (Lynch, 2020; White, 2008).

Quarrying often runs under permits or with the appearance of legality, which blurs the line between lawful extraction and illegal mining for residents (van Uhm & Nijman, 2022). Respondent accounts from the informal interviews add context. Several respondents described sand extraction near coastlines for residential and industrial construction, and named quarry sites in Sariaya (Quezon), Rizal (Laguna), Mt. Banahaw, and some protected areas. They linked these activities to health problems and environmental damage, a pattern Opondo et al. (2023) also documented among communities exposed to quarry dust and noise, and they expressed concern about limited action from local officials. Respondents also identified backyard burning of plastic, rubber, and similar waste as the most common offense in both provinces. Open burning of domestic waste is a large and poorly regulated source of particulate matter and toxic air pollutants in developing countries (Wiedinmyer et al., 2014), with health effects on the respiratory and immune systems (Glencross et al., 2020; Manisalidis et al., 2020). Responses were not unanimous. A minority of respondents disagreed that mining and quarrying are environmental crimes, which points to limited legal awareness among some residents.

Table 2. Community Perspectives on Forest-Related Crimes

Indicator	Mean	Descriptive Interpretation
Cutting of trees without permit.	3.71	Strongly Agree
Log poaching is committed.	3.40	Strongly Agree
Cutting or destroying trees, shrubs or plants of scenic value along public roads, in plazas, parks.	3.53	Strongly Agree

Possessing of chain saw without permit.	3.30	Strongly Agree
Performing Kaingin *(cutting and burning vegetation for cultivation)*	3.37	Strongly Agree
Wandering, entering and occupying protected areas without authority.	3.52	Strongly Agree
occupation or destruction of forest and grazing lands	3.50	Strongly Agree
Deforestation *(reduction of forest land for residential and business purposes)*	3.54	Strongly Agree
gathering or destroying active nests, nest trees, and host plants	3.38	Strongly Agree
cutting of tindalo, Akle and molave tree	3.16	Agree
Overall Mean	3.44	Strongly Agree

Legend: 3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree

Forest-related offenses drew the strongest agreement among the crime categories (overall M = 3.44, equal to Table 4). Respondents rated cutting trees without a permit (M = 3.71) and deforestation for residential and business purposes (M = 3.54) highest. The cutting of tindalo, akle, and molave trees received the lowest rating (M = 3.16), which suggests lower recognition of offenses involving specific native tree species. Visible acts with a clear victim, such as felled trees, appear easier to recognize than offenses defined by species lists or permit rules. Respondent accounts point to tree cutting linked to unregulated charcoal production and kaingin (slash-and-burn farming), especially in remote mountain areas, with Rizal, Laguna named most often. Suarez and Sajise (2010) traced Philippine forest loss to commercial logging followed by kaingin, driven by poverty, corruption, and politics, and showed swidden fields do not offset the forest biodiversity they replace. The accounts in this study mirror that sequence at the local level. Similar forest clearing drives deforestation and economic loss in many countries (Khalid et al., 2019), and cross-national evidence ties illegal logging to weak institutions and low enforcement capacity (Bösch, 2021).

Respondents also named San Pablo City, Alaminos (Laguna), and parts of Quezon as areas losing forest cover to subdivisions, highways, and access roads. Some admitted they did not know a chainsaw requires a permit, even though they often hear chainsaws in their communities. Rational choice accounts of crime hold offenders weigh expected gains against the perceived risk of sanction (Becker, 1968). Frequent chainsaw use with little visible enforcement signals a low certainty of apprehension, the element of deterrence with the strongest empirical support (Nagin, 2013). A minority of respondents strongly disagreed with some of the listed forest-related crimes, which suggests some residents do not recognize every offense that degrades forests.

Table 3. Community Perspectives on Air Pollution Offenses

Indicator	Mean	Descriptive Interpretation
I am aware that air pollution is a crime.	3.34	Strongly Agree
Smoke Belching vehicle.	3.21	Agree
Burning of materials that are harmful to the environment (plastic, rubber, asbestos etc.)	3.62	Strongly Agree
Emit noxious gases *(from greenhouse gases)* which can reasonably be expected to induce global warming.	3.47	Strongly Agree
Cigarette smoking.	3.32	Strongly Agree
Overall Mean	3.39	Strongly Agree

Legend: 3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree

Air pollution offenses also drew strong average agreement (overall M = 3.39). Respondents rated the burning of harmful materials such as plastic, rubber, and asbestos highest (M = 3.62). Many said they learned about this offense through online information campaigns on sanctions and penalties. Yet respondent accounts describe garbage burning as a daily routine, often done by elderly residents in the morning and afternoon after sweeping, without knowledge of its violation of Section 48 of the Ecological Solid Waste Management Act of 2000 (2001). Incidents are seldom reported, and some respondents burn waste because garbage collection in their barangay is irregular or absent. These accounts illustrate the gap between environmental knowledge and behavior (Kollmuss & Agyeman, 2002). Meta-analytic evidence shows knowledge predicts pro-environmental behavior only weakly, while perceived behavioral control, social norms, and moral norms carry more weight (Bamberg & Möser, 2007). Missing collection services reduce perceived behavioral control, leaving burning as the only practical disposal option for many households (Ajzen, 1991).

When a behavior is common and visible, descriptive norms signal it is acceptable and weaken the injunctive norm expressed in law (Cialdini et al., 1990). Weak enforcement and gaps in collection have long kept open burning common in the Philippines despite the national ban (Saplala-Yaptenco, 2015). Smoke belching vehicles received the lowest rating (M = 3.21), the only air pollution item in the agree band. Respondents see vehicle emissions as a routine part of daily travel, given the growing number of vehicles in both provinces. Disagreement responses on air pollution items were concentrated on smoke belching, which suggests incomplete knowledge of emission offenses under the Clean Air Act of 1999 (1999). The same normalization process appears here: an offense built into ordinary routines is less likely to be seen as a crime.

Table 4. Community Perspectives on Crimes Against Wildlife and Waste Management

Indicator	Mean	Descriptive Interpretation
Hunting wildlife.	3.48	Strongly Agree
Knowledge of different types of wildlife that are prohibited from being captured (e.g., birds, reptiles, mammals, etc.).	3.34	Strongly Agree
Poaching Animals	3.30	Strongly Agree
Practicing improper disposal of infectious wastes.	3.43	Strongly Agree
Disposal of solid waste in rivers, lakes, or seas.	3.55	Strongly Agree
Emitting industry wastes to the bodies of water.	3.46	Strongly Agree
Disposing of hazardous materials in bodies of water.	3.51	Strongly Agree
Landfilling without authority	3.42	Strongly Agree
Overall Mean	3.44	Strongly Agree

Legend: 3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree

Crimes against wildlife and waste management drew a high overall level of agreement (overall M = 3.44). Disposal of solid waste in rivers, lakes, or seas (M = 3.55) and disposal of hazardous materials in bodies of water (M = 3.51) received the highest ratings, and poaching received the lowest (M = 3.30). Most respondents said they learned about these offenses through social media and the news. Respondent accounts describe liquid waste discharged into lakes and rivers, especially in Laguna, a province known for its lakes and waterfalls. Food carts and mobile vendors without proper drainage were described as a growing source of this pollution, as were public markets where waste enters drainage canals. Lakes and rivers used by many parties behave as open-access commons. Each discharger gains private convenience while the cost of pollution is spread across all users, the dynamic Hardin (1968) described as the tragedy of the commons.

Ostrom (1990) showed such resources are sustained when users take part in monitoring and when sanctions are graduated and enforced locally. Other jurisdictions treat the discharge of pollutants into water sources as a criminal act carrying criminal responsibility (Almanasra et al., 2022). In some coastal areas of Quezon, respondents reported residents burying household waste in the sand along the seashore. Several respondents also described the capture and public sale of wild birds and the hunting of lizards and snakes for food. Situational crime prevention research shows poaching concentrates on species that are concealable, removable, available, valuable, enjoyable, and disposable, as Pires and Clarke (2012) found for parrots in Mexico. Wild birds sold openly in local markets fit this profile. These activities often go unregulated, threaten local biodiversity, and fall under offenses defined in the Wildlife Resources Conservation and Protection Act (2001). Awareness of wildlife law has also been shown to deter wildlife crime in pastoral communities (Didarali et al., 2022), which supports legal education as a prevention measure.

Table 5. Community Perspectives on Crimes Related to Bodies of Water

Indicator	Mean	Descriptive Interpretation
Practicing illegal fishing	3.43	Strongly Agree
Using poison in fishing	3.50	Strongly Agree
Using fine mesh in fishing	3.32	Strongly Agree
Practicing overfishing	3.31	Strongly Agree
fishing in marine sanctuaries	3.26	Strongly Agree
selling and exporting of corals	3.38	Strongly Agree
fishing of rare/endangered species	3.43	Strongly Agree
constructing of fish pens	3.19	Agree
Dredging of Sand	3.18	Agree
Overall Mean	3.33	Strongly Agree

Legend: 3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree

Residents showed strong average agreement on crimes related to bodies of water (overall M = 3.33). Seven of the nine indicators fell in the strongly agree band, led by using poison in fishing (M = 3.50), illegal fishing (M = 3.43), and fishing of rare or endangered species (M = 3.43). Most respondents said they learned about these crimes through social media and news reports of actual violations. Respondent accounts focus on fish pens, which are common given the many lakes and rivers in Laguna. Respondents believed many pens in Sampaloc Lake (San Pablo City) and Laguna de Bay operate without permits. Fishpen culture in Laguna de Bay supports income, employment, and cheap fish for urban consumers, yet operators themselves rank declining water quality, siltation, and poaching among its most severe problems (Israel, 2008). Enforcement against unpermitted pens therefore has to weigh livelihoods against the carrying capacity of the lake.

Many respondents also reported fishers using fine-mesh nets, electric shocks, and improper gear, which catch juvenile fish and reduce fish diversity, and they attributed these practices to poor catches. Philippine small-scale fishers report steep catch declines over five decades (Muallil et al., 2014), and falling catches raise the incentive to use destructive gear. Some respondents said they had reported such incidents to the police and local government without any action taken. These practices are prohibited under the Philippine Fisheries Code of 1998, as amended (2015), but unenforced prohibitions offer little deterrence (Nagin, 2013). Dredging of sand received the lowest rating (M = 3.18). Respondents said they seldom observe sand dredging because most of their communities are far from the coast, and only a few had seen black sand taken from rivers for sale as construction material.

Table 6. Community Perspectives on Environmental Issues

Indicator	Mean	Descriptive Interpretation
Dumpsites or landfills located in inappropriate areas posing serious risks to both the environment and human health.	3.43	Strongly Agree
There is no proper and regular segregation, collection, transport, storage, treatment and disposal of solid waste from households and commercial area.	3.42	Strongly Agree
The use of plastic waste, including packaged goods and plastic-based packaging materials, is widespread and often leads to uncontrolled and improper disposal, causing harm to the environment.	3.41	Strongly Agree
The municipality lacks a recycling area and waste management facility to effectively support solid waste reduction and the proper handling of recyclable materials.	3.31	Strongly Agree
Improper garbage disposal, especially in densely populated areas, leading to the contamination of seaside areas, lakes, and rivers.	3.44	Strongly Agree
There are no existing programs focused on information dissemination to raise environmental education and awareness within the community.	3.18	Agree
Some members of the community engage in backyard burning of materials which are considered ozone-depleting substances, such as (*tires, rubber, asbestos, chemicals, plastics, styrofoam, and other similar materials)*	3.36	Strongly Agree
Some hospitals improperly dispose of infectious waste, which can facilitate the airborne transmission of disease.	3.22	Agree
There are no existing programs on environmental conservation and protection to support national laws and environmental agendas.	3.13	Agree
Some residents in the community cut down trees to produce charcoal, which they sell as a source of daily income.	3.28	Strongly Agree
Some residents and private entities cut down trees without securing the necessary permits, often for house construction or business development.	3.30	Strongly Agree
Some individuals, both from the private and public sectors, illegally possess chainsaws without the required permits.	3.15	Agree
Protected areas are being illegally accessed for poaching and mining activities.	3.23	Agree
Sand is frequently extracted from coastal areas to support building construction, posing potential environmental risks.	3.14	Agree
Protected areas are being encroached upon for small-scale mining activities.	3.19	Agree
Illegal quarrying exists in some mountainous areas for the excavation of minerals such as stones,	3.25	Agree

marble, and other types of rock blocks.		
There is a notable occurrence of disaster events in regions with frequent quarrying activities.	3.22	Agree
The area lacks a dedicated presence of environmental enforcement officers.	3.27	Strongly Agree
There is a lack of support from Local Government Units (LGUs) and the private sector in combating environmental crimes.	3.26	Strongly Agree
There is a lack of public knowledge about the different environmental laws.	3.35	Strongly Agree
Overall Mean	3.28	Strongly Agree

Legend: 3.26-4.00 strongly agree, 2.51-3.25- agree, 1.76-2.50- disagree, 1.00-1.75- strongly disagree

Environmental issues in the respondents' localities drew strong average agreement (overall M = 3.28). Improper garbage disposal in densely populated areas (M = 3.44) and poorly located dumpsites or landfills (M = 3.43) received the highest ratings. The absence of programs on environmental conservation and protection (M = 3.13) and illegal chainsaw possession (M = 3.15) received the lowest. Respondents described barangays without regular garbage collection, recycling facilities, or adequate waste segregation, and landfills placed in unsuitable areas. Quarrying emerged as a major concern in both provinces, especially in Dolores and Sariaya (Quezon), Rizal (Laguna), and parts of the Sierra Madre, with reported encroachment on protected areas. Respondents attributed these violations to weak support from local government units (LGUs) and the private sector (M = 3.26), absent or ineffective programs, the lack of dedicated environmental enforcement officers (M = 3.27), poor leadership, and corruption. Respondents thus located the causes of environmental crime in governance as much as in individual conduct. Routine activity theory holds crime occurs when a motivated offender meets a suitable target in the absence of a capable guardian (Cohen & Felson, 1979). The reported lack of enforcement officers describes this missing guardianship. The finding also agrees with studies linking weak enforcement and complex legal procedures to the persistence of environmental offenses (Golubev et al., 2020; Seror & Portnov, 2020). Limited public knowledge of environmental laws (M = 3.35) adds to the problem and points to the need for community awareness programs.

Table 7. Difference in Community Perspectives on Environmental Crimes and Issues Between Laguna and Quezon Respondents

Variable	t	df	p	Mean Difference	95% CI (Lower, Upper)
Environmental crime	-.945	418	.345	-0.05	[-0.18, 0.06]
Forest-related crimes	-0.57	418	.570	-0.04	[-0.16, 0.09]
Air pollution	-0.34	418	.738	-0.02	[-0.15, 0.10]
Crimes against wildlife & waste management	-0.41	418	.684	-0.03	[-0.16, 0.10]
Crimes related to bodies of water	-0.72	418	.473	-0.06	[-0.21, 0.10]
Environmental crimes issues	-0.98	418	.329	-0.07	[-0.21, 0.07]
Environmental crimes effect	-1.20	418	.231	-0.07	[-0.18, 0.04]

Levene's test indicated equal variances for all variables except environmental crimes effect ($p = .019$). For that variable, the table reports the Welch t-test (equal variances not assumed) with Welch-Satterthwaite adjusted degrees of freedom [Authors: replace the df, t, p, and CI values in this row with the 'equal variances not assumed' row of the SPSS output]. All other rows report the pooled-variance t-test (df = 418). The Kolmogorov–Smirnov and Shapiro–Wilk tests indicated significant departures from normality ($p < .001$). Formal normality tests tend to flag minor deviations in large samples, so skewness and kurtosis values were also examined (Kim, 2013). Skewness (−1.51 to

−0.42) and kurtosis (−1.34 to 3.54) fell within acceptable limits for approximate normality. Given the sample sizes (n = 327 for Laguna and n = 93 for Quezon) and the robustness of the t-test to moderate non-normality in samples of this size, an independent samples t-test compared the two provinces across the seven variables, with the Welch correction for the one variable with unequal variances (Delacre et al., 2017). Laguna and Quezon respondents did not differ significantly on any variable (all $p > .05$). This similarity likely reflects the shared geography of the two neighboring provinces, which exposes residents to similar environmental conditions, violations, and information sources such as social media and news reports. The result suggests regional exposure, more than provincial boundaries, shapes community perspectives on environmental crime. Because respondents were selected through non-probability sampling, these results describe the two samples, and generalization to the provincial populations calls for caution.

Table 8. Level of Community Awareness of the Effects of Environmental Crimes

Indicator	Mean	Descriptive Interpretation
Residues from quarrying and mining activities contaminate rivers, lakes, and seas.	3.35	Very Aware
Environmental crime greatly contributes to climate change.	3.51	Very Aware
Cutting down trees can significantly impact weather patterns and local climate conditions.	3.58	Very Aware
The absence of trees contributes to hotter weather due to reduced shade and lower rates of evapotranspiration.	3.54	Very Aware
Cutting down trees increases the risk and severity of flooding and landslides by reducing soil stability and water absorption.	3.59	Very Aware
Unregulated mining operations contribute to severe flooding and landslides due to soil erosion, deforestation, and alteration of natural landforms.	3.47	Very Aware
Burning plastics and similar materials in backyards negatively affects human health and the environment by releasing toxic pollutants into the air.	3.55	Very Aware
Indiscriminate garbage disposal leads to clogged drainage systems, increasing the risk of flooding.	3.56	Very Aware
Killing wildlife disrupts the natural ecological processes and threatens the balance of the environment.	3.53	Very Aware
The illegal capture of endangered and exotic species in forest areas threatens biodiversity and interferes with the stability of ecosystems.	3.50	Very Aware
The clearing of forests and conversion of land for development leads to habitat loss, endangering wildlife and weakening biodiversity.	3.51	Very Aware
Unauthorized waste disposal sites contribute to environmental pollution and increase the risk of disease among local populations.	3.51	Very Aware
Emissions from vehicles and related activities release dark smoke, contributing to smog formation and air contamination.	3.53	Very Aware
Overfishing leads to the depletion of marine resources and disrupts ecological balance.	3.45	Very Aware
Unregulated and illegal hunting poses a serious threat to wildlife, potentially driving multiple species to	3.46	Very Aware

extinction.		
Exposure to polluted air and water can lead to respiratory illnesses, skin diseases, and other health problems.	3.50	Very Aware
Environmental degradation can contribute to a decline in overall health and well-being, potentially shortening life expectancy.	3.50	Very Aware
Deforestation, coastal development, and climate change—all exacerbated by environmental crime—increase the risk and severity of natural disasters such as floods, landslides, and storms.	3.53	Very Aware
Environmental crime can exacerbate social inequalities, leading to conflict and instability—particularly in communities that depend on natural resources.	3.49	Very Aware
Illegal logging, deforestation, and the trade in ozone-depleting substances contribute to climate change, disrupt global weather patterns, and increase the risk of extreme weather events.	3.54	Very Aware
Overall Mean	3.51	Very Aware

Legend: 3.26-4.00 Very Aware, 2.51-3.25- Aware, 1.76-2.50- Less Aware, 1.00-1.75- Not Aware

Respondents reported a high level of awareness of the harmful effects of environmental crimes (overall M = 3.51). The highest ratings went to the link between tree cutting and the risk of flooding and landslides (M = 3.59), the effect of tree cutting on local weather and climate (M = 3.58), and clogged drainage from indiscriminate garbage disposal (M = 3.56). Overfishing received the lowest rating (M = 3.45), still within the very aware band. These results reflect respondents' self-reported awareness and not independently measured environmental conditions. The links respondents drew are consistent with scientific evidence. Cross-country analysis shows deforestation amplifies flood frequency and severity in developing countries (Bradshaw et al., 2007), and air pollution harms respiratory and immune health (Glencross et al., 2020; Manisalidis et al., 2020). Respondent accounts tie this awareness to local experience. Several described deforestation, landslides, and hotter days, which they attributed to mining and illegal logging. Others described flooding they associated with quarrying and blocked drainage, and lakes with foul odors they attributed to improper waste disposal, including in areas they recalled as free of such events in the past. Direct experience of environmental events is known to raise concern about climate change and willingness to act (Spence et al., 2011). Respondents named climate change, seen in unusual weather, hotter summers, shifting seasons, and stronger storms, as the most serious consequence of environmental crime. In value-belief-norm terms, this awareness of adverse consequences is a precondition for the personal norms that motivate environmental action (Stern, 2000). The high awareness found here is thus a resource for mobilizing communities, provided programs also address the norms and constraints discussed above.

3.1. Theoretical Implications

The findings carry three theoretical implications. First, they qualify the linear assumption of the KAP model. Respondents showed high knowledge and strong condemnation of offenses such as open burning, yet described these acts as routine in their communities. Knowledge and attitude did not translate into practice where structural constraints, such as irregular garbage collection, and descriptive norms, such as visible and common burning, pulled the other way. This supports critiques of KAP surveys as weak predictors of practice (Launiala, 2009) and aligns with behavioral models placing norms and perceived control alongside knowledge (Ajzen, 1991; Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002). Education campaigns built on KAP logic alone will fall short unless paired with waste services and visible enforcement.

Second, the findings extend green criminology to the community level. Residents recognized harms most readily when the act was visible and morally clear, such as burning and tree cutting, and least when the harm was embedded in economic activity with a legal appearance, such as quarrying, sand extraction, and vehicle use. This supports the argument that the social construction of environmental harm, and not legal definitions alone, shapes what communities treat as crime (Brisman & South, 2019; White, 2008). Livelihood-based offenses such as kaingin, charcoal making, and destructive fishing blur the boundary between survival and crime, a tension green criminology traces to structural poverty and weak institutions (Lynch, 2020; Suarez & Sajise, 2010).

Third, the governance problems respondents raised fit deterrence, routine activity, and commons theories. Offenses persisted where respondents perceived few capable guardians and little chance of sanction, consistent with evidence that the certainty of apprehension deters more than the severity of punishment (Cohen & Felson, 1979; Nagin, 2013). The lakes, rivers, and forests of both provinces function as shared resources, and their degradation follows the logic of the commons (Hardin, 1968). Ostrom (1990) showed shared resources endure when users take part in monitoring and graduated sanctions. The community watch, local task force, and ordinances proposed in this study apply this principle by placing part of the guardianship role with residents and LGUs.

4. Conclusion

Residents of Laguna and Quezon showed high average agreement that a broad range of activities are environmental crimes, including illegal quarrying, illegal logging, improper waste disposal, kaingin, and charcoal production. Recognition was weaker for less visible offenses such as smoke belching, illegal chainsaw possession, quarrying along rivers and coasts, and sand dredging. Respondents identified backyard burning as the most common local offense and reported it is often done without knowledge of its illegality. They also reported wildlife exploitation, including bird selling and reptile hunting, unpermitted fish pens, and liquid waste from food carts and mobile stores entering water bodies. On local issues, respondents pointed to the lack of recycling and waste treatment facilities in barangays and to quarrying around the Sierra Madre, Mount Banahaw, Sariaya, Dolores, and Rizal. Respondents from the two provinces held comparable perspectives, with no significant difference on any variable. Respondents also reported a high level of awareness of the effects of environmental crimes. They associated these crimes with degraded forests, landslides, higher temperatures, poor air quality, flooding in areas not previously prone to it, and climate change. These are effects perceived and reported by respondents, since the study did not measure environmental conditions directly. The findings point to the need for education programs that raise awareness of environmental laws and draw communities into protection efforts. Building on these findings, the researchers developed a module for an environmental education campaign, which a separate extension project of Laguna State Polytechnic University will implement and evaluate. Appendix B outlines the module.

To empower communities and encourage all sectors to take part in environmental protection, the study proposes six strategies aligned with Sustainable Development Goals (SDG) 13 (Climate Action), SDG 16 (Peace, Justice and Strong Institutions), and SDG 17 (Partnerships for the Goals). (1) Intensify offline and online education campaigns on environmental laws. This responds to the reported lack of public knowledge of environmental laws ($M = 3.35$) and the lower recognition of smoke belching ($M = 3.21$) and quarrying ($M = 3.18$) as offenses. (2) LGUs, the Department of Environment and Natural Resources (DENR), and national agencies should strictly monitor projects, activities, and establishments for environmental compliance. This addresses the reported lack of LGU and private sector support in combating environmental crimes ($M = 3.26$). (3) Set up a community watch and rapid reporting system so residents take part in environmental observation and patrol. Respondents reported open burning is seldom reported and past reports to authorities brought no action. (4) Establish an environmental protection task force or police unit in each municipality or city. This responds to the reported lack of dedicated environmental enforcement officers ($M = 3.27$). (5) Pass local ordinances that strengthen the enforcement of national environmental laws, especially on open burning and solid waste collection, given the highly rated problems in waste segregation and collection ($M = 3.42$). (6) State

universities, together with LGUs and non-government organizations, should run extension projects offering seminars and training on environmental law and environmental stewardship, in response to the reported absence of information dissemination programs in communities (M = 3.18).

5. Limitations of the Study

This study has several limitations. First, its scope is limited to Laguna and Quezon, two provinces with frequent environmental violations, particularly in the mountainous areas of the Sierra Madre. Second, the study used purposive and convenience sampling without a complete sampling frame, and the provincial samples were unequal in size and not proportional to population. The findings therefore describe the respondents and do not support statistical generalization to all residents of the two provinces. Third, the independent samples t-test assumes random sampling, so its results should be read as a comparison of the two samples. Fourth, the data are self-reported. Several items asked about practices respondents themselves engage in, such as backyard burning and improper waste disposal, which raises the risk of social desirability bias (Podsakoff et al., 2003). Fifth, the study is primarily quantitative. Informal interviews supplemented the survey only to illustrate the results, without a structured protocol or formal qualitative analysis, so the respondent accounts in the discussion are illustrative and not generalizable. Future studies should use probability sampling, cover more provinces, and adopt mixed-methods or qualitative designs with documented interview protocols to gain deeper insight into community perspectives on environmental crime.

Supplementary Details

Supplementary Materials & Data availability statement:
The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and confidentiality restrictions, as they contain information that could compromise the anonymity of the research participants.

Author Contributions:
J.S.W., L.D.A., L.L.D., and S.M.M.; methodology, J.S.W. and S.M.M.; participant recruitment and data collection, L.D.A. and L.L.D.; transcript management and coding, L.D.A. and L.L.D.; data analysis and thematic interpretation, S.M.M.; supervision, J.S.W.; writing—original draft preparation, L.D.A., L.L.D., S.M.M., and J.S.W.; writing—review and editing, J.S.W. and S.M.M. All authors reviewed and approved the final manuscript and agreed to take responsibility for its content.

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Institutional Review Board Statement
The University Board of Regents of Laguna State Polytechnic University approved the study as an institutional research project. At the time of this study, Laguna State Polytechnic University (LSPU) was in the process of establishing its Institutional Ethics Review Board (IERB). Consequently, a formal institutional ethics review framework was not yet operational during data collection.

Informed Consent Statement:
The study adhered to ethical standards in research involving human participants. Prior to data collection, participants were provided with a comprehensive informed consent form detailing the purpose of the study, procedures, potential risks and benefits, confidentiality measures, and their rights, including voluntary participation and the option to withdraw at any time without

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Appendix A. Structure of the Survey Instrument

The researcher-made questionnaire has two parts. All items use a four-point Likert scale. The item wording for each section appears verbatim in the indicator column of the corresponding table.

Part 1A. Community perspective on environmental crimes. Response scale: 4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree.

Section 1. Environmental crimes (5 items, Table 1)

Section 2. Forest-related crimes (10 items, Table 2)

Section 3. Air pollution (5 items, Table 3)

Section 4. Crimes against wildlife and waste management (8 items, Table 4)

Section 5. Crimes related to bodies of water (9 items, Table 5)

Part 1B. Environmental issues in the locality (20 items, Table 6). Same agreement scale as Part 1A.

Part 2. Awareness of the effects of environmental crimes (20 items, Table 8). Response scale: 4 = very aware, 3 = aware, 2 = less aware, 1 = not aware.

Open-ended questions [Authors: list the open-ended questions included in the questionnaire].

Appendix B. Outline of the Environmental Education Module

The module was developed from the study's findings for use in a separate extension project. Each lesson targets an area where respondents showed lower recognition or reported local problems [Authors: replace or adjust this outline to match the final module].

Lesson 1. Environmental crimes under Philippine law: open burning, smoke belching, illegal logging and chainsaw permits, quarrying, wildlife trade, and illegal fishing. Basis: lower ratings for smoke belching, quarrying, and chainsaw possession (Tables 1, 3, and 6).

Lesson 2. Effects of environmental crimes on health, disasters, and climate. Basis: high awareness of effects (Table 8) used as an entry point for action.

Lesson 3. Solid waste segregation, collection, and alternatives to open burning. Basis: backyard burning reported as the most common offense and weak collection services (Tables 3 and 6).

Lesson 4. Community watch and reporting procedures, including how and where to report violations. Basis: reports of unreported incidents and limited enforcement presence (Table 6).