

Fiqh Al-Bi'ah: The Interdisciplinary of Economics and Technology Aiming for Environmental Sustainability in The State of Pahang

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ABSTRACT

Fiqh al-Bi'ah constitutes a Shariah-based legal framework that guides human interaction with the natural environment in a sustainable manner, emphasising the role of humans as khalifah (steward) of Allah. This legal framework serves as an effective mechanism for addressing contemporary environmental challenges in the state of Pahang, such as solid waste management, flood disasters, deforestation, water piping systems, and other forms of environmental pollution. Therefore, this study aims to examine the application of Fiqh al-Bi'ah as a mechanism to ensure environmental sustainability through the integration of economic and technological approaches. This study adopts a qualitative research design by employing an inductive analysis of both primary and secondary sources. The findings reveal that the Fiqh al-Bi'ah approach offers an effective solution for preserving environmental sustainability in Pahang, grounded in the dharuriyyah principles of *Maqasid al-Shariah*, namely the preservation of religion, life, intellect, lineage, and property. Furthermore, the principles of Fiqh al-Bi'ah are compatible with the achievement of the Sustainable Development Goals (SDGs), which emphasise the sustainable management of natural resources to ensure their continued availability for present and future generations. The integration of Fiqh al-Bi'ah principles with innovation in the sector of economy and technology have the potential to serve as a holistic model of environmental management under the framework of Islamic Shariah. This literature-based analysis is expected to contribute to the development of practical and realistic ideas for formulating more sustainable environmental policies without marginalising the Shariah principles ordained by Allah SWT.

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1. Introduction

The debate on environmental sustainability in Malaysia is gaining increasing attention among academics, policymakers, and the general public following the emergence of various ecological crises that have become increasingly critical over the past two decades. Malaysia is currently faced with the issue of recurring river pollution, whether due to industrial waste dumping, chemical spills, or uncontrolled mining activities (Rahman,

2021). In addition, large-scale logging in forest reserves continues to be a cause for concern as it affects national biodiversity and increases the risk of disasters such as debris floods and landslides (Jamaluddin & Hashim, 2020). The phenomenon of air pollution also shows an alarming trend, especially in urban and industrial areas, driven by vehicle smoke emissions, open combustion, as well as microparticles that directly impact public health (Lee, 2022). In the agricultural sector, the intensive use of chemical fertilisers has contributed to soil degradation, groundwater pollution, and long-term decline in ecosystem productivity (Aziz, 2019).

Within this framework, the State of Pahang has a strategic position as a state rich in natural resources. Extensive tropical forests, major river networks such as Sungai Pahang and Sungai Kuantan, highland areas such as Cameron Highlands, as well as marine ecosystems on the coast of the South China Sea, make Pahang among the most significant states from an ecological point of view and the economic value of natural resources (Mansor, 2021). This wealth not only contributes to the tourism, agroecology, and forestry sectors, but is also an important asset to the development of the halal industry, food industry, and the fast-growing green technology sector.

However, this natural resource award is not exempt from complex and challenging management issues. Several reports show that there are gaps in the monitoring of logging activities, enforcement of environmental laws, as well as inconsistency between the interests of economic development and environmental protection (Hassan & Roslan, 2020). Water resource management, forest land encroachment, as well as pollution due to quarrying and mining activities, also put pressure on the sustainability of the state's ecosystem (Yaacob, 2022). This demands a new, more holistic approach, not only relying on conventional development models, but also incorporating moral, ethical, and spiritual dimensions in environmental planning.

In the context of Islamic scholarship, the concept of Fiqh al-Bi'ah emerges as a framework that offers principles of environmental management based on Sharia demands. Fiqh al-Bi'ah emphasises that humans are the caliphs who are responsible for maintaining the balance of nature, preserving resources, and preventing damage (fa'ade) on the earth (Ibrahim, 2018). This approach not only sees nature as an economic resource but as a trust and part of the sharia *maqasid* that demands the preservation of aspects of life, well-being, and sustainability. This concept integrates the guidance of the Quran, hadith, and fiqh methods in formulating environmental policies, strategies, and more ethical practices, ecosystem-friendly, and generally *maslahah*-oriented.

Along with the development of modern technology and economics, the discourse of Fiqh al-Bi'ah now demands a more innovative and integrated approach. Digital technologies, the Internet of Things (IoT), automation, big data analytics, and green energy innovations are opening up new spaces in more efficient, transparent, and sustainable environmental management (Saad, 2023). Therefore, the combination of technological progress with the principles of Fiqh al-Bi'ah has the potential to produce an environmental management model that not only drives economic growth but also preserves the ecological integrity of the state.

This article aims to examine how the principles of Fiqh al-Bi'ah can be strategically combined with economic and technological developments to create a suitable environmental sustainability model for the State of Pahang. Through an analytical and normative approach, this article will assess current issues, the potential of the state, as well as the sharia framework that can be empowered to form a more holistic, fair, and competitive environmental governance system.

2. Research Methodology

Research methodology refers to the method chosen by the researcher to carry out an in-depth study (Mohd Sukri et al., 2022). For this study, the researchers chose a qualitative method of descriptively analysing primary and secondary literature sources using inductive analysis. The inductive method refers to a research strategy that formulates a general formulation based on diverse sources obtained from specific cases. Furthermore, new knowledge can be developed as a result of the conclusions obtained (Abdul Rahman, 2007).

Among the sources that will be collected are scholarly articles from journals, reliable websites and digital newspaper sources. Secondary data refers to data taken from the debates of researchers and scientists that have been analysed in detail based on the understanding of primary data sources (Sulung & Maspawi, 2021). A qualitative approach is able to obtain detailed information, especially in issues that have received little attention by researchers in the past (Waruwu, 2024).

Qualitative research analysis requires the direct involvement of researchers because researchers act as instruments of Miles and Huberman (1994). Researchers are responsible for examining and interpreting the randomly collected data so that the objectives presented are answered (Hsiung, 2014). Mohd Faiz (2017) explained that there are 3 stages involved in analysing qualitative data, namely coding, memoing and thick descriptions. In a literature review, the coding process can be implemented either using manual methods or

using the Atlas TI software to organise the identified themes. Meanwhile, the memo method is used to record the important contents that the researcher feels represent the themes that have been identified. Next, an in-depth explanation will be carried out by the researcher after the themes have been successfully collected and the important contents to be written have been identified as representing the themes that have been compiled (Mohamed Yusof & Nurhanani, 2019).

3. Discussion

3.1 Epistemologists *Fiqh Al-Bi'ah*

Fiqh al-Bi'ah is a branch of science in Islamic law that outlines legal and ethical provisions regarding human interaction with the environment.

Etymologically, *Fiqh al-Bi'ah* is a combination of two words:

- *Al-Fiqh*: Derived from the root word *faqiha-yafqahu*, which means deep understanding (*al-fahm*) or knowledge of something (*al-ilm bi al-shay'*). *Al-Bi'ah*: Means environment or environment, which is the space of life that includes all things, forces, conditions, and living things (including humans) that interact with each other and influence the survival of life (Radiah et al., 2025).

In terms of terminology, *Fiqh al-Bi'ah* is defined as:

- A regulation or norm of Islamic law that is sourced from detailed sharia postulates (*Al-Quran and Sunnah*) to regulate human ecological behaviour. The purpose is to create the general benefit (*maṣlaḥah*) for the inhabitants of the earth and prevent any form of damage (*mafsadah*) or environmental degradation (Sabalino, 2023).

3.1.1 Principles of *Fiqh Al-Bi'ah* in Ensuring Environmental Sustainability

Fiqh al-Bi'ah plays a critical role in ensuring environmental sustainability through an approach that combines theological, ethical, and legal values. It is not just a set of rules, but a framework that makes the preservation of nature part of the demands of human faith and moral responsibility.

Here is how *Fiqh al-Bi'ah* guarantees environmental sustainability:

Changing the Human Paradigm: The Caliphate and Trust

Fiqh al-Bi'ah changed the way humans viewed nature, from an "absolute owner" who was free to exploit to a responsible "administrator". Concept of caliph: Man is appointed as a caliph (representative/administrator) on earth. This role is not a license to do damage, but rather a mandate to administer and prosper the earth (*isti 'mar*) fairly (Mat Johar et al., 2021). Humans are responsible for ensuring that natural resources can be inherited by future generations. Principle of trust: The environment is a "trust" or trust from Allah. Humans bear a moral responsibility (*mas'uliyah*) to maintain the integrity of God's creation and will be questioned in the hereafter regarding its management (Jaafar et al., 2026). This awareness forms an internal control not to destroy nature even in the absence of human supervision.

Integration with *Maqasid Syariah (Hifz al-Bi'ah)*

Fiqh al-Bi'ah elevates the status of environmental preservation as part of the purpose of sharia (*Maqasid Syariah*). Environmental preservation is considered a prerequisite for protecting the five basic human needs: religion, life (*hifz al-nafs*), intellect, heredity (*hifz al-nasl*), and property (*hifz al-mal*) (Istiani & Purwanto, 2019). For example, air pollution threatens lives, while soil damage threatens property and offspring. Contemporary scholars such as Ali Yafie suggest that *Hifz al-Bi'ah* (environmental preservation) be included as the sixth principle in *Maqasid Syariah* at the level of *dharuriyyat* (urgent need) since without it, human life cannot survive (Mat Johar et al., 2021).

Setting Boundaries through the Principle of Balance (*Mizan*)

In *Fiqh al-Bi'ah*, it is emphasised that this world was created in a state of balance and harmony. Allah created nature with the right size and balance (*Mizan*). Humans are prohibited from exceeding the limits or disturbing the balance of this ecosystem (Yusran et al., 2025). In the Qur'an, it expressly forbids acts of *faḍad* (damage) on the earth, such as pollution and destruction of habitats, after Allah created them well (*al-A 'rāf*: 56).

Practical Applications in Resource Management

Fiqh al-Bi'ah provides specific guidance for managing environmental elements:

- **Water Management**: Islam prohibits the pollution of water sources (such as non-flowing water) and prevents water wastage (*israf*) even when performing ablution in flowing rivers (Dzulraidi, 2025).
- **Land Management (*Ihya' al-Mawat*)**: The concept of "reviving dead land" promotes the productivity of idle land for agriculture or greening. Planting trees is considered alms and a form of worship (Istiani, 2019).
- **Protection of Animals**: Animals have the right to live and be free from tyranny. *Fiqh al-Bi'ah* prohibits the killing of animals without just cause and obliges *ihsan* (mercy) towards them. (Radiah et al., 2025).

Modern Legal Instruments and Fatwas

Fiqh al-Bi'ah is also translated into legal mechanisms and fatwas to address modern issues:

1. Strict Liability: In the case of corporate pollution (such as forest fires), this principle can be used to prosecute companies that cause damage without having to prove malicious intent, in order to ensure justice and restoration of the environment (Cahyo & Muttaqin, 2019).
2. Environmental Damage Fatwa: Institutions such as KUPI (Indonesian Women's Ulema Congress) have issued fatwas that acts of damaging the environment (such as leaving garbage) are haram, using a mubadalah (reciprocity) approach between humans and nature (Adhania, 2023).
3. Green Economy: The application of the principles of *Fiqh al-Bi'ah* in the economy (Green Economy) promotes business activities that do not damage the environment and efficient use of resources (Dzulraidi, 2025).

3.2 Development of the Economic Sector in the State of Pahang

The state of Pahang Darul Makmur stands as the largest geographical entity in Peninsular Malaysia with a land area of 35,965 square kilometres. According to Habibah (2013), this physical vastness is endowed with a wealth of unique and diverse natural treasures, covering tropical rainforest ecosystems, highlands, river networks, lakes, and island clusters. Among the natural assets that are the pride of the state are the Pahang River, which is the longest river in the Peninsula, the peak of Mount Tahan, as well as strategic highland destinations such as Cameron Highlands, Genting Highlands, and Fraser Hill. More proudly, Pahang still retains a significant area of Permanent Reserved Forest (PRF), covering around 1.56 million hectares or 43% of the state's total land composition (Pahang Forestry Department).

In the context of the management of these treasures, the Islamic approach is outlined through the framework of *Fiqh al-Bi'ah*. Literally, the term is a combination of the words "*fiqh*", which means the understanding of practical law, and "*al-bi'ah*", which refers to the environment or residence. From a terminological point of view, *Fiqh al-Bi'ah* refers to a set of sharia rules and laws that govern human interaction with the environment, including the elements of earth, water, air, and living beings. This concept shifts the human paradigm to see nature not just as a material resource, but as a trust of Allah SWT that needs to be maintained. The topographical condition and wealth of resources in Pahang are, in fact, a manifestation of the greatness of the Creator who demands management based on the principles of *al-Bi'ah*.

This philosophy is closely related to the role of humans who are appointed as Caliphs (administrators) on earth. The responsibility of the caliph is to protect nature (*imarah*) and manage it fairly, as well as to prevent any form of damage. Pahang's natural assets, such as the network of major river basins (Sungai Pahang and Sungai Kuantan) as well as forest reserves that serve as water catchment areas, are blessings that must be preserved for survival. This wealth also positions Pahang as a major ecotourism destination, but the development of this sector must be sustainable so that the intrinsic value of these natural resources is not affected.

However, the current reality shows that Pahang is facing a critical challenge due to the hands of man, a phenomenon referred to as *façade* (damage) as warned in the Quran (*Surah al-Rum: 41*). Uncontrolled economic activities have disrupted the balance of the state's ecosystem, including the bauxite mining crisis in Kuantan, illegal land encroachment in Cameron Highlands, and water quality pollution in Tasik Chini. These issues give a clear signal that the principles of the Caliphate and *Fiqh al-Bi'ah* are often set aside in pursuit of material gain.

Recognising how critical the need is to conserve the integrity of the environment, the highest commitment has been shown by the palace and the state administration. The Pahang Government respects the order of His Majesty the Regent of Pahang, Tengku Hassan Ibrahim Alam Shah, who demanded that strict enforcement action be taken against any activities that damage flora, fauna, and the environment. This royal mandate further reinforces the need to integrate the principles of *Fiqh al-Bi'ah* in every state development policy to ensure that Pahang's sustainability continues to be preserved.

3.2.1 Agriculture Sector

The state of Pahang has a unique geographical advantage in driving the country's agricultural sector, especially in highland areas. The Cameron Highlands District, for example, has long established itself as a major hub for the production of vegetables, fruits, and flowers, driven by low temperature factors and optimal soil fertility (Addailamy & Azriana, 2019). The economic capacity of this sector is proven to be strong as the export value of flowers alone is estimated to reach RM800 million in 2017, a figure that is a catalyst for the wider opening of agricultural land in the area (Addailamy & Azriana, 2019).

In addition to the dominance in highland agriculture, the state's food security is also strengthened by the growing livestock sector. Based on data from the Department of Statistics Malaysia (2021), Pahang recorded

a significant livestock capacity in 2020 with a population of 130,689 cattle, 33,638 goats, and poultry farming exceeding 14 million heads. These statistics strengthen Pahang's position as a major contributor to the country's food supply chain.

However, the rapid development of this sector brings with it high ecological costs. Economic growth that is not balanced with sustainability ethics has raised the issue of illegal land encroachment, which is critical. According to Addailamy and Azriana (2019), illegal exploration activities, especially in sensitive areas such as hillsides and forest reserves, have contributed to serious river pollution as well as increased environmental temperatures. This situation reflects the failure of conventional management models in balancing commercial demands with the preservation of *Fiqh al-Bi'ah*.

Recognising this conflict between the economy and the environment, there is an urgent need to explore Islamic economic instruments as an alternative solution. Muhammad Ikhlas et al. (2023) suggest that the potential of waqf agribusiness should be highlighted to develop waqf lands that have not yet been utilised. This approach is not only able to generate sustainable income for state religious institutions, but it also offers a more controlled and ethical land use model, thus reducing the pressure on new forest reserve encroachment.

3.2.2 Forestry Sector

The forestry sector is one of the critical components in the management of Pahang's natural resources, given the state's status as a major contributor to the country's green cover. Based on statistics from the Pahang Forestry Department, the state has a large area of Permanent Reserved Forest (PRF), which is around 1.56 million hectares. This represents 43% of the state's total land area, which is currently systematically administered based on the strategic document of the Forest Management Plan (RPH) for the period 2016 to 2025.

To ensure that the economic survival of this sector does not affect the ecosystem, the state government is committed to adopting the Sustainable Forest Management policy (Sustainable Forest Management-SFM). This approach is translated through a strict yield control mechanism, where the Annual Logging Ration (CTT) is set at 13,687 hectares. This quota limit is implemented to balance the production of timber products with the natural ability of the forest to conserve itself, thus avoiding drastic resource depletion (Forestry Department, Pahang).

In addition to production activities, the state's forestry sector is also empowered by various proactive conservation initiatives. Among the significant efforts are the implementation of Central Forest Spine (CFS), which functions to create ecological corridors to connect major forest complexes to preserve habitats and biodiversity. In addition, post-felling rehabilitation measures are also actively carried out through silviculture treatment and planting programmes to ensure that the forest areas that have been cultivated can recover and remain productive (Forestry Department, Pahang).

3.2.3 Mining Sector

The mining sector in the State of Pahang, despite contributing to the state's economic output, is often mired in critical environmental management controversies. In the Kuantan district, the bauxite mining industry once recorded very intensive and large-scale activities. However, the rapid pace of this uncontrolled activity has invited serious ecological implications, including soil pollution and the spread of red dust that affects air quality as well as public health. As a result of the worsening pollution crisis, the government was forced to intervene by enforcing a moratorium in 2016 to temporarily halt mining operations for the purpose of restoring and restructuring the industry (Berita Harian, 2016).

In addition to the bauxite issue, iron ore mining activities in environmentally sensitive areas such as Tasik Chini are also of particular concern. Mineral extraction activities around the lake, whether licensed or illegally operated, have been found to have directly contributed to the deterioration of the lake's water quality. Cahyo (2011) in his study reported that surface water runoff (surface runoff) from the mine site brings with it heavy metal residues that pollute water bodies, thus threatening the balance of aquatic ecosystems. More worryingly, this environmental degradation also affects the survival of the Orang Asli community, who are completely dependent on the natural resources in the area.

In addition, gold mining activities in the districts of Raub and Lipis also contribute to this challenge. Polemic on the use of cyanide chemicals in Bukit Koman, Raub, as well as the issue of waste management tailings in the mines around Lipis, shows the urgent need to integrate cleaner and safer mining technologies, in line with the principles of environmental sustainability.

3.2.4 Housing Sector

The rapid flow of urbanisation in the major cities of the State of Pahang, especially in Kuantan, has triggered a high demand for residential infrastructure development. However, the boom in the real estate sector

contributes to significant side effects on the environment, especially in terms of increasing the generation of construction solid waste (Subramaniam et al., 2018).

Based on the analysis of the composition of waste at construction sites around Kuantan, Afifah Azmira Rizuan and Hannifah Tami (2023) found that the main waste material is dominated by wood and stone waste. This waste management challenge is becoming increasingly critical due to the industry's reliance on conventional construction methods. According to Sharifah et al. (2019), the use of conventional methods compared to Industrial Building System technology (Industrialised Building System - IBS) has resulted in the production of much higher and inefficient residual quantities.

Therefore, to address the issue of construction waste dumping, strict compliance with the existing legal framework, especially the Solid Waste Management and Public Cleaning Act (Act 672), is very critical (Latas et al., 2021). The enforcement of this act, in line with the transition to cleaner construction technology, is a prerequisite step to ensure the sustainability of the housing sector in Pahang

3.2.5 Fisheries Sector

The fisheries sector remains a strategic component in the agro-food economic framework of the State of Pahang, contributing significantly to the country's food security. Based on a report by the Department of Statistics Malaysia (2021), marine fish landing activities in the state recorded an impressive performance with a total catch of more than 101 thousand metric tons in 2020. This figure represents a contribution of around 7.3% to the total number of fish landings at the national level, thus positioning Pahang as one of the major players in the east coast marine fisheries industry.

The economic impact of this sector is not limited to upstream activities alone, but it is a catalyst for the development of Small and Medium Industries (SMEs) in coastal areas. In tourist destinations such as Cherating, Rosniza et al. (2018) found that seafood has supported the local entrepreneurial ecosystem through the production of downstream products such as keropok lekor and dried seafood. This synergy between fisheries and tourism is not only an attraction for visitors but also acts as a major source of income that supports the socio-economic livelihood of the local population.

Along with the increasing demand for protein sources, the country's fisheries landscape has also evolved through the adaptation of aquaculture systems. Department of Statistics Malaysia (2021) reported that fish farming methods such as the use of ponds, freshwater cages, and the use of abandoned former mines are now being actively pursued as an alternative to wild sea catch. This approach shows the potential for optimising land and water resources in Pahang to ensure a sustainable fish supply.

3.3 Use of Technology Resources in Government Administration in the State of Pahang

The development of information and communication technology has permeated various sectors of public administration. At the state level, the Pahang Government is using technology strategies to improve administrative efficiency, strengthen environmental monitoring and assist socio-economic development (Sinar Harian, 2025). Technology has not only replaced manual actions but formed an administrative framework that is more responsive to today's needs.

3.3.1 Platform Digital: Pahang Go

Pahang Go is a digital platform created to assist the public and the Pahang state government in obtaining public services online. The platform provides facilities such as land tax payments, utility bills, vehicle services, as well as land title searches through one comprehensive application. This application not only facilitates public affairs but also demonstrates the state government's commitment to developing public services digitally (Pahang Go, 2025; PahangMedia.my, 2025).

3.3.2 Solar Power Sources

The Pahang government is committed to developing clean energy and renewable energy as part of its environmental sustainability strategy. This includes assistance to floating solar projects and solar fields in strategic locations to replace the use of fossil fuels and reduce the impact of global warming (Pahang Committed to Developing Clean Energy Sources, 2024).

3.3.3 River Water Irrigation and Drainage Control Technology

Water and drainage management is one of the important areas of state administration, especially to ensure adequate water supply, assist agriculture and reduce the risk of flooding. The Pahang State Irrigation and Drainage Department is responsible for managing the construction and management of effective irrigation and drainage systems, including the management of hydrological and drainage areas in coastal areas (Pahang State Department of Irrigation and Drainage, 2021).

3.3.4 Flood Monitoring and Forecasting System

The State Government and technical departments have installed technology to monitor and predict floods through various systems that use the internet and remote sensors. For example, the SPHTN system combines data from water monitoring stations, early warning sounds and internet cameras to monitor water levels and rainfall conditions live. This information is then sent to the relevant parties and the public (SPHTN, 2024). The system is also connected to the PRAB system, which works at the national level to predict flooding in major rivers such as Sungai Pahang (PRAB, 2025).

3.3.5 Sustainable Agro System

Sustainable agricultural systems and advanced agricultural technology are further improved in Pahang through the use of the Internet of Things (IoT) in agriculture. IoT is used to automatically handle water and nutrients as well as monitor soil conditions. Projects such as smart solar irrigation systems and IoT-guided fertiliser management technologies have shown a beneficial impact on small and medium-sized farms, helping in more sustainable agriculture and increasing crop yields (Afyq & Ruzaini, 2021).

3.4 Environmental Management Issues in the State of Pahang

The state of Pahang is the largest state in Peninsular Malaysia, which is rich in diverse natural resources due to its unique terrain. However, due to the rapid development process, unlicensed logging activities and unplanned deforestation have put significant pressure on the state's environmental sustainability (Saad et al., 2023). In addition, issues that also affect environmental pollution are the issue of solid waste management (Nadiah et al., 2024; Mohd Rafi, 2025), the issue of flood disasters (Mahfuzul et al., 2022), the issue of river pollution (Noradilla, 2018) and open burning (Asrol, 2025). The issue of piping is one of the hotly discussed issues, especially to ensure that there is an adequate source of clean water supply that can be enjoyed by the people (Roskhoirah, 2026). Further discussion on environmental management issues is as follows.

3.4.1 Solid Waste Management Issues

The Pahang Solid Waste Management and Public Cleaning Corporation (SWCorp) has recorded that more than 300 tonnes of flood waste have been collected since the post-flood clean-up operation involving 40 areas around the state of Pahang since December 22, 2025. The highest waste in the Kuantan district is around 285 tonnes, followed by Pekan with 9.6 tonnes and 5.64 tonnes in Maran. Its director, Mohd Rohaidy Zulkifli, said among the flood waste that was dumped by the residents were chipboard furniture, sofas, mattresses, books and electrical appliances. All the flood waste collected will be transferred in stages to the Landfill in Jabor (Mohd Rafi, 2025). The results of solid waste disposal do not include the results of solid waste disposal for areas that are not involved in flooding.

According to a study conducted by Nadiah et al. (2024), the rate of solid waste production in three residential areas in the Gambang area, Pahang, is getting worse and requires very serious disposal management. They have classified Food waste as the largest contributor to solid waste piles in landfills. The findings of the study show that the socioeconomic status of the population greatly affects the type of waste produced. For example, higher consumption of canned goods in high-income areas. Meanwhile, cosmetic waste is also a major contributor to environmental problems due to the disposal of solid waste.

In addition, the researchers also outlined several factors that lead to masala to manage solid waste. Among them is the increase in the rate of waste generation, which is due to the uncontrolled consumption of food and non-food items. In Kuantan alone, about 500 tonnes of food waste are disposed of every day. Second, due to socio-economic factors, i.e., those with high incomes are more likely to buy canned goods due to the busy work factor. Third, the issue of a lack of sites to dispose of garbage is due to the lack of land to be used as a landfill, while the disposal of solid waste is getting out of control. Effective waste management, therefore, requires cooperation from both urban and rural areas to achieve the goal of optimal solid waste disposal reduction.

3.4.2 Flood Disaster Issues

The National Water Research Institute Malaysia (NAHRIM) points out that the amount of annual rainfall will increase by up to 10% by 2050 in several Malaysian regions, including in the state of Pahang, especially in coastal areas. This led to the threat of flooding in several areas such as the Cherok Paloh area, Taman Gelora, Pantai Sepat and Sungai Penor. More worryingly, most of the residents in this area are middle-income (M40) and low-income (B40). Some of the residents here work in the forestry, fisheries and agriculture sectors. In the event of a major flood, the population will suffer huge losses and will not be able to cover the losses if they do not have any insurance coverage (Mahfuzul et al., 2022).

Furthermore, a study conducted by Lim et al. (2019) also focused on the impact of major flood disasters on the deterioration of water quality in Sungai Pahang, especially after the major flood events that hit in 2014. The results of the study revealed a drastic increase in the levels of water turbidity, biochemical oxygen (BOD), and chemical oxygen (COD) that have affected aquatic animal ecosystems. The data shows that the water quality index falls to contaminated levels and makes it unsafe for daily human use without going through a systematic

water treatment process. Therefore, sustainable research is needed to improve the strategic plan for clean water management, especially in the face of possible natural disasters that may occur at any time in the future. In conclusion, major floods play a very important role in the widespread dispersion of harmful contaminants into major river systems.

3.4.3 Deforestation and Deforestation Issues

The issue of deforestation and logging is one of the factors that lead to environmental pollution in the state of Pahang. Among the areas involved is the Ulu Jelai Forest Reserve in the Lipis district, Pahang. Although logging activities are carried out selectively and supervised by the Pahang State Forestry Department and the Malaysian Timber Certification Council (MTCC), the effects of logging also contribute to forest damage and greenhouse gas emission rates. In this area, the total carbon gas emissions are estimated to be 1102.86 Mg C per hectare. Meanwhile, the cause of forest damage is due to three main factors, namely, wood extraction due to the felling of the trees themselves. Second, the construction of forest roads and towing lanes (skid trails), which are used to transport logs, has taken up space to replant trees. Subsequently, the open space created by fallen trees has destroyed the surrounding forest structure (Saad et al., 2023).

The attempt to encroach on the Ulu Jelai Forest Reserve for illegal logging activities using yellow letters was one of the most pointed issues in 2020. Pahang State Forestry Department (JPNP) director Datuk Dr Mohd Hizamri Mohd Yasin stressed that any attempt at encroachment would not be compromised at all. Among the assets that have been seized are 10 pieces of heavy machinery worth more than RM1.6 million stored in the forest. In addition, among those seized were three trucks transporting logs, two bulldozers and five excavators to transport logs that had been felled. In fact, a shared house was also built to house workers and fuel tanks, as well as other equipment as well. The act of encroaching on forest reserve areas is illegal under the National Forestry Act 1984, including placing machinery (Mohd Rafi, 2020).

3.4.4 Piping System Issues

Clean water supply is a very important factor to ensure the survival of the local population, whether it is used as a daily drink, for cultivation and other uses. Clean water supply can be divided into two parts, namely, domestic water supply and non-domestic water supply. Based on Section 18, Water Supply, Enactment No.130, water supply for domestic use can be explained as the water supply used by a resident to ensure the survival of life. Meanwhile, non-domestic water supply refers to water supply used for non-domestic purposes such as agriculture, animal husbandry, public use, trade and others (Nik Fuaad, 1990).

Water supply issues and problems throughout the country are not a new issue. The state of Pahang is one of the states that is not exempt from water supply disruptions, apart from Kedah, Kelantan, Selangor, and others, as reported by the mass media and social media (Abdullah & Mohd Noor, 2019). For example, in the Tasik Chini area, water pollution can be considered a very acute issue due to mining and logging activities. However, various efforts to conserve and improve water quality are being carried out to restore the beauty of the lotus flowers in Tasik Chini as well as to save the Orang Asli community from water pollution, but a complete solution has not yet been found (Tasik Chini Research Centre, 2013). In addition, in the Cameron Highlands area, farmers also face problems in obtaining an adequate water supply as some of them get their water supply from forest areas through water piping systems that are not regulated by the government (Awang Noor et al., 2008).

One of the main factors causing problems in ensuring the continuity of a clean water supply is the huge expenditure required to manage a sustainable piping system, especially to replace old pipes with new ones thoroughly. Pengurusan Air Pahang Berhad (PAIP) needs an allocation of about RM450 million over two years to carry out the replacement works of old pipes throughout the state in stages (Roskhoirah, 2026). In fact, Pahang Menteri Besar Datuk Seri Wan Rosdy Wan Ismail also stressed that the state government remains committed to replacing the obsolete pipes with new ones in stages as the cost to replace the entire system is estimated to reach around RM3 billion, which is a huge expenditure. However, to ensure that the people continue to be comfortable and enjoy enough water, the state government will try its best to make it happen (RTM News, 2025).

3.4.5 Pollution Issues

The issue of environmental pollution is one of the most pressing issues in the state of Pahang. Among the polluted areas is Tasik Chini, which is located in Pekan. In fact, it has been gazetted as the first Biosphere Reserve site in Malaysia and is now threatened by environmental pollution due to uncontrolled mineral mining. Meanwhile, in the Kuala Lipis area, Sungai Balok, Penggorak and Bukit Goh in the Kuantan area are also in an alarming situation due to metal pollution caused by bauxite mining, which causes water colour patterns to be polluted due to bauxite ore (Noradilla, 2018).

In addition, the Sultan of Pahang, Al-Sultan Abdullah Ri'ayatuddin Al-Mustafa Billah Shah, expressed concern over the condition of polluted air quality in Balok. The Pahang Palace's Principal Royal Pensioner, Major General Datuk Mohamed Zahari Yahya, said he also expressed this concern, especially for those with respiratory problems and serious health problems. Therefore, as open burning activities are strictly prohibited due to the air pollution index (IPU) readings in the area, New Beamare is in the unhealthy category with an IPU reading of 188. The contamination is caused by the effects of fire in the coconut plantation, which has a Breadth of 75.67 hectares. This incident was reported to have occurred on February 22, 2025 (Asrol, 2025).

3.5 *Fiqh al-Bi'ah as a Medium for Sustainable Economic and Technology Management in the State of Pahang*

Concept Fiqh al-Bi'ah refers to a basic concept of knowledge and methodology to understand, interpret, and apply Islamic principles in solving issues related to the environment. Fiqh al-Bi'ah is one of the pillars of Fiqh al-Watan, which emphasises a balanced relationship between humans, the homeland, and God's created nature as a complementary ecosystem. Basically, the epistemology of Fiqh al-Bi'ah is based on three main sources, namely Divine Revelation, which is guided by the Quran and as-Sunnah as the main reference, Aql and Ijtihad in implementing any decision, and Waqi' refers to the current reality (Jaafar et al., 2026).

This view is also expressed by Hanapi (2018), who emphasises that the application of Fiqh al-Bi'ah is effective when it is able to balance three main sources, namely, revelation as the basic guide of action, reason as an instrument to understand an action, and waqi' as application space according to current circulation. These three are the basis of a balanced driving force in forming an effective Islamic epistemology against the changing times without abandoning any Sharia principles. Environmental management, according to an Islamic perspective, is very important in facing the worsening globalisation crisis. This issue occurs due to a lack of appreciation for the purpose of God's creation of nature. It is a spiritual crisis caused by the rejection of the function of religion in managing the environment. Meanwhile, religion plays a very important role as an ethical basis for an individual because of the misunderstanding that effective environmental management can only be addressed through Science and Technology alone (Fazlhashemi, 2025). Therefore, the author is very optimistic about the approach and application of Fiqh al-Bi'ah in management, being able to manage the environment sustainably, even though the technology approach is used consistently.

3.5.1. *Fiqh al-Bi'ah in the Framework of Maqasid al-Shariah*

The environment is a trust from Allah SWT to humans as caliphs on earth. However, uncontrolled human activities such as illegal tree felling, water and air pollution and overuse of natural resources have caused serious damage to ecosystems. This problem requires a comprehensive solution, not only from a scientific and technical point of view, but also from a religious and ethical point of view.

In the context of Islam, Fiqh al-Bi'ah is a discipline that emphasises the understanding of Sharia laws related to the maintenance and management of the environment. This concept is inseparable from *Maqasid al-Shari'ah*, which is the main purpose of the statement of Islamic law, which aims to bring good and avoid evil (al-Shatibi, 2004).

Fiqh al-Bi'ah is a discussion on sharia laws related to the environment, including aspects of administration, restoration and prevention of damage to nature.

The Qur'an clearly prohibits actions that damage nature, as found in the words of Allah SWT:

"And do not do any damage to the earth after it has been repaired (al-A'raf, 7:56)

This verse is the main basis for prohibiting pollution and excessive use of natural resources. *Maqasid al-Shari'ah* is the purpose and wisdom behind the drafting of Islamic law. Scholars such as al-Ghazali and al-Shatibi have placed this Maqasid into five main requirements (*al-Daruriyyat*), namely:

1. Preserving the religion (*hifz al-din*)
2. Preserving life (*hifz al-nafs*)
3. Preserving the intellect (*hifz al-'aql*)
4. Preserving offspring (*hifz al-nasl*)
5. Preserving treasures (*hifz al-mal*)

These five aspects are closely related to the preservation of the surrounding nature (Kamali, 2008).

Fiqh al-Bi'ah in the View of Maqasid al-Shari'ah

1. Preservation of Life (*Hifz al-Nafs*)

Natural damage, such as water and air pollution, has a direct impact on human health and life. So, any action that pollutes nature so that it endangers human life is contrary to the principle *Maqasid al-Shari'ah* (Ibn 'Ashur, 2006).

2. Preservation of Property (*Hifz al-Mal*)

Resources such as land, water and forests are important economic assets. If used incontinuously, it will cause great losses to society and the country, which is also against the principle of preservation of property in Islam.

3. Preservation of Offspring (*Hifz al-Nasl*)

Constant damage to nature will disrupt the well-being of people to come. Islam emphasises the international responsibility between generations in ensuring that natural resources are conserved. *Fiqh al-Bi'ah*, in the context of *Maqasid al-Shari'ah*, stressed that protecting the environment is not just an option, but an obligation in the Sharia view. Framework *Maqasid al-Shari'ah* proves that the sustainability of nature is very closely related to the protection of life, property and overall human well-being. Therefore, it is important to integrate *Fiqh al-Bi'ah* in public policies, education systems and environmental management so that the development carried out is balanced and continuous, in line with the requirements of sharia.

3.5.2 *Fiqh al-Bi'ah* as a Sustainable Economic and Technology Management Model

Worsening global ecological crises, such as climate change, pollution, and resource extinction, demand a framework for solutions that go beyond mere technical approaches. In this context, *Fiqh al-Bi'ah* emerged as a critical discipline. By definition, *Fiqh al-Bi'ah* refers to the provisions of Islamic law that are sourced from the postulates of sharia (Al-Quran and Sunnah) to regulate human behaviour towards the environment, aiming to realise the public benefit (*maṣlaḥah*) and prevent damage (*mafsadah*) (Radiah et al., 2025). It is not just a collection of rules but serves as a bridge that connects ethics with legal norms to ensure the sustainability of the universe (Istiani & Purwanto, 2019).

Epistemologists Foundation

The caliphate, trust, and balance of economic and technological management models in Islam are built on a solid theological foundation. Humans are not positioned as the absolute owners of nature, but rather as Caliphs (administrators/representatives) who hold the Trust of Allah (Radiah et al., 2025). This role requires humans to prosper the earth (*Isti'mar*) and administer it fairly, not exploit it for purely personal or corporate gain. The universe was created in a state of equilibrium (*Mizan*), and any economic or technological activity that exceeds the boundaries of this equilibrium is considered a violation of God's law (Musa, 2010). The realisation that nature is God's "entrustment" to be held accountable in the hereafter forms a strong internal moral control for economic and industrial actors (Mat Johar et al., 2021).

Integration of *Fiqh al-Bi'ah* in *Maqasid Syariah*

Relevance *Fiqh al-Bi'ah* in modern management is strengthened through its integration with *Maqasid Syariah* (the purpose of sharia). Contemporary scholars, such as Ali Yafie, hold that environmental preservation (*Hifz al-Bi'ah*) is an absolute prerequisite for protecting the five basic human needs (*al-dharuriyyat al-khams*): religion, life, intellect, ancestry, and wealth. (Istiani & Purwanto, 2019).

Without a healthy environment, the survival of life and property will be threatened. In fact, some scholars suggest that *Hifz al-Bi'ah* was adopted as the sixth principle in *Maqasid Syariah* at the level of *dharuriyyat* (Mat Johar, 2021). In an economic context, this means that any development policy that destroys the environment is contrary to the purpose of the sharia itself, as it threatens human survival. (Khuluq & Asmuni, 2024).

Applications in the Green Economy Model

Application *Fiqh al-Bi'ah* provides a framework for the Green Economy, which balances economic gains (profit) with social welfare (people) dan kelestarian planet (planet). (Fathony, A., & Syafiqotunnafile. (2024)

- Financial Instruments: This principle is translated through Islamic financial instruments such as Green Sukuk (green sukuk) and green banking (Green Banking), which finance environmentally friendly projects (Rizqi et al., 2025).
- Consumption Ethics: *Fiqh al-Bi'ah* opposes the culture of excessive consumerism through the prohibition of *Israf* (excess) and *Tabzir* (waste). The use of natural resources must be done wisely (*tashrif*) and efficiently to ensure sustainability for future generations (Yusran & Patimah, 2025).
- Production: In the industrial sector, this principle requires manufacturers to produce environmentally friendly products that minimise waste and carbon emissions, in line with the principle of *tahsinu al-bi'ah* (environmental improvement) (Fathony & Syafiqotunnafile, 2024).

Technological and Legal Controls: The Principle of Absolute Liability

In facing technological and industrial risks, *Fiqh al-Bi'ah* applies the Fiqh Method "*La Darar wa la Dirar*" (There can be no harm and no return harm) (Mat Johar et al., 2021). This means that any technology that brings harm to the ecosystem is prohibited.

To enforce this principle, the concept of Strict Liability (Absolute Responsibility) can be applied to corporations that cause environmental damage, such as forest fires or toxic pollution (Cahyo & Muttaqin, 2019). Under this principle, the company is liable to pay damages based on the impact of the damage caused. This is in line with the principle of Fiqh that harm must be eliminated (*ad-dhararu yuzalu*).

Fiqh al-Bi'ah offers a comprehensive economic and technological management model by combining theological, ethical, and legal values. It changed the paradigm of development from anthropocentric (purely human-centred) to biophilic and theocentric (God-centered and respectful of nature) (Jaafar @ Ramli, et al., 2026). By making the preservation of nature part of the worship and demands of *Maqasid Shariah*, *Fiqh al-Bi'ah* guarantees that economic and technological progress is not achieved at the expense of the future of the earth (Fathony & Syafiqotunnafila. (2024).

3.5.3 Compatibility of *Fiqh al-Bi'ah* Principles in Achieving the Sustainable Development Goals (SDGs)

Fiqh al-Bi'ah is one of the branches of contemporary fiqh that focuses on human interaction with the environment based on Islamic principles. It is a responsibility that must be carried out by humans, as mentioned in the Quran:

Meaning: "And do not do any harm to the earth after Allah has prepared all that is good for it, and pray to Him with fear and with a feeling of hopelessness. Indeed, Allah's mercy is near to the one who improves his deeds." (Surah al-A'raf; 59).

In fact, Allah SWT also forbids humans to do any damage to this earth, including the environment created by Allah SWT for humans to prosper. This coincides with the words of Allah SWT:

Meaning: "And thou shalt not do any harm on the earth; Indeed, Allah does not like those who do evil." (Surah al-Qasas: 77).

Concept *Fiqh al-Bi'ah* in ensuring environmental sustainability is also in line with the goals Sustainable Development Goals (SDGs) or Sustainable Development Goals set by the United Nations. The *Fiqh al-Bi'ah* approach emphasises the basic Islamic values to achieve environmental sustainability, especially controlling human actions in managing the environment based on Islamic ethics and *Maqasid Shariah*, so that there are no irregularities due to the possession of human greed. The principles of *Fiqh al-Bi'ah* also support the SDG agenda, which seeks to preserve the environment based on the sixth, seventh, eighth, thirteenth, fourteenth and fifteenth principles (UPM Postgraduate School Bulletin, 2025). The principles are as follows:

Table 1: Sustainable Development Goals (SDGs) in line with the Principles of *Fiqh al-Bi'ah*

SDG Principles	Remarks
Sixth principle (6)	Ensure the availability and sustainability of water and sanitation management.
Seventh principle (7)	Ensure access to affordable, reliable, sustainable energy and keep pace with the pace of modernization.
Eighth principle (8)	Promote sustainable, comprehensive and sustainable economic growth and promote productivity.
Thirteenth principle (13)	Take immediate action to address climate change and its impacts.
Fourteenth principle (14)	To use marine resources sustainably as well as efforts to conserve them continuously.
Fifteenth principle (15)	Conserve and use land resources sustainably to ensure ecosystem balance.

The principle of *Fiqh al-Bi'ah* is based on the role of human beings as khalifah on this earth, who are responsible for preserving nature and staying away from things that can damage nature. Therefore, the environment needs to be managed in the right and sustainable conditions so that the conservation process continues to be strengthened. In fact, humans themselves are part of the environment that is entrusted and responsible for protecting the environment from any damage. In fact, the use of technology is required if it brings benefits to humans. For example, the use of the latest technology to cultivate the agricultural sector, as

long as it brings benefits to society based on the methods of al-Istishab, that is, to maintain the existing law until the advent of evidence that changes the law (Zahari, 2010). This is also based on the Word of Allah SWT: "And He makes it easy for you (to benefit and use) all that is in the heavens and on the earth, (as a blessing given) from it. Indeed, they contain signs (that prove His mercy and power) for those who think carefully about them." (Surah al-Jathiyah, 45:13)

5. Conclusion

In conclusion, this study confirms that the application of *Fiqh al-Bi'ah* is one of the effective methods to ensure that sustainable environmental management can be implemented in the state of Pahang. As a state that is endowed with a wealth of diverse natural treasures, the appreciation of Islamic principles that elevate the role of humans as caliphs is important to ensure that natural resources are not only seen as material elements, but as the trust of Allah SWT, which must be preserved and protected from any damage. Furthermore, the controlled and ethical use of technology is very important to help prosper the economic sector in a sustainable manner in the state of Pahang, as well as support the aspirations of the Sustainable Development Goals (SDGs). Ultimately, a strong commitment from the government through strict law enforcement and the appreciation of the principles of *Fiqh al-Bi'ah* among the community, especially those involved in managing environmental sustainability governance in the state of Pahang, must be strengthened so that environmental prosperity will continue to be preserved in the present and in the future.

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