

RESEARCH ARTICLE

Mapping environmental problems in the new capital city of “Nusantara” as a foundation for sustainable development governance

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ABSTRACT

Indonesia moved the country’s capital from Jakarta to Kalimantan Island. This activity is a major breakthrough, but if done incorrectly it can be a serious challenge, especially from an environmental perspective. This research aims to identify environmental problems in the development of Indonesian capital cities. This information was obtained through literature studies and field observations. City management studies, especially the development of the nation’s capital, need to be directed so as not to cause environmental damage problems. The mapping process starts from the pre-construction stage, construction stage, operational stage or environmental impact analysis. The mapping results show that environmental problems need to be mapped in the form of types of activities with a social, economic and environmental approach in accordance with sustainable development standards starting from a social approach to ensure the fulfillment of citizens’ rights in improving the quality of the environment city. The results of impact identification conclude that there is a positive impact on improving community welfare and there is a negative impact that increases the burden on the environment. An economic approach by ensuring the fulfillment of citizens’ rights in obtaining decent work and an environmental approach by paying attention to air, water quality and waste management in accordance with technological standards and following applicable laws and regulations. As for alternative conclusions for resolving environmental problems, community model governance is governance with a community approach for activities that have an area of less than 5 hectares and the complexity of environmental impacts is less than three impacts, while the complexity of environmental impacts is more than three impacts. of the three impacts are managed using a collaborative model.

Keywords: environmental problems; national capital; Indonesia

1. Introduction

Every development process certainly needs to pay attention to environmental sustainability^[1]. Sustainable development is development that harmonizes human development and the environment. After running until now, the concept of sustainable development requires new innovations that prioritize the environment^[2]. Circular economic and industrial issues need to be directed to support the achievement of sustainable development^[3]. Attention to environmental sustainability is absolutely necessary so that disasters can be

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avoided. The problem of environmental pollution in urban areas, especially urban areas in Indonesia, has shown quite serious symptoms, such as environmental problems regarding water availability, air quality and environmental cleanliness conditions^[4]. Indonesia as an archipelagic country is not immune from environmental damage. Every state institution is of course obliged to manage the environment^[5]. The cause of pollution does not only come from industrial waste which simply dumps its waste water without prior treatment into rivers or the sea, but urban activities also contribute to environmental damage^[6]. Pollution is also carried out by urban communities themselves, whether intentionally or not, of course it requires special attention so that it does not have a negative impact on life^[7]. As a result of household wastewater increasing day by day in line with population growth, pollution is becoming increasingly evident. The low awareness of some people who immediately throw feces and rubbish into rivers causes the process of pollution in existing rivers to accelerate.

Carrying out development is an activity that carries the risk of changes to the quality of the environment and can also disrupt the ecosystem that has been formed and have an impact on the social conditions of society, therefore the implementation of sustainable development must be based on the principles of environmentally sound development as a means to achieve the development journey^[8]. Environmentally friendly is determined by the guarantee that the current generation will not damage future generations. The government of the Republic of Indonesia has issued a law regulating environmental management through government regulation number 22 of 2021 which is a derivative of law number 11 of 2020 concerning job creation^[9]. Government regulation number 22 of 2021 covering environmental management mandates that environmental management is an important part of development^[10]. So that development is directed and does not damage the environment, it is necessary to pay attention to the development of development areas through a licensing process that is in accordance with entry standards. In regulations regarding environmentally sound development as regulations issued by the government of the Republic of Indonesia mandate that every planned activity that has a significant impact on the environment must have an environmental document^[11]. Likewise, development activities in various development areas that are being developed in various parts of Indonesia, at the point where development activities start from the construction phase to the post-construction phase, are expected to cause environmental impacts, therefore they must be managed following environmental quality standards^[12]. This is also related to the implementation of business licensing process regulations through a risk-based online single mission system which is embedded in government regulation number 5 of 2021 and is currently in effect in Indonesia^[13].

Implementing environmental management and monitoring through environmental management efforts and environmental monitoring efforts requires a plan that can be used as a guide in development implementation processes^[14]. This design is intended so that the implementation of environmental management and environmental monitoring efforts can be directed and clearly implemented in the field effectively and efficiently in the form of environmental impact analysis studies, environmental management and monitoring efforts and environmental management capability statements^[15]. For this reason, it is necessary to develop a framework for environmental management and monitoring as the scope of environmental impact analysis studies that will be carried out for each development activity. This development activity needs to prepare environmental documents that are in line with the planned development concepts. This becomes increasingly important because the views and attitudes of local communities can be officially accommodated regarding development activities. Identification of planned development activities that will have a significant impact on changes to the environment, therefore the aim of preparing environmental documents is to determine the environmental tone that will be affected by the activities that will be carried out in development.

Environmental documents are currently the main requirement in development activities, including in

Indonesia and in development activities for the Indonesian capital planned by the Indonesian government^[16]. Environmental documents are prepared as a study in monitoring the quality of the environment both at the location of the activities to be carried out and in the area around the construction of the archipelagic capital development point launched by the Indonesian government which of course requires an environmental impact identification study^[17]. Identification of existing and discovered environmental impacts in the national capital area of the archipelago was carried out through field observations and literary studies which became the main basis for development and started from the preparation of environmental documents^[18]. The point of meaning of sustainable development in the national capital through sustainable forest city branding is that the area The capital city of the archipelago which will be developed by Indonesia will provide support for the sociological and ecological conditions of the city itself^[19]. The concept of this development planning is to maintain natural resources so that they can last longer and then provide potential for human life and at the same time maintain natural resources and the environment as an ecological system in continuing the conditions for the development of agriculture, forestry industry and the use of materials that will later become part of the development of the capital region of the archipelago in Indonesia^[20].

The increasing rate of population development and industrialization has resulted in a decline in environmental quality^[21]. Residential density and poor environmental sanitation conditions as well as industrial waste which is dumped directly into the environment without any processing have caused environmental pollution. Various environmental pollution has become a common condition, including in urban development. Mexico City noted in the study that people aged 18–65 years were confirmed to have health complaints due to the city's drinking water^[22]. Bangladesh also reports the influence of environmental quality on urban residents^[23]. Overpopulation in Europe also has an impact on environmental quality^[24]. Not only rivers, shallow groundwater in several parts of the city and coastal areas will also be affected due to existing pollution. The relocation of the capital city to the archipelago in the area around North Penajam Paser and Kutai Kartanegara in East Kalimantan certainly needs to be managed in order to reduce pressure on the environment. There are pros and cons to this activity. In terms of cons, they say that this development can change the natural landscape and ecosystem of the surrounding environment which is considered the lungs of the world and a conservation area for endemic fauna. Apart from that, a study of the environmental impacts of the new National Capital is absolutely necessary.

2. Methodology/materials

This research begins with a literature study which is the appropriate research method chosen to achieve the research objective, namely finding a mapping in accordance with the objectives of this research^[25]. The research source is a journal article indexed by a leading indexer^[26]. This usage was also explored using the publish and perish applications^[27]. In literature study research, the technique used is to read publications related to the specified research title^[28], in this case the development of the capital city of the Indonesian archipelago. The term keyword is used to refer to a particular research methodology or research and development carried out to collect and evaluate related research on a particular topic focus, in this case environmental problems in moving the Indonesian capital. Literature studies are carried out with various objectives to identify, examine, evaluate and interpret all existing research in topic areas according to research objectives, with certain relevant research questions^[29].

The type of data in this research is primary data taken from individuals who understand the development and management of environmentally sound development and is carried out by means of interviews and filling out questionnaires conducted by researchers^[30].

Meanwhile, secondary data is data obtained from studying literature which is then compared to examine

primary data, including data obtained from research results of other parties which are presented either by primary data collectors or by other parties who can support this research.

Research questions are created based on the needs of the chosen topic. The aim of this writing is to analyze in the form of mapping environmental problems and formulate a management model in accordance with standards for preparing environmental governance in the capital city of Indonesia. In more detail, the aim of this article is to analyze pictures of environmental problems and develop management models according to standards for the preparation of environmental governance in the environmental sector “Indonesia capital city”.

3. Results and findings

3.1. Literature review on environmental issues and capital relocation

Study: A literary study was carried out to find agreement in raising research topics regarding the development of the nation’s capital of the archipelago, which was carried out by researchers (**Table 1**). Researchers visited the location of research activities and then also tried to look for references regarding the development of the nation’s capital of the archipelago^[31]. This is done with a qualitative approach; descriptive methods are used to systematically describe the facts or characteristics of a population or a particular field in an actual and accurate manner with emphasis on observations and background development directly in the field. The point for quantitative data is devoted to the interpretation of conditions. Condition of research results conducted by various institutions. The researcher then provides a review of the literature studied in order to discover and map environmental management and monitoring which will later become part of the development of the nation’s capital city of the archipelago^[32].

Researchers compared field observations with the development conditions of the capital city of the Indonesian Archipelago carried out by researchers. From all the literature studies that researchers have explored, analysis of environmental impacts as a basis for governance has not been specifically published, so researchers feel it is important to raise this topic. The following are topics and research results that are close to the topic raised by the researcher.

Table 1. Results of literature study.

Literary title	Research result
Analysis of the move of the national capital ^[33]	Currently, Jakarta is designated as the capital of the Republic of Indonesia through Law of the Republic of Indonesia Number 10 of 1964 concerning the establishment of the special capital region of Jakarta. However, in its development, Jakarta has not always been the capital because it was also moved to Yogyakarta and in several other places by the government, but this condition is understandable because it is part of the process of developing a country, the capital of Indonesia was also moved to Bukit Tinggi, West Sumatra and Aceh Province for only a short time. After that, the country’s capital moved again to Jakarta and this remains the case to this day. Several countries have transferred their capital, such as Malaysia, Germany, Australia, Spain and Japan. Malaysia moved its capital from Kuala Lumpur to Putrajaya, while Germany moved its capital from Pun to Berlin and Australia moved its capital from Spain, moved its capital from Head to Madrid and Japan moved its capital from Kyoto to relocation. Tokyo, the capital of countries in various parts of the world, of course remains the key to success and new challenges. The United Arab Emirates is developing Dubai as a business city, but there is also Abu Dhabi as the capital of the United Arab Emirates. India Mumbai is the business capital while New Delhi is the center of government. The general reasons for choosing a capital are socio-economic considerations, political considerations and geographical considerations. Indonesia considers these three factors in its capital training analysis, not only domestic analysis but also analysis of the experiences of other countries in the world that have moved their capitals. The experiences of various countries with capital movements will provide input for considerations that can be used as appropriate analytical tools to examine the problems that exist in Indonesia.

Table 1. (Continued).

Literary title	Research result
Moving the new capital city of the republic of Indonesia to East Kalimantan: Strategy for meeting energy needs and consumption ^[34]	The designation of East Kalimantan as the new National Capital (IKN) has had the impact of increasing energy needs by two-fold. The basic principles for meeting energy needs and energy consumption are proposed: i) Making the development of IKN a momentum to develop Kalimantan's energy supply system widely; ii) Relying on meeting energy needs from local sources; iii) Prioritizing Kalimantan's energy sources for Kalimantan first; iv) prioritizing the use of clean and renewable energy; v) providing/strengthening energy infrastructure interconnections throughout Kalimantan, and vi) using energy efficiently. Proposed energy strategy projects: i) construction of a natural gas transmission network from the location of natural gas (or LNG) availability in East Kalimantan to IKN; ii) strengthening of the electricity interconnection transmission network throughout Kalimantan; iii) construction of a power plant large-scale water that utilizes the potential of rivers in Kalimantan; iv) development of environmentally friendly energy installations and utilization, and v) development of energy-saving and environmentally friendly transportation systems.
Changes in Maritime Governance in the East Kalimantan Region as the New Capital City ^[35]	In this research, the analytical study carried out is how changes in the maritime system are the basis for preparing the national capital of the archipelago in East Kalimantan through various infrastructure sectors. Conditions for the transfer of the state capital are carried out through joint development with the Indonesian national army navy through various strategies of related agencies. The results of research from this literary study show that improvements in infrastructure, especially dock and port terminal facilities, as well as the addition of open storage areas and Bung Karno in Balikpapan are part of the development plan for the master plan for the nation's capital. Of course, this will greatly influence the title of the nation's capital as a country. maritime authorities who will then be able to drive maritime security operations in the context of developing the authority, including the port authority in Balikpapan, as part of support for the development of the new national capital, namely the national capital of the archipelago.
Sectoral and Spatial Analysis of North Kalimantan Province as Support for the New Capital City: Interregional Input-Output Approach (IRIO) ^[36]	Plans to move the new national capital (IKN) to East Kalimantan are still ongoing. Implementation of this plan has an impact on preparing a buffer zone for new IKN candidates. North Kalimantan, as a region directly bordering East Kalimantan, is one of the leading provinces in supporting new IKN candidates. This research aims to determine the economic structure of North Kalimantan and the spatial relationship of the province with other provinces. By using the North Kalimantan Input-Output (IO) table, this research succeeded in identifying leading sectors in North Kalimantan and the linkages between sectors in the province. This study was also deepened by using the Interregional Input Output (IRIO) Table to obtain the economic relationship between the North Kalimantan region and other provinces. The research results show that the leading sectors in North Kalimantan are the mining and agricultural sectors, while the leading sectors in this province are the processing industry and electricity. From a spatial perspective, East Kalimantan is the province most affected when North Kalimantan experiences changes in final demand.
Management of Tourist Attractions Facing Potential Disasters in Balikpapan as Support for the New National Capital ^[37]	In this research, we write about one of the cities close to the capital of the Indonesian archipelago which is planned by the Indonesian government, namely Balikpapan as one of the large cities located in East Kalimantan province and has become one of the business and tourism destinations in Indonesia. This research mentions a lot about the condition of tourism in the city of Balikpapan which is surrounded by tourism potentials which can continue as the nation's capital. The point of research results from this paper is where the readiness to manage the city of Balikpapan as a business and tourism city is analyzed and what approach is then taken to continue the birth of the nation's capital. The research carried out and this research used a qualitative approach with a case learning design. The data analysis used is an improvement based on existing regulations and supported by existing theories to analyze each preparation and knowledge variable. The results of the research show that the level of readiness of the city of Balikpapan from all agencies is still not able to ensure that this city is responsive to environmental changes and becomes a buffer for the new state capital. Tourism development in the city of Balikpapan is expected to be able to drive public knowledge about how environmentally sound development can be.
Handling Potential Threats of Terrorism in Indonesia's New Capital City Case Study: Kutai Kartanegara and North Penajam Paser Regency ^[38]	This research resulted in considerations regarding the designation of Kutai Kartanegara and North Penajam Paser Regencies as the location of the state capital or PKN Nusantara based on several studies conducted by Bappenas which not only highlight security factors, especially regarding the threat of terrorism in the region but are also part of actions regarding potential threats in the state capital. The new writing in this research uses qualitative methods by collecting data from books and journals. The author uses 5 aspects of protection geography as a focus to identify areas of national science between the social environment, ethnicity, religion, language, social structure and military installations. Based on the analysis that has been carried out, it is known that the geographical characteristics of the protection of Kutai Kartanegara Regency and the Kingdom of North Pasai in dealing with the potential threat of terrorism are still lacking because the potential threat from all of them is quite large around the capital of this new country. So, it requires difficult protection and security cooperation between regions and neighboring countries reform of religious and citizenship education is also needed as well as developing the skills of local residents who are given low levels so that they are threatened with poverty and destitution. As a result of the change to a new national capital, the conclusion of the results of this research shows that the image based on environmental management documents has not been discussed.

3.2. Environmental problem mapping

The aim of the research stated at the beginning regarding this article is how to describe environmental problems in the context of realizing governance according to the principles of sustainable development in the development process of the nation’s capital of the archipelago. Once used as the basis for preparing environmental documents, the preparation of educational documents needs to take into account the socio-economic and environmental conditions at the development location. both at the construction and operational stages. The sustainable development approach in preparing model documents for handling conditions in various eras, including when the Covid pandemic hit, needs to be seen from three main aspects of housing development, namely permanent social development, permanent economic development and permanent environmental development in order to realize sustainable historical development management of the nation’s capital of the archipelago.

The location and environmental impacts that arise will be the basis for studies to realize sustainable development of the Indonesian capital city and can support Indonesia’s development plans which support environmentally sound development globally and contribute to saving the world from issues of environmental damage (**Table 2**).

Table 2. Results of analysis of environmental problem mapping and environmental impact identification.

Number	Type of activity	Program to support activity
I	Construction phase	
1	Surveys and licensing	1) Increase in PAD
2	Socialization	2) Public and government perceptions
II	Construction phase	
1	Construction worker recruitment	Job, business and income opportunities
2	Land management	Environmental aesthetics (vegetation loss)
3	Mobilization of construction tools and materials	Piles of garbage and garbage
4	Building construction and supporting facilities	1) Air quality
5	Construction waste management	2) Noise
6	K3 management	3) Traffic disruption
		4) Public and worker health and occupational safety
III	Operational stage	
1	Acceptance of operational personnel	1) Job, business and income opportunities
2	Operational activities for the development of the national capital city	2) Air quality
3	Building and environmental maintenance	3) Noise
4	Waste management	4) Water quality and quantity
		5) Traffic disruption
		6) Waste and waste landfill sites (Solid, Liquid and LB3)
		7) Fire hazard
		8) Public and worker health and occupational safety

Source: Research Analysis 2023.

Identification of environmental problems in the development of the capital city of the Indonesian archipelago in Kalimantan has important value in Indonesia’s development activities, especially with the branding “Sustainable Forest City”, it is hoped that the national capital can become the main icon as a pilot area for the development of the country’s capital. development of a modern sustainable urban development model. Therefore, identification of environmental impacts must be able to support a design concept that is sustainable, beautiful and able to survive in the midst of various changing conditions in the world. The identification points of activities carried out starting from the pre-construction-construction and operational stages needs to be carried out continuously with an environmental perspective that leads to improving

community welfare, especially when facing environmental changes even during the Covid-19 pandemic. Currently, the mechanism for implementing identity in the environment can be a criterion in compiling environmental documents for development, including in the development of the national capital of the archipelago. The point of having an analysis of environmental impacts will help early methods and seek solutions for entrepreneurs. The important thing is that in the development of a project it will not harm various parties, so that development will continue to learn without causing a detrimental impact on the environment.

3.3. Governance analysis through the concept of sustainable development

The live weekly document, which is the main requirement for being capable of development, must of course be created and prepared by taking into account various aspects of the environmental document point, prepared as a study in monitoring environmental quality both at the activity location and around the development area. Therefore, the development of the nation's capital of the archipelago certainly requires an environmental impact identification study. Identification of the environmental impact of the capital of the archipelago, which is found through literary observation and comparison of field observations, can direct the picture of sustainable and environmentally sound development. Points of meaning of sustainable development in the capital of the archipelago are part of social and ecological development where this planning concept is carried out to protect natural resources so that they can last longer and be able to provide support for the persistence of natural resources, both renewable and non-renewable, as a system that is part of the development of this research.

Moving the country's capital to the archipelago in the area around North Penajam Paser and Kutai Kartanegara in East Kalimantan has had its pros and cons. In terms of cons, they say that this development can change the natural landscape and ecosystem of the surrounding environment which is considered the lungs of the world and a conservation area for endemic fauna. Apart from the environment, this diversion will have an impact on the social and economic life of the community around IKN which is still relatively low. On the other hand, the development of the National Capital City (IKN) will have a positive impact both from an economic and social perspective, and the development will be carried out without damaging the environment. The development of IKN will continue to be carried out, therefore, in its development it must be ensured that it does not damage the environment, one of which is by implementing sustainable development. Development is not only about meeting the needs of the current generation, but also paying attention to meeting the needs of future generations, namely by preserving nature. Various national regulations regarding environmental protection have been made by Indonesia, apart from that there are also various principles of international law, including the principle or concept of sustainable development or sustainable development. The importance of this research is as a first step in identifying environmental impacts to create a picture of sustainable development in the nation's capital of the archipelago. In the future, the discovery point of the environmental front can become the basis for a sustainable development model that can direct more sustainable development. The point of identifying environmental impacts is by preparing documents. Environmental documents in an effort to manage environmental governance as an identification of the stages of development activities will have a positive impact on the management of environmental development. For this reason, the effectiveness of knowledge environmental impact management that is carried out needs to be carried out by various stakeholders with both the authorities, the initiating contractor consultant and the relevant government. The focus on developing the nation's capital of the archipelago in the most populous and sustainable manner means paying attention to socio-economic and environmental conditions and this is carried out by preliminary studies of environmental images where development governance must pay attention to the environmental community in the development activities of the development of the capital of the archipelago. As for suggestions for future development, firstly, the activities carried out should be planned in accordance with the development drawings

by prioritizing environmental expenditures both on a small scale and on a large scale. Then secondly, make efforts to play an important role in minimizing the negative impacts. Environmental monitoring management must be carried out in accordance with regulatory regulations or determined and to be able to determine the impacts that occur in this development, it is recommended to carry out continuous monitoring studies and report them continuously in each semester of development.

4. Conclusion

Environmental problems are serious problems that must be resolved. Pollution of rivers, waterways, wells and seas is increasing due to increasing urban activities. Indonesia is currently calling for the transfer of the country's capital from Java to Kalimantan. This condition poses a serious challenge to the country's development from various angles, including from an environmental perspective. This research aims to identify environmental problems by tracing the sources of environmental problems in the development of Indonesian capital cities. This information is traced through a review of literature studies in collaboration with researchers' experience in compiling environmental documents. City management studies, especially the development of the capital city of the Indonesian Archipelago, need to be directed so as not to cause new environmental problems in the future and cause environmental damage. The mapping process starts from the pre-construction stage, construction stage, operational stage and post-operational stage. The mapping results show that environmental problems need to be mapped in the form of a social, economic and environmental approach in accordance with sustainable development standards starting from a social approach to ensure the fulfillment of citizens' rights in improving the quality of the urban environment. The results of impact identification conclude that there is a positive impact on improving community welfare and there is a negative impact that increases the burden on the environment. An economic approach by ensuring the fulfillment of citizens' rights in obtaining decent work and an environmental approach by paying attention to air, water quality and waste management in accordance with technological standards and following applicable laws and regulations. As for alternative conclusions for overcoming environmental problems, community model governance is governance with a community approach for activities that have an area of less than 5 hectares and the complexity of environmental impacts is less than three impacts, while the complexity of environmental impacts is more than three impacts. of the three impacts are managed using a collaborative model.

Author contributions

Conceptualization, PHP, FFW, VNJR and LGJG; methodology, PHP, FFW, VNJR and LGJG; software, PHP, FFW, VNJR and LGJG; validation, PHP, FFW, VNJR and LGJG; formal analysis, PHP, FFW, VNJR and LGJG; investigation, PHP, FFW, VNJR and LGJG; resources, PHP, FFW, VNJR and LGJG; data curation, PHP, FFW, VNJR and LGJG; writing—original draft preparation, PHP, FFW, VNJR and LGJG; writing—review and editing, PHP, FFW, VNJR and LGJG; visualization, PHP, FFW, VNJR and LGJG; supervision, PHP, FFW, VNJR and LGJG; project administration, PHP, FFW, VNJR and LGJG; funding acquisition, PHP, FFW, VNJR and LGJG. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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