The Impact of the Toll Road Development on the Environment and Ecosystem in Kukusan Village, Depok, West Java, 2015-2020

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Abstract. This article analyzes the impact of the construction of the Cinere-Jagorawi (Cijago) Toll Road Section II, which connects the Bogor Highway and the Kukusan area on the environment around the toll road construction site. Most of the Kukusan areas affected by the toll road construction project are open areas and shrubs, which are habitats for wild animals, especially snakes so that the balance of snake habitat in the area is disturbed. The research method used in this study is the historical method which consists of four stages, namely heuristics, verification, interpretation, and historiography. In addition to books obtained from several libraries, the data used in this study were also obtained from interviews with people living near toll road construction projects, especially ornamental plant traders. This research shows that environmental changes due to the construction of toll road infrastructure impact the disruption of the habitat of several wild animals and an increase in temperature and concerns about the availability of clean water in the future, especially in the Kukusan area.

1. Introduction
The development of infrastructures such as roads and bridges will undoubtedly benefit the community because they provide various conveniences in carrying out daily social and economic activities. However, infrastructure development often affects the existence of the environment so that it changes the contours of the land disrupts the balance of the ecosystem and the habitats that inhabit it. Infrastructure development in a suburban area such as in the Kukusan Village area, Depok, impacts the balance of the ecosystem at several points and an adaptation process from semi-urban community infrastructure to an increasingly dynamic urban society and environment and an increasingly polluted environment.

Kukusan Village is located adjacent to the University of Indonesia Campus in Depok, operating in 1987. The Kukusan area and its surroundings became widely known as the construction of the University of Indonesia’s new campus were chosen in the area. The construction of the new campus was due to the existence of the old campus in the Rawamangun area, Jakarta, which is considered no longer adequate to expand and build various other facilities to improve the quality of learning and teaching. Until 2015, which is the year before the toll road construction in the Kukusan Village area, the existence of the new University of Indonesia campus has changed the face of the Kukusan area and two other villages, namely Bambon village and Serdang village. Many Kukusan settlements around the campus area have been converted or even sold. In general, residents who sell their houses and land change their functions into
dormitories and places of business. In addition, several residents also later worked at the University of Indonesia as campus security and administration staff so that changes occurred not only in their living environment but also in their work. The face of the Kukusan area has turned into a semi-urban area and a crossing area that connects the Jakarta and Depok areas. The need for a toll road is urgent considering that the people of Depok who work in Jakarta and its surroundings need the fastest access. Especially in the Kukusan area where the University of Indonesia’s new campus is located, the presence of the toll road can also facilitate traffic from the Jl. Margonda Raya to other areas for those who study and work in the university.

There are not many works that can be used as sources in this research because there are not many written works on the history of Depok City. However, two works can explain the history and development of Depok City, including a work entitled History of Depok 1950-1990s written by Tri Wahyunung M. Irsyam [1]. This paper describes the development of Depok City since 1950 in many aspects, including demographic and transportation issues and the establishment of the University of Indonesia Campus in Depok. In this work, the development of Depok City to the establishment of the University of Indonesia Campus can be said to be not fast. This book contains many data, but the research period is only limited to the 1990s, so it does not discuss the development of toll road construction in the Kukusan Village area. However, this work can explain the dynamics of early development in Depok City after constructing the New Campus of the University of Indonesia.

Another work related to the development of the City of Depok was written by Wenri Wahar entitled The Gedoran Depok Social Revolution on the Edge of Jakarta. This work describes the social dynamics that occurred in the Depok area to the Tanah Baru area during the Revolution, so it does not explain infrastructure development, especially in the Kukusan area [2]. Although it is not directly related to the urban problems faced by the current government and people of Depok, this work explains the social conditions and simple government structures in Depok since the revolution period.

2. Method
The method used in this research is the historical method which consists of heuristics, verification, interpretation, and historiography (Figure 1). The heuristic process, which is the stage of collecting writing sources, collects data and facts from books in several online libraries including the University of Indonesia Library and the National Library of the Republic of Indonesia. In addition, data collection was also carried out by conducting interviews with people living around the toll road construction project. They are community groups directly affected by environmental changes that occur and see the impact of disrupting the balance of the ecosystem at the toll road construction site.

In addition to efforts to collect data from several libraries and direct interviews with the public, direct observations were also made to the toll road construction sites. Field research provides a direct description of the process of environmental change that occurs on lands that have been converted into toll roads. These environmental changes visually illustrate several possibilities that will occur in the future in the Kukusan area, especially the shadow of the conditions in which many cars will cross the toll road. Pollution will be getting worse in the Kukusan area in addition to the predictable temperature increase.
This study chose the 2015-2020 period because the Kukusan toll road construction process began in 2015, and in 2020 the toll road began operating. During the toll road construction process, the people living in the vicinity have felt various impacts on the surrounding environment. The community felt the impact even more after the Cinere-Jagorawi (Cijago) Toll Road Section II was followed by the Cinere-Jagorawi (Cijago) Toll Road Section III project.

3. Result and Discussion

3.1. The history of the development of the kukusan area

Etymologically, the name Kukusan comes from a type of duku that was once commonly found in this village. This type of duku is commonly known by the locals as the Kokosan fruit. According to Mr. Mukhlis Sutami, a resource person who now serves as the head of the Community Association (RW) 08 Kukusan Village, the fruit is now difficult to find, especially with the lack of community-owned garden land that has been turned into buildings, both houses and boarding houses as well as businesses. Mushroomed in Kukusan Village, especially after the establishment of the University of Indonesia Campus in Depok [3]. Like other garden and field products, the Kokosan fruit in the past was generally sold by the residents of this village to Jakarta to the Pasar Senen area by bicycle or train via Pondok Cina Station. As an area that was later considered a producer of Kokosan fruit, this village was later known as Kokosan Village. But in its development, there is a vocal change in the mention of the name of this village, namely Kukusan Village.

Administratively, Kukusan is now the name of a sub-district under the Beji District structure. In the past, there were three adjoining villages in the area now part of the University of Indonesia, namely Kukusan Village, Serdang Village, and Bambon Village. In general, especially the residents of Kukusan Village are residents of the outskirts of Betawi ethnicity. Until now, indirectly, efforts to distinguish between natives and immigrants in Kukusan Village can be done through dialogue so that the periphery Betawi dialect and the dialects and languages of the immigrants will be seen. However, some of the migrants who have lived in Kukusan Village for a long time have been able to speak and have the same dialect as the natives, so that sometimes they appear to be natives of Kukusan Village. The outskirt Betawi itself has differences with the original Betawi ethnicity, which can be found in several Jakarta areas such as the Condet, Rawabelong, or Kemayoran areas. This difference is inseparable from geographical factors where Kukusan Village, which is included in the Depok area, is administratively headquartered in Bogor Regency. This geographical condition directly affects the traditions and culture of the residents of Kukusan Village, whereas residents living on the outskirts of Jakarta, the residents of Kukusan Village, receive the influence of Betawi and Sundanese culture. However, these two cultural influences do not color the lives of the Kukusan Village residents so that the emerging culture can be said to be unique and distinctive of the Kukusan Village residents. Thus, despite being more ethnically close to the Betawi Tribe and in the past included in the Bogor Regency area, the residents of Kampung Kukusan generally cannot speak Sundanese.

Besides Kukusan Village, another village affected by the construction of the University of Indonesia in Depok was Bambon Village. The location of this village has now been replaced by the existence of the Faculty of Engineering and the University of Indonesia Football Stadium. Part of this village area is now included in the Kukusan Village area, and the other part was originally a rubber plantation area. One other village is Serdang Village, which has begun to disappear from the people's memory along with the increasing number of developments and immigrants. The Serdang Village area itself used to be located in an area now the location for the Pertamina gas pipeline to be planted and is bordered by Jalan Raya Kukusan. The area itself is now a bustling intersection because it is a crossing point for residents of Depok City who will go to Jakarta and vice versa or the academic community of the University of Indonesia who go to and return from their activities at the University of Indonesia. The increasing number of residents in this area also makes land prices in Kukusan Village higher, especially with the realization of a toll road construction plan that will shorten the travel time from the Margonda Road area to the Cinere area. It is almost confident that land prices in the Kukusan Village area will continue to increase along with the completion of the toll road construction estimated in 2019.
3.2. Kukusan toll road construction

Along with the increasing population of Depok City, including in Kukusan Village, various community activities are also increasingly demanding efficiency, including time and convenience. The increasingly diverse society of Depok makes the professions and fields of work occupied more varied. Cross-sectoral activities are growing so that several areas in Depok are urgently connected with toll road infrastructure for access to Jakarta and other areas. The Margonda Street area, which can be said to be the center of economic activity in Depok, is the busiest road and a source of congestion. To relieve congestion in the Margonda Street area, the construction of the Kukusan Toll Road is an alternative that connects the Kukusan area and Margonda Street with a concise travel time.

The construction of the Kukusan Toll Road began around 2012, which began with the acquisition of land and buildings to be used as land for the toll road. The land used as a toll road consists of vacant land and housing for residents in the Kukusan Village area. The construction of the Kukusan Toll Road was completed and started operating in 2019. As stated by the Minister of Public Works and Public Housing, Basuki Hadimuljono, the construction of toll roads in urban areas faces more significant challenges because the land acquisition process often takes a long time [4]. Price negotiations between the government and the owners of buildings and land are sometimes tough to get a price agreed upon by both parties. The construction of the Kukusan Toll Road is part of the Section 2 toll road that connects the 5.5-kilometer Bogor-Kukusan Highway. As with the construction of toll roads in other areas, Minister Basuki hopes that the construction of the Kukusan Toll Road is expected to increase the volume of distribution of goods and services in Jakarta, Bogor, Depok, Tangerang, and Bekasi areas. In addition, the Kukusan Toll Road is also expected to contribute to economic development, especially the Depok area. The existence of toll roads in other areas such as the Trans Java Toll Road contributes to developing new industrial areas such as Brebes, Batang, and Ngawi.

The construction of the Kukusan Toll Road itself is generally part of the 14.7-kilometer Cijago Toll Road construction project, which consists of three sections. Section 1 connects Jagorawi-Jalan Raya Bogor for 3.7 kilometers. The toll road has started operating in January 2012. While Section 2 connects the Bogor-Kukusan Highway for approximately 5.5 kilometers, operating in September 2019, and then Section 3, connects the Kukusan-Cinere area for 5.44 kilometers. According to the Mayor of Depok, Mohammad Idris, the construction of the Section 3 Toll Road is very helpful for the mobility of residents because 60% of Depok residents work outside Depok, namely 40% in Jakarta and the rest work in Bekasi, and Bogor [4].

The construction of the Kukusan Toll Road took quite a long time because the land acquisition along the area used as a toll road route was immensely challenging, with residents wanting a fair price as compensation for their houses and land. Several residents who stayed at the price they wanted partly managed to get it. As of April 2017, the land acquisition for the Cinere-Jagorawi (Cijago) Section II Toll Road project in the Kukusan area has yet to be completed, although the physical construction work of the project is continuing and is targeted to be completed in mid-2017.

Efforts to complete the Section II Cinere-Jagorawi (Cijago) Toll Road project in the Kukusan area continue. On September 28, 2019, the trial operation without tariffs was carried out while waiting for the inauguration of the operation of the toll road by President Joko Widodo. Until now, the Cinere-Jagorawi (Cijago) Toll Road Section II in the Kukusan area has operated with all the impacts that have been felt by the residents of Depok and its surroundings, especially residents who live in the Kukusan area. Currently, the project is being continued with the construction of the Cinere-Jagorawi (Cijago) Toll Road Section III, which will connect the Kukusan area with the Cinere area.

3.3. The impact of kukusan toll road construction

It is undeniable that infrastructure such as roads and bridges provide many benefits for the smooth transportation of goods and services. Thanks to this infrastructure, Depok’s goods and services traffic, especially in the Kukusan Village area and its surroundings is getting smoother. This smoothness helps improve the community’s economy as well as saves time on travel. Not far from the Kukusan Toll Road, there is also the Graha Permata Ibu Hospital which provides health services for the residents of Kukusan.
and its surroundings so that the existence of the toll road also provides convenience for patients who want to go to the hospital. Business centers in the previously established Kukusan area, including several bank branches and ATMs, also benefit from opening the Kukusan Toll Road.

Nevertheless, on the other hand, the existence of the Kukusan Toll Road also causes side effects to the people living around the location. Several houses have to be evicted because they are located at the toll road construction site. Despite receiving compensation for land and buildings, people who have lived in the Kukusan Village area for decades have to leave the location that has become their childhood memory. In some parts of Palakali Street, which is one of the entrances to the University of Indonesia from the Kukusan Village direction, several houses that have been evicted are places of business to earn a living for their families. These places of business are generally home-based businesses, including small stalls, motorcycle and bicycle repair shops, and businesses selling freshwater fish. Residents whose houses were evicted were generally prepared to buy houses in other locations with the money they earned from land acquisition. As a result of the liberation of part of Jalan Palakali, the face of the Kukusan Village, adjacent to the University of Indonesia, is now divided by the Kukusan Toll Road. The area was previously a reasonably green area with many trees planted by residents in their yards, but now the air temperature in the area feels warmer and more open, Dave's Apartment has also been established in this area, which was originally expected to be an alternative for students to rent a place to live while studying at the University of Indonesia.

The construction of the Kukusan Toll Road that significantly changes the environment is the section of the toll road located at the Kukusan intersection point towards the Tanah Baru Village. The acquisition of land to be used as part of the Kukusan Toll Road in this area opened a large area of land that was initially vacant and used by ornamental plant sellers and grass sellers. In this area, ornamental plant sellers peddle their commodities parallel to the toll road. Toll road land acquisition in this area impacts the disruption of the habitat of a number of wild animals, especially snakes. During land acquisition in this area, residents, especially ornamental plant sellers, found several snakes and their nests, later partially captured. Due to the disruption of snake habitat in this area, residents living around the Kukusan Toll Road construction area often encounter snakes roaming their homes. The disruption of the snake's habitat makes it seem as if the snakes are trying to get another living space and enter residential areas. According to Mr. Arif, 44, who works as a seller of ornamental plants around the construction site of the Kukusan Toll Road, the snakes inhabit vacant land in the form of shrubs and are often seen during his work [5]. However, their presence and the construction of a toll road made the snakes move away from the bush area near a small river not far from where he sells ornamental plants. The disappearance of snakes in the Kukusan Toll Road construction area will indirectly increase the number of rats that have been prey for snakes.

The construction of the Kukusan Toll Road which replaces bushland makes the area’s temperature also tends to increase. According to Mr. Arif, this has begun to be felt since the land behind where he works began to be acquired and prepared to construct of the Kukusan Toll Road to Cinere. Between the land acquired and the place where ornamental plants are sold, a dividing wall is now erected. The wall will later become a clear boundary between the toll road construction area and public space, including the buying and selling of ornamental plants. The presence of traders of ornamental plants and the plants they sell directly helps reduce pollution, which has increased in line with the construction of toll roads and cars going back and forth in the area. According to Mr. Novan, 20 years old, who also works as an ornamental plant trader, the land acquired to construct toll roads is productive land used by grass traders to plant grass for sale [6]. He hoped that there would be large trees planted on the side of the toll road by the Ministry of Public Works so that the area would remain shady and shady while reducing pollution and dust from the toll road.

For the people of Depok, especially those who live in Kukusan, the Kukusan Toll Road makes it easier for them to get to where they work in Jakarta. They can get to their office faster because using the toll road can avoid several congestion points that often make their travel time to the office longer. The travel time for residents who want to go to the Kukusan area from Jalan Margonda Raya is also short. In addition, as expected, the existence of the Kukusan Toll Road has been proven to reduce congestion
on Jalan Arif Rahman Hakim, Jalan Nusantara, and Jalan Dewi Sartika. However, in general, the vacant land area that was turned into the previous toll road area is an area that is very good at absorbing rainwater which can prevent flooding. Previously, at the Kukusan intersection, there had been frequent floods, and it was feared that this would make the area more prone to flooding because the vacant land area had been turned into a toll road. The environment around the Kukusan Toll Road has turned into an urban area that will increase the temperature, and air quality in Kukusan Village, as many residents have experienced.

On the other hand, the existence of the Kukusan Toll Road has also made economic and social activities more efficient. For business people, including ornamental plant sellers who sell on the side of the Kukusan Toll Road, more and more buyers from the upper classes are coming to buy their ornamental plants. These customers use cars that can easily reach the ornamental plant sales location slightly outside the Kukusan toll gate. The convenience of these customers makes trading activities increase. The increase in the volume of ornamental plant trade was even quite significant during the restrictions on community activities during the Covid-19 pandemic because many residents were required to work at home and then added to their busyness by planting ornamental plants in their yards.

4. Conclusion
The existence of the Cinere-Jagorawi (Cijago) Toll Road Section II in the Kukusan area is an effort to facilitate the transportation of goods and services and various other Depok residents' activities, especially in the Kukusan area. The various impacts that arise with the construction of the toll road indicate a lack of anticipation of environmental changes that occur around the toll road construction project. Kukusan is a suburb and a border with the South Jakarta, area where there are still many open lands and plantation areas. The acquisition of land, which is a habitat for snakes, makes residents who live close to the toll road project area worry, as evidenced by the number of snake discoveries by residents. The snakes found in large numbers can endanger the safety of residents because the snakes then look for new habitats, including residential areas around the toll road construction project. The construction of the Kukusan Toll Road also has an impact on reducing the area for groundwater absorption. This is because the open area used as land for the construction of the Kukusan Toll Road is an open area that has been effective for absorbing rainwater to prevent the danger of flooding. In addition, public space is also decreasing. The increasingly narrow public space along the road parallel to the Kukusan Toll Road is increasingly being felt. Pedestrians who have had difficulty getting space are getting less attention with the existence of toll roads. This condition should be a concern for toll road construction companies, the Depok City government, and the Ministry of Public Works and Public Housing so that the construction of new infrastructure is carried out and improves the city's spatial planning.

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Interview with Mr. Arif, 44 years old, Sunday, September 5, 2021 at the location of the sale of ornamental plants on the side of the Kukusan Depok Toll Road construction project.

Interview with Mr. Novan, 20 years old, Sunday, September 5, 2021 at the location of the sale of ornamental plants on the side of the Kukusan Depok Toll Road construction project.