



Bird of Minerva Havoc in Hiaasen's Hoot

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Abstract

Purpose

This research aimed to study the connection and its consequences of massive development, particularly on the urban areas, towards burrowing owl's population decline and its effect.

Method

The qualitative method was applied to assist the data analysis process in this research. The data are taken from narrative and dialogue within the story. Ecocriticism theory is also implemented to help analyze the effect of urbanization in the story.

Results/findings

The research found that urbanization has dreadful consequences on environment. Urbanization not only drives burrowing owl's decline in population, it also disrupts the food chain system, and affects the population of pest.

Conclusion

The study concluded that the effects of urbanization have a broader impact for the environment. Its negative impact can cause mayhem for human life. In accordance with that, this research suggests that urbanization must be planned carefully and consider the effect for the nature and ecosystem.

Keywords

children's literature, burrowing owl, urbanization, ecocriticism.

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Abstrak

Tujuan

Penelitian ini bertujuan untuk mengkaji hubungan urbanisasi di daerah perkotaan terhadap penurunan populasi burung hantu penggali dan efek yang ditimbulkan akibat menurunnya populasi mereka.

Metode

Metode kualitatif digunakan untuk membantu dalam penelitian ini. Data-data yang digunakan diambil dari narasi dan percakapan antar tokoh di dalam cerita. Teori ekokritik juga dipakai untuk membantu menganalisis efek yang ditimbulkan akibat urbanisasi di dalam cerita.

Hasil/temuan

Penelitian ini menemukan bahwa urbanisasi menimbulkan dampak buruk bagi lingkungan. Urbanisasi tidak hanya mengakibatkan populasi burung hantu penggali mengalami penurunan, namun juga mengganggu keseimbangan rantai makanan, dan juga mempengaruhi populasi hama.

Kesimpulan

Penelitian ini menyimpulkan bahwa urbanisasi memiliki efek negatif yang luas bagi lingkungan. Dampak negatif tersebut juga sangat merugikan bagi kehidupan manusia. Oleh karena itu, penelitian ini merekomendasikan bahwa urbanisasi harus direncanakan secara matang serta juga menimbang efek terhadap lingkungan dan ekosistem.

Kata kunci

sastra anak, burung hantu penggali, urbanisasi, ekokritik

المخلص

الهدف

يهدف هذا البحث إلى دراسة العلاقة بين التحضر في المناطق الحضرية وانخفاض أعداد البوم الجور والآثار الناجمة عن انخفاض أعدادها.

الطريقة

واستخدمت الأساليب الكيفية للمساعدة في هذا البحث. أما البيانات المستخدمة فهي مأخوذة من الروايات والمحادثات بين الشخصيات في القصة. وتستخدم النظرية النقدية البيئية أيضاً للمساعدة في تحليل تأثيرات التحضر في القصة.

النتائج

ويخلص هذا البحث إلى أن التحضر له تأثير سلبي على البيئة. لا يؤدي التحضر إلى انخفاض أعداد البوم المختبئة فحسب، بل يؤدي أيضاً إلى تعطيل توازن السلسلة الغذائية، ويؤثر أيضاً على أعداد الآفات.

الخلاصة

ويخلص هذا البحث إلى أن التحضر له آثار سلبية بعيدة المدى على البيئة. كما أن هذه الآثار السلبية تلحق ضرراً كبيراً بحياة الإنسان. ولذلك، يوصي هذا البحث بضرورة التخطيط للتوسع الحضري بعناية، وكذلك النظر في آثاره على البيئة والنظام البيئي.

الكلمات الرئيسية

أدب الأطفال؛ بومة تختبئ التحضر؛ النقد البيئي

INTRODUCTION

The Burrowing Owl or *Athene Cunicularia* is a small owl that is commonly found in the North and South American region. Their subspecies also can be traced in the Caribbean Islands. The burrowing owl itself has a small body weighing 125-248 grams, and it has brownish feathers with round head and bright yellow eyes (Wellicome & Todd, 2012, p.1). Unlike other owl species that are mostly active during night; nocturnal, this particular owl is frequently seen active during daylight (Luque-Fernandez, 2020). Despite this, the burrowing owl still performs hunting during night and their preys are mainly large insects including grasshoppers, moths, and caterpillars.

Burrowing owl's habitat is commonly found in an area which has low levels of vegetation, such as in the open space of urban areas. Due to its natural habitat, in recent years there has been a population decline of burrowing owls. Hence, in the United States, the burrowing owl is federally protected under the Migratory Bird Treaty Act (United States Fish and Wildlife Service, n.d.). Meanwhile, in Canada, burrowing owls are listed as red listed or endangered species, and in 2015, Canadian population of burrowing owls was just 270 owls (Committee on the Status of Endangered Wildlife in Canada, 2017, p. 35). Moreover, the burrowing owl has been listed as a threatened species in Mexico since 1994 (Klute et al., 2003).

The fall of burrowing owls' population is caused by a number of factors. However, habitat loss is the main one. Loss of habitat has detrimental effects on biodiversity (Jackson & Fahrig, 2013) and species population abundance (Laurance et al., 2002) in addition to the burrowing owl population. Consequently, the burrowing owl population continues to face threats. Therefore, it is reasonable to assume that the burrowing owl will become extinct if it is not adequately addressed.

Additionally, the extinction of animals has been recorded through many literary works, including in Hiaasen's *Hoot*. In this mystery-thrilled adolescent novel, Hiaasen writes a story of Roy, the main character of *Hoot*. He moved from a place where natural beauty, Bozeman Montana, to a distressing apartment complex, Coconut Cove. Roy tried to save a burrowing owl from extinction due to their habitat being used to build a business facility. He strained to prevent the destruction of burrowing owl nests as a consequence of massive urban development.

Moreover, animal extinction issues have also been discussed through several studies. One of the previous studies was conducted by Winta Hari Aristowati (2016) from University of Brawijaya, she discussed the human exploitation that resulted in the death of certain animals. She used the fables from Aesop, a notable Greek fabulist and storyteller, particularly *The Goose with the Golden Eggs* and *The Milkmaid and Her Pail*. In conclusion, the study by Winta Hari Aristowati (2016) found that human exploitation is one of the factors behind animal extinction. Another study regarding the animal issues in a novel is a research by Tatik Apriati (2013) entitled *An Analysis of Human-Nature Relationship in Children's Book Julie by Jean Craighead George (An Ecocritical Study)*. In her studies, she analyzed the connection between human and nature in the novel, and it is portrayed as a bad relationship. In the novel, the characters can be seen ignoring nature as a result of industrialization. They also underestimate the role of animals and plants in human's life by exploiting nature without any effort to preserve and disregard the existence of other species (Apriati, 2013). From those two previous studies, it could be said that humans contribute to the extinction of several animal and plant species. Human role in affecting havoc in several animals and plants through urbanization through the portrayal of industrialization is also being depicted in the Tatik Apriati's studies.

Thus, this research will explore and focus on the effect of urbanization as the prime culprit of burrowing owl's population decline and extinction. In this study, the ecocriticism approach is applied. It is a study that examines the relation between literature and nature as a way to renew awareness from the reader towards the non-human world and his/her responsibility to sustain it (Dobie, 2012), particularly, animal extinction issue

since nature and animals are an essential part of human life. That is why, it is hoped that this study will increase reader's consciousness in connection with the role of animals and plants in ecology. On top of that, it is hoped that this journal will encourage authorities to do sustainable urbanization.

METHOD

In this research, the qualitative method was applied. Qualitative method is mainly about image and text-based, and it also possesses distinctive steps in the analysis process (Creswell, 2009). Additionally, Sugiono (2015) explains that the qualitative method aims to analyze and explain a phenomena or certain research object(s) through social activities, and individual or group's perception. The primary data source in this study was taken from Hiaasen's *Hoot*; nonetheless, a secondary reading technique and certain theories were also applied to assist in this research. Since this research did not involve numerical analysis, qualitative research was the acceptable method for this study. Additionally, as the object of this research was a novel, the text-based analysis might also be utilized.

There were several steps in analyzing the novel. The first step was reading the novel. To gain a comprehensive understanding of the novel, close reading technique was also applied as it can stimulate us to develop a deeper understanding of a text (Saccomano, 2014). The second step was reducing and filtering the data. To reduce and filter the data, a bank data was created. It had some categories according to issues reflected in the dialogue or narration. The next was reducing the data by separating the unnecessary data that were not connected with this research. After all data regarding the Bird of Minerva havoc in the novel were collected, they were composed. The data focused on the connection between urbanization and burrowing owl's habitat loss; therefore, leading to its endangerment and extinction. Hence, according to the main issue of this research, theory with a focus in ecology was applied. Ecocriticism theory is a study concerning the connection of humans and their surroundings (Mane, 2014); moreover, ecology itself is a study that examines human relationship with nature. The ecocriticism theory is important as it can raise readers' awareness of animal issues; in particular, animal extinction and habitat loss. The last step was filtering data after they have been collected. The data would be described and analyzed to give detailed information related to the issue. Finally, the data would be concluded.

FINDING AND DISCUSSION

In discussing the issue in this research, the discussion is divided into three subchapters. The first subchapter will discuss the habitat loss of burrowing owls due to urbanization. It is important to know since urbanization is one of the biggest threats for burrowing owls. In the second subchapter, the unavailability of preys will be discussed. In this subchapter, there is an explanation on how burrowing owls experience loss of prey that could threaten their population. Lastly, it will discuss the effect of burrowing owl's population decline on pests' population.

More Restaurants, Less Owl

The burrowing owl, its Latin name is *Athene Cunicularia*, is commonly found in the open space, where they build their nest by burrowing the soil; this is why their name is taken. This is also described in the novel "Curly gestured at a hole in the ground. It was as big as Mother Paula's famous buttermilk flapjack. 'An owl lives down there? How big are they?' The policeman asked. 'Bout as tall as a beer can.' Curly said. (Hiaasen, 2009;6). From the narration and dialogue above, we know that this particular owl lives underground where they build their nest; moreover, their distinctiveness from other owl is their height that is only as tall as a can. Burrowing owl can also be found in Florida, where the story takes place, and the "common type in Florida is *Athene Cunicularia Floridana*, it has darker feathers than the western type (Hiaasen, 2009;223)". Besides, it is also ex-

plained that burrowing owls have shy characteristics. Their nesting season usually happened between February and July; however, “fledgling had been observed in the den at the latest in October (Hiaasen, 2009;223).

The burrowing owl's natural habitat in an open space makes them vulnerable to population decline over the year. One of the main reasons for their decline is land conversion as a result of massive urbanization. In the novel, the burrowing owl nest is found in a vacant lot that will be converted into a new restaurant. This is proven by “... Sent to the future site of another Mother Paula's All American Pancake House. Which was located on the corner of East Oriole and it was a vacant lot (Hiaasen, 2009;4). We can infer from the narration that the vacant lot will be a future site of a pancake restaurant. The construction of Mother Paula's pancake restaurant is part of the urbanization happening in the State of Florida. Hence, to support the urbanization in Florida and “to establish an ideal for the Florida community, developers apply some changes towards natural landscape and resources in Florida (Folk et al., 2017). Furthermore, the urban population in Florida has been growing within each year; in 2010, there were 18.8 million people out of 16.4 million of Florida's population lived in the urban area and that number grew to 21.6 million between 2011-2020 according to Florida Department of Transportation (2021). The number shows that the population is growing each year; thus, construction will occur every time to fulfill the population's needs. In accordance with that, many animal populations could be threatened by that.

Hence, the construction of that Pancakes restaurant in the city has become hot news for the Coconut Cove people, since “most everybody likes pancakes... (Hiaasen, 2009:245). Thus, it is pretty clear that the citizens of Coconut Cove, a city mentioned in the story, will support the construction of the restaurant. However, there is a fact that most of the citizens do not know; the burrowing owl. On the site, “Turns out live two families of burrowing owls (Hiaasen, 2009:245) and with the concern, they must raise their babies inside the nest. Their nest, which was located underground or in a burrow, is very important for them and for their chick. If their nest is destroyed, due to natural disaster or man-made disaster, they will seek another suitable place to build a new nest. When Burrowing Owls could not find any natural habitat that they could build a new house, “they will use irrigation pipes or buried cars to make a new nest (Peoria Zoo, 2018). In fact, the vacant lot was home for the burrowing owl before it was taken over by Mother Paula's restaurant as mentioned in “the parking lot was owl's before it belonged to the pancake house (Hiaasen, 2009:171).

The development happens in Coconut Cove and the vacant lot converted into what would be a restaurant shows that the city is experiencing development. One of associated sign of urbanization is rapid development in the city (Dorward et al., 2024). Furthermore, in urbanization, the majority of the city is used as the center of “human settlement, socio-economic and environmental vulnerability (United Nation Human Settlement Program, 2016). Therefore, the population of burrowing owls, particularly in Florida, is decreasing; thus, its status has been updated into threatened list (Florida Fish and Wildlife Conservation Committee, 2020). Similarly, in the novel it is also explained that Burrowing owls are federally protected “Roy explained that burrowing owls are protected both by state and federal law (Hiaasen, 2009:247)”. From the statements above, it is clear that burrowing owls are a protected species in Florida; hence, it is illegal to disturb or harm the bird without any permit from the government.

The Mother Paula Company says inside a paper that they “take pride in our strong commitment to the environment. (Hiaasen, 2009: 172)”. However, it turns out that the statement is bogus as it can be proven when Roy went to the building department to investigate Mother Paula's construction permit. The clerk at the building department said that “the files containing Mother Paula's permit are not there (Hiaasen, 2009: 225)”. The file that Roy wanted to see is called Environmental Impact Statement (EIS), and it is a permit issued by the government, which in the United States it is managed by The United States Environmental Protection Agency. Supposedly, the construction of Mother Paula's

restaurant should have an Environmental Issues Statement from the authority, yet they do not have this permit as it explained in the dialog “The reporter said ‘every big construction should have E.I.S’ . . . ‘Yeah, but Mother Paula's isn't there’ Roy said. (Hiaasen, 2009: 280). This makes Roy, the main character, feel concerned about the owl and need to find a way to prevent any harm for the owl. His worry can be seen through this dialogue, “‘I'll tell you what's going to happen.’ Roy looked at Mr. Ryan. “The machines will bury all those burrows.’ (Hiaasen, 2009:246).”

In addition to that matter, the existence of Environmental Impact Statement is one of the government efforts to realize sustainable urbanization particularly in the state of Florida. Environmental Impact Statement (EIS) can give us the outline of the impact, whether negative or positive impact, for the environment of a project. For instance, the site where Mother Paula's restaurant would be constructed is located in “the vacant lot in the corner of East Oriole and Woodbury (Hiaasen, 2009:4) and the site itself is surrounded by a thicket of plants, mainly pine tree and pepper tree, as it is shown in narration in the novel “the pine tree and dense ground scrubs looks impenetrable . . . soon he sneaks up between pepper trees (Hiaasen, 2009:50). From the evidence above it shows that trees and bushes are growing in the site, they are very important for the environment as they can reduce the risk of flooding by maintaining the infiltration process.

Furthermore, the unavailability of trees can threaten the surrounding area with higher risk of flood, it likely happens as the infiltration of water is minimum (Bella & Rahayu, 2021). It is safe to say that if the trees in Mother Paula's restaurant site were cleared, it would have a negative impact on the Florida environment. For example, the presence of trees can also give cooling effect in summer and natural heater in winter (Laverne & Lewis, 1996); hence, in the last 15 years, average temperature of Florida is 74.1 degrees (Girod, 2024). Thus, Florida ranked first as the hottest state in the United States (Miznazi, 2024). Furthermore, in the United Nation Panel on Climate Change report shows that Florida used as an example where the effect of climate change can be felt (Harris, 2022). Thus, it is safe to say that Florida is facing a chronic effect of climate change and the effect is not only affected the environment but it also has its impact on the economy. It is believed that tidal flooding caused by the rising of sea level in Florida leads to \$500 million in lost of real estate value from 2005-2016 (Harris, 2022). In the connection to that, Florida also could lose approximately \$55 billion of tourism money as a result of the destruction of coral reefs due to the temperature rise. Hence, according to the several studies above, it shows that urbanization is not only affected the environment but also affected economy of a region.

Another research done by Elmqvist, Zipperer, and Güneralp (2015) found that urbanization can affect biodiversity through direct and indirect way, and the most obvious land cover change as the result of urban growth. Land cover change is also present in the state of Florida, it is caused by many factors and one of them is due to urbanization. Land change due to urbanization in Florida was started after World War I and “the cities were modified to attract tourists . . . and they altered the land to do so. (Volk et al., 2017)”. Furthermore, according to (Endries et al., 2009) in Volk et al. research the biodiversity in Florida also being affected by overexploitation of resources and pollution; thus, it led to the extinction of several vertebrate's species such as Passenger Pigeon (*Ectopistes migratorius*), Carolina Parakeet (*Conuropsis carolinensis*), Red Wolf (*Canis rufus*), and Plains Bison (*Bison bison bison*) prior 1900. It has been proven that if urbanization is not treated with care, it could lead to extinction of animals and vegetation; including, burrowing owls and their prey. Therefore, burrowing owls is also being threatened with the unavailability of prey if urbanization is not applying a sustainable effort.

More Restaurants, Less Prey

Hiaasen's *Hoot* takes place in Florida in the fictional city of Coconut Cove. Geographically, the State of Florida is situated in the peninsula between the Gulf of Mexico, Atlantic Ocean, and Florida Strait. Since Florida is located in a peninsula, it is not a mountain-

ous area; instead, the surface of Florida is relatively flat as it is also explained in the novel “‘Florida's so flat.’ said the boy (Hiassen, 2009:171).” Meanwhile, the highest point in Florida is Britton Hill with only 105 meter high.

Florida is a home for *Athene Cunicularia Floridana*, it is a subtype of burrowing owl. It is explained that the main prey for burrowing owls is “bugs and worms. (Hiassen, 2009:171). From that statement above can be inferred that burrowing owl's favorite prey are bugs, they will eat bugs like grasshoppers or beetles. However, the urbanization process is also put grasshoppers and beetles' population in danger. It is also explained in the novel that Roy was afraid that “it was not only about the owl, it was about all animals and wild places that were in danger of being wipe out. (Hiassen, 2009:205)”. Thus, we can infer that the novel is not only contained regarding burrowing owl's populations that are in danger of extinction, but also all animals and vegetation that are also in great danger due to urbanization; for instance, bugs that are burrowing owls' prey.

A study conducted by Ellen Welti (2020) found that more than 40 species of grasshoppers are falling more than 2% each year and the culprit that is responsible for their population decline is the increasing level of carbon dioxide (CO₂). The increasing level of CO₂ plays a role in their population by “making plants less nutritious (Pennisi, 2020). Furthermore, “previous studies in the past 5 years show that there is population decrease of insects (Pennisi, 2020). Moreover, a recent study shows that approximately half of the bugs population they examine will vanished over the next century due temperature change (Duffy, Gouhier, & Ganguly, 2022) as bugs do not have mechanism to regulate body temperature in their body when there is a sudden and drastic temperature change on its surrounding (NASA, 2022). It shows that carbon dioxide's rising level is the thread for grasshoppers and insect; which they are common prey for burrowing owls.

According to the United States Energy Information Administration shows that human activities in urban areas are contributing to the increasing level of Carbon Dioxide. Furthermore, a study conducted by Li et al (2022) strengthens the point that urbanization has a positive connection in the rising level of Carbon dioxide. Similarly, another study shows that the population of beetles are also threatened by urbanization and shows that “quite a large percentage of the loss population occurred in urban area (Fattorini, 2011).”

Besides, the increasing level of carbon dioxide is strongly associated with urbanization. It is caused by the reduction of the green space within metro area. On the other hand, the construction of impermeable building and parking lot becomes massive; hence, it makes disturbance on the evapotranspiration process and generates more heat. (Grimmond & Oke, 1992; Fatimah & Sobirin, 2015). As a consequence of that, the temperature within the metro area tends to warmer compared to rural area. The condition is known as Urban Heat Island, it is when metro areas has warmer temperature than the rural areas (Nuruzzaman, 2015).

Therefore, it is proven that biodiversity is distracted not merely due to the raising level of carbon dioxide, the usage of pesticide and deforestation that is loss of land are also the factor of biodiversity loss; that is also affected the population bugs (Janicky et al., 2022). The decline of bugs having a negative impact for the environment. Bugs are vital for the environment particularly on the food chain in the environment. If the population of bugs are decreasing, it will have a dire consequence both for ecosystem and for people (Goulson, 2019).

Another study regarding bugs population decline shows that their population is declining up to 2% each year; in contrast to that, the population of human is growing up to 1% each year. From the study we can infer that each year the human abundance is growing; hence, human will need more resources to support their live. If human keep to exploit nature without maintain its preservation, it will lead to biodiversity loss. Thus, the biodiversity loss is also a threat for burrowing owl existence. It has been explained above that bugs population is keep declining up to 2% each year, and if this decline still continues for few years in the future, then burrowing owl will struggle to find prey as they depend on bugs as their primary food.

The unavailability of prey is not merely threatening the population of burrowing owl, it is also affected other species as well. This phenomenon is resulted from the domination of human in the ecosystem; thus, leading to the disconnection from the nature which is happened when human disregarding towards material elements, non-material elements; such as energy, and values that comprise nature (Beery et al., 2023). Urbanization, deforestation, land-use change are few examples of human activities which have negative impact for the nature; particularly, the unavailability of foods. Furthermore, urbanization is often associated as the culprit of habitat loss as forest is converted into modern facility; thus, leading to the extinction of some animals as their will have difficulty to find natural prey with the unavailability of natural habitat (Dri, Fontana, & de Sales Dambros, 2021; Hahs et al., 2009; Sol et al., 2014).

Therefore, it is common to hearing a news regarding animals breaking into human neighborhood. In Florida, alligator frequently seen wandering within human residence. In some cases, the sighting between alligator and human led to injury or death both in human or the alligator itself. According to the statistic from the Florida Fish and Wildlife Conservation Commission there were 442 attacks involving human and alligator between 1948-2021 and those number have been increased within last decade to approximately 10 attacks per year (Candamo, 2022). In addition to that, in India there are approximately 745 human casualties and 1.040 people injured as a result of human-animal conflict in the past 5 years (Mathew, 2023). Furthermore, human-animal conflict is also occurred in Indonesia and between 2017-2021 there were 529 cases happened particularly in the Aceh Province (Indonesia Wildlife and Forestry Service, 2022).

Those statistic showed that human-animal conflict keep steadily occurred each year and in some countries the number keep growing each year. Moreover, it is can be inferred that the number will growing and will leads into more casualties both for animal or human; however, it can be avoided if human have more awareness regarding the importance of the nature and learn how to preserve it.

Less Owl, More Pest

Every creature in this world plays its own role in the ecology. In ecology it is studied all the relationship of all creature in the world, particularly human and nature. From the ecology perspective, it is believed that every human, animal, or plant hold their specific role in the nature; the specific role of that is known as ecological niche. The term refers to the position of a species in the ecosystem; hence, it is encompassed all of their interaction with the biotic or abiotic environment surround them (Polechova & Storch, 2018). It is can be understood that niche is resembling the basic concept of the ecology, that is the connection and interaction between species in the environment. From the statement by Polechova and Storch we can also learn that the presence of a species can affect the environment; hence, the unavailability of a species can also affect the environment. It is happening due everything happens in the ecology are interconnected and intertwined one another.

However, some people still misunderstood regarding the role of other creature for the environment. They often to think that small creature does not have an important role for the environment, they underestimated regarding that; thus, lead to an act of exploitation of them as they would think small creature have a minimum role for the environment. One of the small creatures that is being threatened due to exploitation is burrowing owl (*Athene cunicularia*). Their population in Florida is federally protected as the result of their population decline, they also an protected animal in the Canada and Mexico (Tides, 2017). The subspecies of burrowing owl that is native to Florida is *Athene cunicularia floridana*, where it also can be found in Bahamas (Tides, 2017). The appearances of burrowing owl that is in small and friendly shape will drive human to think that this particular animal does not an important role for the environment. However, it is incorrect due burrowing owl plays as a predator in the ecosystem; therefore, they hold an essential role in the ecosystem. In ecosystem, predator plays as a regulator of their prey. Furthermore,

their ascendancy is not only limited merely on their prey, but also affected other species.

The displacement of apex predator can cause some alter toward the behavior and abundance of other species; smaller predator and vegetation (Glen & Dickman, 2014). It can be understood that the presence of predator affecting other species as well; therefore, predator maintaining the ecosystem by controlling the distribution, diversity, and population structure particularly of its prey (Estes et al., 2001). Hence, burrowing owl as a predator plays a role to maintain the population of their prey which is bug, rodent, or small reptiles. The population decline occurred within burrowing owl affected the population of their prey as well; particularly in the state of Florida. In the recent study shows that New York and Florida are sits in the first and second place respectively as the state who have bad problem of bug and rodent (Spears, 2023; O’Kane, 2022); Sampson, 2022; Kern, 2018). The abundance population of bugs and rodent in Florida shows that there is a population decline of the predator, particularly burrowing owl. Another study shows that the decline has a strong relationship with urbanization as it deteriorated the top-down food chain in the ecosystem (Koranyi et al., 2021; Raupp et al., 2010) by causing decline of their natural predator (Koranyi et al., 2022).

Furthermore, the displacement of apex predator also affected the population of rodent. In recent news, it is reported that several famous cities in the world have been dubbed as rat-infested city. One of those cities is Paris, the capital city of France, which have been categorized as one of rat-infested city in the world as there are up to 1.75 rats per person in Paris (Graziela, 2022; Rodriguez, 2023; Camut, 2023). The population explode of small mammal like rodent is contemplated by numerous factors, notably weather. Rodents’ population will be increasing rapidly when there is an irregular period of rainfall which will generates vegetation as their primary food (White, 2019). Besides weather, their population also heavily affected by the presence of predator (Andersson, 1977). It is proven by the research by Blackwell et al (2003) found that the population of rat tend to increasing in the area where predator is not present. In accordance to that, one of the rats’ predators is owl; including burrowing owl.

Since 1970s, nest boxes of owl have been used as natural agent of pest and rodent control specifically in agriculture. It was pioneered in Malaysia in the 1970s; later, it was also being implemented in Hulla Valley, Israel, in 1981 (Peleg, 2018). In the contemporary era, barn owl is broadly used to control pest and rodent population in numerous countries across continent; for example, Chile, Israel, Malaysia and Spain (Munoz & Murua, 1990; Wood & Fee, 2003; & Paz et al., 2013). Therefore, the population of owl, as a predator, holds a crucial role to maintaining population of bug and rodent, as owl well adapted to hunt and kill rodent (Watson, 1957), to ensure their population is not explode beyond control and causing harm on agriculture and human health.

Hence, the decreasing population of apex-predator and small predator affecting the abundance of their prey as well. According to the studies mentioned above, it is can be summarized that bug and rodent population are becoming more abundance if there is no presence of their predator. The abundance of their population will be disturbing not only the ecosystem, yet it will affect the human life as well. Rodents are widely known as the transmitter of several disease that could infected human; for example, hantavirus, leptospirosis, or rat-bite fever (Centers for Disease Control and Prevention, 2023). Furthermore, rodent and bugs are also dangerous for agriculture, as they able to cause destruction in crops. Therefore, it is important for human to maintaining the ecosystem balance to ensure that ecological process can run normally. The abnormality of ecological process proved will lead to bad effect towards human and the environment.

CONCLUSION

Urbanization is one of the responsible factors behind the decline of burrowing owl population in Florida. It is clearly affected their population due urbanization causing the habitat loss and the loss of prey. Hence, burrowing owl is federally protected in the Unit-

ed States; furthermore, Canada and Mexico also encompassed similar thing to protect the population of burrowing owl that still experiencing decline in their population each year.

Additionally, urbanization is not solely affecting burrowing owl's population, it is also influenced the human life and ecosystem; particularly, the food chain web. Food chain web affected by urbanization since it is disturbing the natural process of it. The disturbance that occurred have a strong relationship with the habitat loss and loss of prey; specifically, among burrowing owl. Burrowing owl as predator maintained the population of their prey; bugs and rodent. However, their population abundance is declining each year; as a consequence, the population of bugs and rodent is exploding since natural predator is absent. Urbanization also influences the population of pest. In the ecosystem, burrowing owl plays important role as predator. They feed mainly bugs. Since their population is steadily decrease, the population of bugs could increase. If it is not addressed properly, the uncontrollable population of bugs could do harm for human; especially, for agriculture sector.

Therefore, it can be understood that urbanization is, indeed, the factor behind the population and extinction towards several animal; notably in burrowing owl. Thus, it becomes important for human to sustain nature to avoid any havoc in burrowing owl and other species population due any absent of one species population could affecting the natural process of ecosystem. Thus, it is important to plan well prior committing a construction. Make some consideration of its effect for the environment, it is important as it can minimize bad effect for the nature.

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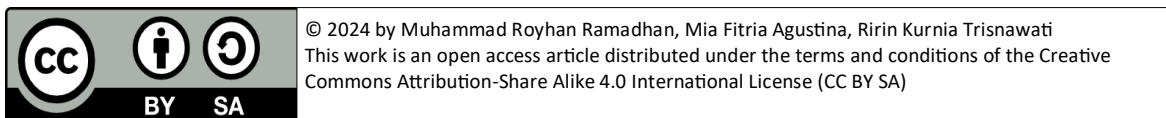
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