Wildlife awareness program on UI civitas to achieve life on land sustainability on campus

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Abstract. Universitas Indonesia has a high diversity of animals, especially snakes and monitor lizards. The existence of snakes in the UI region is often found in areas with high civitas activity and cause conflicts with humans. This can be seen from the snake incident report data that is quite high from 2017 to 2019. To reduce the conflict, it is necessary to educate the community to raise awareness about the types and roles of snakes and monitor lizards in the ecosystem. Educational programs include conducting socialization, holding open classes about snakes, as well as training in handling snakes to the UI civitas. Based on the educational program that has been carried out, there has been a decrease in the number of snakes that have died as well as the demand for lizards catching in the range of 2017 to 2019. The most found snake is Southern Indonesia Spitting Cobra (\textit{Naja sputatrix}).

1. Introduction

Universitas Indonesia is one of university in Indonesia that has a large green open area and urban forest, with a total area of 192 hectares \cite{1}. These conditions cause the Universitas Indonesia campus area to become a habitat for several wild animal species. Wild animals in question include birds, reptiles, amphibians, fish and mammals such as bats and squirrels \cite{2,3}.

Biodiversity that is quite high in the Universitas Indonesia campus area has a value of usefulness such as the object of research for students and lecturers, as a means of education, and as a means of recreation \cite{4}. However, the existence of several wild animal species also creates problems when there are interactions with humans \cite{5}. For example, when wild animals such as snakes and monitor lizards roam in residential areas. This has the potential to cause conflicts between humans and wild animals, so that it can threaten the survival of these wild animals \cite{6}.

The presence of wild animals in urban forest ecosystems is inevitable and will form an interaction with humans \cite{7}. The interaction is ecologically beneficial for each other, but in some cases can be a mutually harmful interaction, so that it leads to the labelling of wild animals as pests \cite{8}. In the case of Universitas Indonesia, snakes and monitor lizards are considered to be harmful and dangerous by most members of society, so they need to be eliminated. This is an incorrect understanding because the
existence of wild animals has an important role for the ecosystem. Therefore, educational program needs to be done to increase awareness of the community at the Universitas Indonesia campus environment.

2. Theory
Urban forests are one of the ecosystems in urban areas that are often the result of land fragmentation. The large number of land clearing programs for residential areas and offices leaves little land that can be used as a habitat for several wild animal species [9]. This causes the life of wild animals in contact with human life, so that it often leads to conflict [8,9]. Some animals are able to adapt and survive, while others are unable to adapt and lead to extinction [6].

Some animal species such as mammals are able to adapt and survive well in urban areas because these areas provide alternative sources of food [10,11]. But other animal species such as snakes and monitor lizards, they are only able to survive by preying on animals that are their main food, such as mice, birds, and other small animals [12,13]. The animals that are their source of food can be found easily in urban areas.

In its role in the ecosystem, snakes are one of the animals that control the rat or mice population, where mice are one of the pests in urban areas. The existence of many food sources found in residential areas makes snakes often enter the area to find food [12]. In addition, the need for thermoregulation is another reason for snakes to enter residential areas too [12]. On the other hand, the existence of these snakes raises conflicts with humans. Some snake species are dangerous and venomous so they can threaten human lives, but most of them are harmless and non-venomous. However, the ignorance of the community about the snake species made them try to catch and even kill the snakes [8,14,15]. It is very threatening the survival of snakes and can disturb the balance of the ecosystem.

3. Methods
Sampling was carried out in the range of 2017 to 2019 using a sampling method based on reports of the presence of snakes from the civitas in the Universitas Indonesia campus area [16]. During this time period, we collected data on snake species found, conducted studies related to a sustainable campus environment, planned and implemented programs that supported a sustainable campus environment [17].

The programs that we carry out in an effort to preserve the diversity of snake species and reduce conflicts with the civitas include:

- Provide training to special officers related to the ability to handle snakes,
- Conduct rapid response to reports of the presence of snakes and monitor lizards,
- Identifying and moving the snake to a place far from the civitas activities,
- If a snake species that is very dangerous and venomous is found, the snake will be handed over to related parties who are capable of further handling,
- Providing education to the community at the location of the discovery of snakes and monitor lizards,
- Providing education in the form of open classes to the civitas about the snake species in the Universitas Indonesia campus environment, their role in the ecosystem and how to handle them [18].

Through these efforts, it is hoped that it can increase awareness of the civitas in the UI campus environment about snake species and how to handle them without having to kill the snakes.

4. Results
Based on data of reptile reports from 2017 to 2019, 53 snakes and 8 monitor lizards were found (figure 1). The snake that was found consisted of nine snake species, of which three were high-venomous snakes. The most often found snake species is the Southern Indonesian Spitting Cobra (Naja sputatrix), which is dangerous and highly venomous snake. In addition, other dangerous and high venomous snakes
that are also found are Malaysian Pit Viper (*Calloselasma rhodostoma*) and Bamboo Pit Viper (*Trimeresurus albolabris*). The rest are not dangerous snake species.

![Graph showing number of reptiles found in 2017 to 2019.](image1)

**Figure 1.** Number and species of reptiles found in 2017 to 2019.

![Graph comparing number of snakes found and dead snakes in 2017 to 2019.](image2)

**Figure 2.** Comparison of the number of snakes found with dead snakes in 2017 to 2019.

Based on data about the condition of snakes found in the range from 2017 to 2019, it appears that the number of snakes found has increased, while the number of dead snakes has decreased (figure 2). The number of dead snakes found had increased 100% from two snakes in 2017 to four snakes in 2018, but decreased until no dead snakes were found in 2019. The decrease in the number of dead snakes is most likely the result of the efforts that have been done to increase awareness of the civitas.
5. Discussion
The loss and fragmentation of snake habitat in the Universitas Indonesia campus environment is a major factor causing conflicts between snakes and civitas. Reduced habitat area causes the cruising space for snakes to be limited. On the other hand, snakes need cruising areas for various necessities of life such as foraging, thermoregulation and breeding [12]. This causes the interaction between snake and civitas become unavoidable.

All snakes found during 2017 to 2019 were found in the academic area, and some of them were found in office and lecture rooms. The academic area generally consists of building areas and green open areas. In the green open area, birds and small mammals which are a source of food for snakes, can be easily found. In addition, temperatures in the academic area are generally warmer and are a preference for ectothermic animals such as snakes to stabilize their body temperature (thermoregulation), especially when the rainy season arrives [12].

When the rainy season arrives, the level of encounter of snakes with civitas becomes higher. This is caused by the temperature of the environment which becomes colder all the time, even during the daytime. Snakes and other reptile species need a warm place to maintain their metabolism. Usually they will sunbathe in the morning to raise their body temperature that dropped at night. However, the reduced intensity of sunlight during the rainy season causes snakes and other reptile species to find alternative places to raise their body temperature. On the other hand, the academic area generally has a warmer temperature so that it can be a suitable place for those needs.

Lack of understanding of the correct way to handle snakes and lack of knowledge about venomous and non-venomous snake’s species makes the civitas will tend to kill the snakes they encounter. This can be seen in 2017 and 2018 where dead snakes were found. The dead snake comes from four snake species, namely the Southern Indonesian Spitting Cobra (Naja sputatrix), the Oriental Whip Snake (Ahaetulla prasina), the Sunbeam Snake (Xenopeltis unicolor), and the Indo-Chinese Ratsnake (Ptyas korros) (figure 3). Whereas of the four snake species, only the Southern Indonesian Spitting Cobra is indeed dangerous and highly venomous, while the other three snake species are harmless and less venomous.

The Oriental Whip Snake (Ahaetulla prasina) is often misidentified as the highly venomous Bamboo Pit Viper (Trimeresurus albolabris) or also known as Green Viper. This is due to limited knowledge about the morphological differences between the Oriental Whip Snake and the Bamboo Pit Viper. Though there are very clear differences between the two in terms of body shape. The Oriental Whip Snake is rather flat while the Bamboo Pit Viper is round [4].

The increase in the number of snakes found and the decrease in the number of dead snakes in 2019 is the result of efforts that have been made to maintain the diversity of snake species and reduce conflicts
with civitas. The program that has been created has been successful in educating and raising awareness of the community at the Universitas Indonesia campus environment related to wildlife, especially snakes. One of the programs is training on handling snakes to improve the ability of civitas in handling snakes, both venomous and non-venomous. Although only a small number of civitas have participated in training and have the ability to handle snakes, but other educational programs such as socialization and open classes are able to increase awareness not to kill snakes [18].

However, we realize that the greater challenge is how to prevent various snake species in the Universitas Indonesia campus environment, especially the dangerous and highly poisonous snake species, from entering the academic area. To achieve this, a more comprehensive environmental management plan needs to be carried out by involving many wildlife experts, so that the development and land use programs in the Universitas Indonesia campus area consider the survival of existing wildlife, especially snakes [17,19]. In addition, research on environmental management and wildlife in urban areas also needs to be increased to support sustainable life.

6. Conclusion
The educational programs on the diversity of snake species and their role in the ecosystem has succeeded in raising awareness of the Universitas Indonesia's campus community. This can be seen from the decrease in the number of dead snake found in the range of 2017 to 2019. There are nine snake species that have been found throughout the time period, where the most often snake species found is the Southern Indonesian Spitting Cobra (Naja sputatrix).

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References
[1] Pradita E, Kholis N, Lestari F and Bowolaksono A 2018 Tree risk identification, assessment and mitigation in Universitas Indonesia’s urban forest IOP Conf Ser Earth Environ Sci. 203(1)
[2] Sheherazade, Yasman, Pradana D H and Tsang S M 2017 The role of fruit bats in plant community changes in an urban forest in Indonesia Raffles Bull Zool 65 497–505
[3] Pradana D H, Mardiastuti A and Yasman Y 2018 Utilization of Ficus benjamina by Birds at Urban Habitat in Depok Bioma Berk Ilm Biol. 20(1) 75
[4] Widodo S, Kholis N, Lestari F, Abinawanto A and Bowolaksono A 2019 Snake Diversity at Universitas Indonesia’s Urban Forest IOP Conf Ser Mater Sci Eng. 546(2)
[5] Temby I D 2004 Urban wildlife issues in Australia In: 4th International Urban Wildlife Symposium 26–34
[6] Breininger D R, Mazeronne M J, Bolt M R, Legare M L, Drese J H and Hines J E 2012 Habitat fragmentation effects on annual survival of the federally protected eastern indigo snake Anim Conserv. 15(4) 361–8
[7] Kawata Y 2014 Need for Sustainability and Coexistence with Wildlife in a Compact City Int J Environ Sci Dev. 5(4) 357–61
[8] Lunney D and Burgin S 2004 Urban wildlife management : forming an Australian synthesis In: Urban Wildlife: more than meets the eye 230–47
[9] Salbitano F, Borelli S, Conigliaro M and Yujuan C 2016 Guidelines on urban and peri-urban forestry (FAO)
[10] Ditchkoff S S, Saalfeld S T and Gibson C J 2006 Animal behavior in urban ecosystems : Modifications due to human-induced stress Urban Ecosyst 9 5–12
[11] Lowry H, Lill A and Wong B B M 2012 Behavioural responses of wildlife to urban environments Biol Rev. 1–13
[12] Carfagno G L F, Heske E J and Weatherhead P J 2006 Does mammalian prey abundance explain
forest-edge use by snakes? *Écoscience* 13(3) 293–7

[13] Hager H A 1998 Area-sensitivity of reptiles and amphibians: are there indicator species for habitat fragmentation? *Écoscience* 5(2) 139–47

[14] Shine R and Koenig J  2001 Snakes in the garden: an analysis of reptiles “‘rescued’” by community-based wildlife carers *Biol Conserv* 102 271–83

[15] Jadhav P L, Chavan S P and Sudarshan H 2018 Snake species diversity and their distribution in and around Nanded city, Maharashtra, India *J Entomol Zool Stud.* 6(4) 1855–60

[16] Yue S, Bonebrake T C and Gibson L 2019 Informing snake roadkill mitigation strategies in Taiwan using citizen science *J Wildl Manage.* 83(1) 80–8

[17] Adams L W 2005 Urban wildlife ecology and conservation: A brief *Urban Ecosyst.* 8 139–56

[18] Chamberlain P A, Caroline M and Wright W A 1981 Urban Vertebrate Pest Management: A Practical Approach *In: Great Plains Wildlife Damage Control Workshop Proceedings* 78–96

[19] Clark J R, Matheny N P, Cross G and Wake V 1997 A Model of Urban Forest Sustainability *J Arboric* 23 17–30