

**投稿類別：**史地類

**篇名：**From Serpents to Society: The Fascinating Interplay between Python Bivittatus, Politics, and Society in Kinmen

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## I. Introduction

This research discusses the conservation status and obstacles of Python Bivittatus as the major researched question. The essay understands more details about ecological status and significance from learning more about Python Bivittatus' species characteristics and its development in Kinmen. Not only does it discover more facts by observation, but we also consider residents' and ecologists' opinions of Python Bivittatus. Therefore, we can explore its history and modern state under Kinmen's natural and social environment. The research firstly collects second-hand resources to gather more basic information about Python Bivittatus and the current ecological status of Kinmen. Then, the research comprehends its position from the snake phobia and the perspective of political ecology. Later in the essay, the contents will be mainly covered by the first-handed resources from our field study to Kinmen. Based on our interview, we will have lots of exclusive content and understanding: Detailed observation from experts in Kinmen, which tells its tale and how it extends its species development; consider the social and natural growth in Kinmen, evaluate the necessity of artificial ecological conservation and the potential and barrier of developing ecotourism. Furthermore, through interaction with relevant units and experienced scholars, we can easily use the different points of view to examine Kinmen's natural environment, political structure, and industrial pattern. Then we can analyze those ambiguous conflicts between the government and the biological environment. Finally, we will attempt to contain global warming and local population change to investigate Python Bivittatus' population diversity in the Kinmen ecosystem. Also, we will consider the potential and provide some advice to develop Python Bivittatus as part of Kinmen's ecotourism.

## II. Literature Review

This research will be focusing on the second-hand source about the Python Bivittatus and the conservation in Kinmen. Including the argument on the naming, the development of ecotourism and the origin of ophidiophobia for us to understand the relation between the residents of Kinmen, the government and the ecologist. Furthermore, we use the perspective of political ecology to look at the complex conservation issue.

### (I) The Controversy Between Indigenous Species and Alien Species

An indigenous species is an organism that regularly naturally distributes and migrates in a certain area. Also, it naturally regenerates without being distributed by humans. On the other hand, invasive species, also known as introduced species, obviously is an organism that does not have a certain natural distributed area and is brought in by human forces.(特有生物研究保育中心, 2008)

Since the 1970s, Python Bivittatus' record has disappeared in Kinmen's ecological research and there is no related record and description for almost 30 years. However, people started to discover its existence again in the 2000s. Unfortunately, due to the disappearing existing record, local people lose their awareness of this organism, and some middle-aged people don't recognize it as Kinmen's indigenous species. Its Chinese scientific name contains the word "mian dian", which means Myanmar, and there is no scientific evidence that can prove its origin, so people consider it an invasive species. Originally, most people didn't pay too much attention to it. Nevertheless, its number increased over time and slowly caused panic among residents even though those pythons didn't cause conflict with people. Meanwhile, these pythons attract the Kinmen government and Taiwan's ecological academia attention. In the 2012s, professor Lin and his team, department of life science, National Taiwan Normal University, aim to have more profound research on Python Bivittatus.

Between 2012s to 2014s, professor Lin includes his research and investigative methods in his research report: living area, gene research, and its physical characteristics. To know its living area, professor Lin inserts wireless into the transmitter and puts it into the pythons through laparoscopic surgery. Then, they will receive geographical position and geographical information

from it. Therefore, professor Lin can estimate Python Bivittatus' living area. Afterward, they will set a sensor on pythons to get their habitat type, which includes the regional temperature, soil temperature, air moisture, and forest coverage. Furthermore, professor Lin uses DNA sequencing to rebuild the genetic relationship. As a result, python in Kinmen and Fuzhou, China, have a closed genetic relationship, which also maintains the characteristics of monophyletic, but is not similar to python in Vietnam. Consequently, professor Lin proves that Python Bivittatus is indigenous species in Kinmen. (林思民, 2012)

Lastly, professor Lin besides using genetic evidence, also compares the sample of pythons between the 1950s-1960s and 2009s-2011s in order to wipe the controversy of stating Python Bivittatus is an invasive species. Then he realizes there is not much difference between those two samples. Also, he compares the species' temperature variation with pythons in southeast Asia through 11 months of observation; the result demonstrates Python Bivittatus has higher survivability in high latitude environments than pythons in southeast Asia, which proves Python Bivittatus is not an invasive species. In conclusion, After three years of research from professor Lin, he proves Python Bivittatus is the only indigenous python in both Kinmen and Taiwan through irrefutable scientific evidence.

## (II) The Current Situation of Ecotourism and Ecological Conservation in Kinmen

In the past, there wasn't a clear definition for ecotourism, including most of the other policies about it. In recent years, due to the hard work from TIES (The International Ecotourism Society) and IUCN (International Union for Conservation of Nature), the definition of ecotourism has finally been published. It's said "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education." (王鑫, 2017) In addition, ecological conservation is defined as the "protection" and "restoration" of species and the natural environment. The former is to preserve and maintain biological species and their habitats, while the latter is to breed and reproduce endangered species. However, such actions play a key role in the food chain, biological behavior and habitat environment in the ecosystem, and even the mode of human operation on environmental resources (陳彥米, 2015). Based on the definitions, it can be understood that ecotourism is a good way to protect natural resources and enable the sustainable development of the community economy, and the implementation of ecological conservation can maintain a stable ecological system in the local area.

The current eco-tourism policy in Kinmen is mainly developing with bird watching and the exploration of Eurasian otters as the main axis. We can find many signs and slogans related to the otters along the road. On the one hand, its purpose is for aesthetics, and on the other hand, it is to reduce road killing and other problems. On the website of the Tourist Department, Kinmen County Government, many promotional phrases such as "come for bird watching" and "seek for the otters" are often seen. The content of the website provides information such as the distribution data of otters and birds in Kinmen. In terms of government plans, the Kinmen County Government has implemented programs related to ecotourism or conservation over the years, including the Kinmen bird watching ecotourism promotion, the Kinmen Eurasian otter investigation plan and conservation promotion, etc. It can be seen that over the years, Kinmen are focusing on the development of ecological tourism and conservation, mostly on flagship species such as Eurasian otters or birds. In contrast, promotion plans on Python Bivittatus can hardly be found in Kinmen, so local ecologists made jokes saying that the conservation concept of "cuteness is justice" seems to be the current dilemma.

## (III) The Source of fear- Ophidiophobia

In the general impression and existing media, most people are afraid of snakes. Because most of the snakes convey images of evil and fear (for example: Medusa or the poisonous snake in Harry Potter). However, mammals' fear of snakes originated in the earliest evolutionary stages. In

ancient times, reptiles were the dominant species, posing a widespread and recurring threat to the survival of mammals. And such a feeling of panic has genomic imprinted in our genes, so people avoid contact with these dangerous creatures, thereby increasing the possibility of survival (DeLoache, 2008). Furthermore, as far back as the 40 BC, people saw snakes as an insidious species that ambush in the grass and use venom to poison people, so human's nature of fearing snakes is an inherited fear (Gibbens, 2017). Later, after evolution, people today are naturally resistant to this species, and this psychological phenomenon is called "ophidiophobia" by experts and scholars. This psychological fear can easily cause people to have distorted thoughts towards the snakes. Therefore, if people become the dominant species in the ecosystem and this kind of relation with snakes, the existence value and survival rate of snakes will be inferior.

### III. Research Methods

In this research, we chose Kinmen as our field of research. For the main research we used were the first-hand source, second-hand source and including field study.

In the analysis of second-hand resources, the existing research and Internet media reports of this species are mainly used, and the open data from the official website are also referred to. From it, we can learn about the current understanding of the Python Bivittatus by ecologists and relevant people, then we conduct interviews with relevant people mentioned in the list of interviews (Table 1) to obtain first-hand information in order to learn more detailed information. In addition, by using GIS (Geographic Information System), we can infer the possible habitat distribution of the species and present the area under the jurisdiction of the official unit in Kinmen from the land use zoning data. The following is our interview list and information about it:

Table 1. Lists of Interview

Time	Organizations	Interviewee	Place
February 8th, 2022 10:00-12:00	Kinmen County Forestry Bureau	Director Zhong	Director Zhong's Office
July 6th, 2022 14:00-16:00	National Taiwan Normal University	Professor Lin	National Taiwan Normal University GongGuan Campus
July 11th, 2022 15:00-17:00	Kinmen County Council	Councilor Dong	Kinmen County Council
July 11th, 2022 17:00-18:30	Ju Deng Travel Agency	Mister Cai	Places where the camera was set up
July 12th, 2022 15:00-17:00	Kinmen Wildlife Rehabilitation and Conservation Association (hereinafter to be referred as KWRCA)	Director Xu	Kinmen Wildlife Rehabilitation and Conservation Association

July 15th, 2022 15:00-16:00	K.M. Fish Farm	Mister Chen	K.M. Fish Farm
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(From: organized by author )

In terms of actual inspections, in addition to the interview, under the referral of Director Zhong, we visited the Livestock Research Institute Kinmen County on February 8, 2022 and the Kinmen Wildlife Rehabilitation and Conservation Association on July 12, 2022 to understand the current rescue and containment of this species. And also, under the guidance of Mr. Cai, we visited many places where Python Bivittatus may be found, including abandoned military bunkers, tunnels and the junction between paddy fields, and conducted observations around the environment. Furthermore, on July 15, 2022, we also visit K.M. Fish Farm to observe and learn about the Python Bivittatus that was recently rescued by Mr. Chen.

#### IV. Analysis and Results

##### (I) Species Characteristics of Python Bivittatus in Kinmen

Python Bivittatus is often distributed in the Indian Peninsula, the Indo-China Peninsula, southern China, parts of Indonesia, and the Philippines. It is considered the third largest python in the world, which ranks behind Malayopython Reticulatus and Python Molurus (林思民, 2012). Based on their biological behavior, Python Bivittatus is a nocturnal animal, but its prey, rodents (*Rattus losea* and *Rattus norvegicus*), and terrestrial birds are diurnal animals. Thus, pythons often hunt in the daytime, which plays an important role in stabilizing the food chain in Kinmen. Connecting to their habitats, they usually are set close to water sources (swamps and ponds), which illustrates the importance of water wetlands to them. In spring, summer, and fall, Python Bivittatus mostly choose to inhabit grassland environments. However, according to Si-min Lin, Python Bivittatus rapidly hides in abandoned caves, air-raid shelters, forts, and other military equipment to hibernate (林思民, 2012). Python Bivittatus regenerate in spring, which is around March, and on average reproduce 12 to 36 snake eggs. Moreover, though Python Bivittatus' moving speed seems slow, its actual activity range is broad. According to the observation from director Zhong, Python Bivittatus can cross half Kinmen in one night. Also, it has a talented swimming ability that can stay in the water for a half hour and swim from Xiamen, China back to Kinmen. Therefore, Python Bivittatus is an amphibious species that has good environmental adaptability.

##### (II) Python Bivittatus in Historical Records and Recent Datas

Record of Pythons in Kinmen can be trace back to the Ming and Qing Dynasties (林思民, 2012). At that time, people called the Python Bivittatus as “jing zhua”(Elaphe), but due to the ambiguity between the names in Hokkien and Mandarin, it confused people nowadays by thinking the Python Bivittatus is *Elaphe Carinata*.

The relatively accurate written records of this species can be traced back to the end of the Sino-Japanese War. General Hu Lian, the ROC Army Kinmen Defense Command in the early years of the restoration, wrote an article describing the local pythons in Kinmen. Because the soldiers in the Kinmen area are addicted to eating snakes, it increases the rat population. Later, under the advocacy of General Hu Lian, the bad habit of officers and soldiers to catch snakes was banned, and the rat population was controlled. Subsequently, in order to avoid the attack of the Chinese army, Taiwan's military troops chose to stay on Kinmen Island. According to the data, there were about 100,000 troops concentrated on the Kinmen Island at that time, resulting in a very high population

density, which not only compressed the living space of Python Bivittatus, it can also reduce their population due to the food needs of local soldiers. (You et al., 2013)

Back when the army was in Kinmen, there was little information about Python Bivittatus. From 1950 to 1960, there were only 6 records of Python Bivittatus, and the captured individuals were sent to the then Yuanshan Zoo. In the following 10 years, there were only 16 records (Lin, S., 2013). Until the beginning of 2000, the army began to withdraw from Kinmen in large numbers, reducing the population density in Kinmen, so that the original natural ecosystem was restored, including broad forests and vast wetlands. However, since 2009, more and more farmers and the residents have discovered traces of Python Bivittatus that have broken into chicken coops for food, causing farm losses to chicken farmers, which has indeed shaped the fear of the public. Coupled with the one-sided and exaggerated reports of the news media, the local residents had a great dislike for it, and even made a request to the county government, hoping to remove the original CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora ) certified by the second category of rare animals (You et al., 2013).

The agricultural damage caused by the Python Bivittatus and the negative exposure of the news, made Kinmen residents unacceptable and gradually disgusted with the existence of this species. From 1970 to 2000, there was no scientific evidence, even the story circulated by local residents to support the fact that the Python Bivittatus existed. Besides, a series of complaints and troubles between the government and the people led people to believe that the Python Bivittatus was an invasive species that caused problems.

Until 2011, due to the exposure of information on this species, it attracted the attention of many Taiwan ecologists, including the Endemic Species Research Institute and biological science-related departments of various universities. With the support of academic research projects, Professor Lin led the team from the research laboratory to investigate, not only using DNA research to perfectly prove the fact that the Python Bivittatus is a indigenous species, but also conducted various types of lecture for the conservation of the Python Bivittatus, so that more people can learn about Python Bivittatus. In recent years, after this species is discovered, it is mostly dealt with by the local fire department. They would decide to release in the wild or sent to the Livestock Research Institute Kinmen County depending on whether its size is greater than or less than 3.5 meters.

### (III) The Necessity of Doing Ecological Conservation

Currently, the Kinmen government doesn't implement any conservation plan for Python Bivittatus. Meanwhile, according to the public representative and wildlife conservation society, most residents are unwilling to accept Python Bivittatus. Also, according to the open resources, the number and population size of Python Bivittatus are not stable and safe. Therefore, after organizing first-handed resources, the research states people are able to use an optimistic

#### A. The Number of Python Bivittatus is Sufficient and Steady.

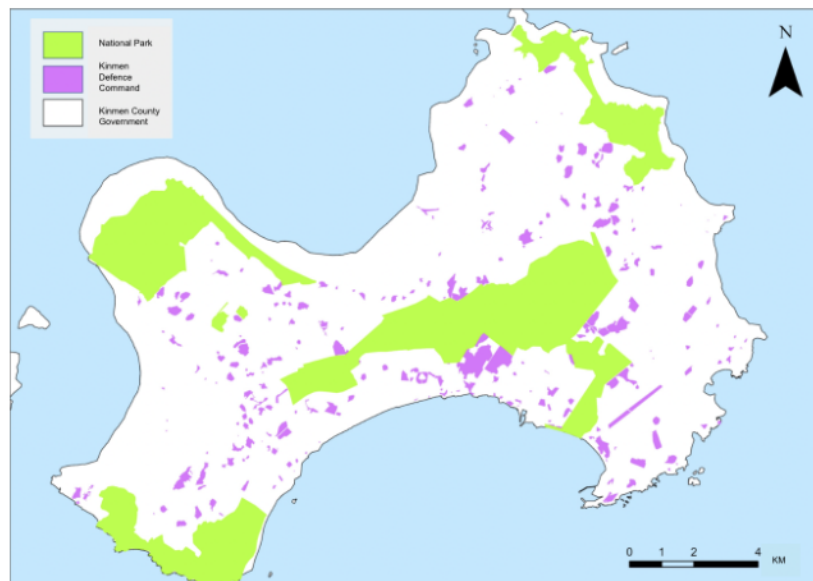
According to professor Lin's prediction, the population of Python Bivittatus compared to the number in 2012s should be 2 to 3 times bigger. The main reason is that the natural environment in Kinmen hasn't changed enormously in recent years and Python Bivittatus has a high generating ability. In addition, Mr. Tsai, who has been doing ecological records on Python Bivittatus for three years, mentioned that the ratio of Python Bivittatus appearance has increased yearly from his dynamic camera. By this point, director Xu, who supports the plan, has agreed with it. The rescued case and the frequency of capturing pythons have risen in these few years. Therefore, we can conclude that the population of Python Bivittatus is stable.

#### B. The Specialty of Kinmen's Government Structure

Kinmen's government structure is managed by three official units[figure 1]: the national park administration operated by the Central Ministry of Interior, the Kinmen defense command operated by the defense department, and the Kinmen government. These units have a strong

relationship with implementing and deciding the development. If one unit tries to develop the overlapping part that is also controlled by another unit, then they are necessary to communicate and coordinate. Hence, they definitely will spend more time finding a solution but might also cause conflict. Regardless, it somehow protects the Python Bivittatus and the habitat itself. Additionally, nearly a hundred thousand military men have retreated from Kinmen since the 2000s. Nowadays, only 3000 military men guard Kinmen, so there are many military tunnels and abandoned military quarters that have become the natural but artificial habitat for Python Bivittatus.

Figure 1. Jurisdiction of Each Kinmen Government Agencies



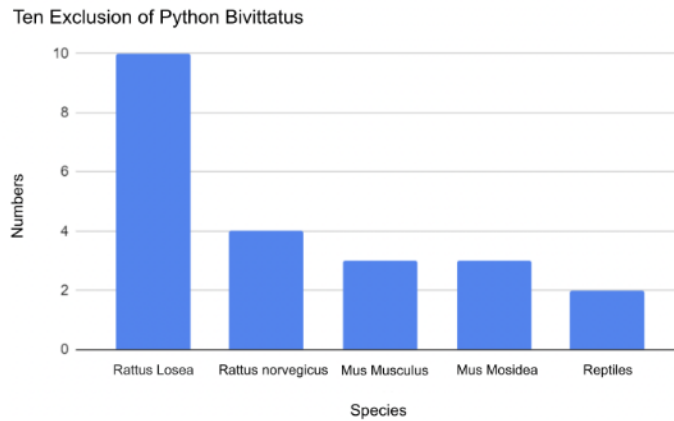
(From: organized by author )

### C. Half Developed Environment

Kinmen is half-developed because the boundary lines of the field, forest, and city are unclear. There are many agricultural lands and wastelands such as military quarters. Also, based on the food analysis of Python Bivittatus [figure 2], its main food resource is *Rattus losea*. These rats usually eat distillers' grains, which people use for fertilizer. Accordingly, these rats primarily distribute in farmland and farmhouses, so we can infer that Python Bivittatus will be more active in those places. To conclude, the research is able to filter the layer of farmland and uncultivated lands through the analysis of land use districts and interpret the place where Python Bivittatus might inhabit and exist. [figure 3]

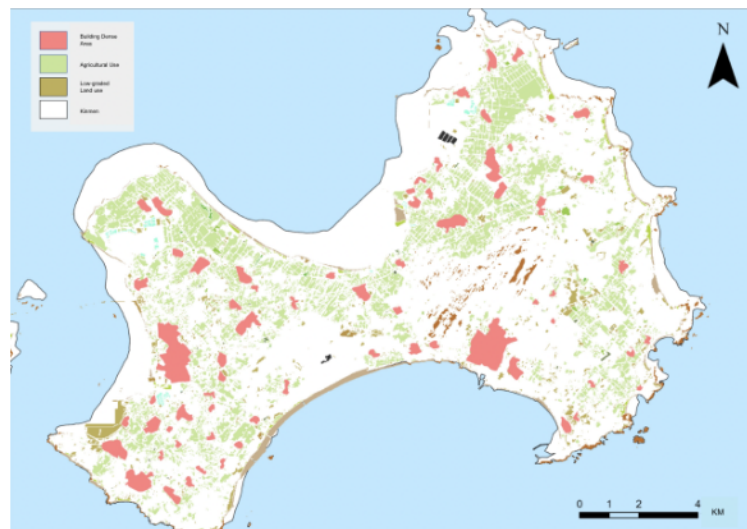
Figure 2. Ten Exclusion of Python Bivittatus

(From: organized by author )



(From: organized by author )

Figure 3. Land Use Distribution



(From: organized by author )

## V. Conclusion and Suggestions

The research believes that Python Bivittatus can stabilize the population in Kinmen based on the combination of the social and natural environment.

Firstly, since there are no large mammals in Kinmen's ecological system such as Reevesi Micrurus and hare. As a result, the major food resources of Python Bivittatus will mostly be limited to rodents. Consequently, Python Bivittatus is a key factor that can either balance the food web or control the number of rodents. However, due to the limitation of food resources, the growth of Python Bivittatus has been restricted as well. Therefore, people not only can live without fear, but it also decreases the contradiction between people and the Python Bivittatus. Moreover, the Kinmen government put more emphasis on otters, which is the flagship species in Kinmen. Through the study, the ecologist stated that the habitat of Python Bivittatus and otters mostly overlap. Thus, when the government implements environmental maintenance for otters, it also maintains the habitat of Python Bivittatus.

Secondly, the developed background, environmental condition, and industrial type of Kinmen are unique in Taiwan. Kinmen used to be the battlefield, so there remain lots of tunnels and bunkers for Python Bivittatus to live safely. Although Kinmen was constantly developed in these few years, the habitat of Python Bivittatus still contains no disturbance by people. Moreover, the



process of making Kaoliang spirit, which is the economic artery of Kinmen, produces many lees, which are the main fertilizers of local farmers. In fact, the main food resources of rodents are lees, so as the population of rodents increases, the Python Bivittatus receives stable food resources. Finally, the political structure of Kinmen includes three official units governing Kinmen together. It causes Kinmen to stay in a semi-developed state, which will not have much change and development due to the communication between each unit. As a result, it indirectly conserves the natural habitat of Kinmen.

In conclusion, the research believes that the value and specialty of Python Bivittatus make it possess the potential of being flagship species. However, people haven't received the correct information from the government. It is challenging to develop ecological tourism in a short period of time, people still need to overcome and evaluate not only the fear naturally existing in the human gene but also the information and stereotypes that are provided by the media. Based on the observation and judgment from ecologists, Python Bivittatus doesn't need artificial conservation. However, in order to support Python Bivittatus, people need to have a basic understanding of Python Bivittatus and comprehend the correct way of interacting with them. People can understand the structure of the whole Kinmen from a tiny Python Bivittatus. From Python Bivittatus, people can see Kinmen is a place that fulfills communication, controversy, and development. No matter it is any kind of animal, local residents, local government, national park, or military department, they are all connected to each other that become a factor in shaping the balance of nature and society of Kinmen.

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