Wacana, Journal of the Humanities of Indonesia

Volume 22
Number 3 *Reading Javanese literature; New directions*

Article 3

10-31-2021

Flora and fauna based on Old Javanese literary reading in the Malang Highlands Region

Blasius Suprapta
State University of Malang, blasius.suprapta.fis@um.ac.id

Wacana Vol. 22 No. 3 (2021): 558-581

Flora and fauna based on Old Javanese literary reading in the Malang Highlands Region

Blasius Suprapta

Abstract

Towards the end of the twelfth century (1104 Ś = AD 1182) until the middle of the fourteenth (1281 Ś = AD 1359), a Hindu-Buddhist civilization, consisting of the *Akuwu* of Tumapĕl - the kingdom of Siŋhasari – and the kingdom of Majapahit, developed a well-organized social and cultural life in the Malang Highlands Region of Java. This included the management of natural resources, flora and fauna. Although their variety has been well documented in Old Javanese literature and inscriptions, so far there has not been an in-depth study identifying the diversity of flora and fauna of the region during the late Hindu-Buddhist era. This is a study of diverse flora and fauna and how people managed these resources based on reading the source of Old Javanese literature. It begins with library research, followed by diplomatic analysis of various types of flora and fauna in Old Javanese inscriptions, zoological analysis, ethno-zoology, and geographical spatial analysis. The results of the study include the use of various types of flora and fauna in *sima* ceremonies and everyday agricultural activities. One type of flora, *alang-alang* (*Imperata*) which thrives on *Gunung* Lĕjar, was controlled by the state as it was a fire-risk. *Alang-alang* was an important thatching material. The trade in endemic plants, herbs, and spices, was protected and regulated by the state. It is also known that the profits from tropical forest management in Bantaran were used for the maintenance of sacred buildings: *prāsāda* in *Hĕmad*.

Blasius Suprapta is a lecturer in Department of History Faculty of Social Sciences, State University of Malang, East Java. He obtained a Masters in Archaeology, Faculty of Humanities, Universitas Indonesia in 1996 and a Doctorate degree in Archaeology, Faculty of Cultural Sciences, Gadjah Mada University in 2015. His research interests are in the field of landscape archaeology, semiotic archaeology, structural archaeology - Lévi-Straus structuralism perspective, and prehistoric archaeology. He has published a book on structural archaeology, *Nilai-nilai pendidikan karakter dalam relief cerita tantric; Perspektif strukturalisme Lévi-Strauss* (2017, Yogyakarta: Kanisius) and a book of semiotic archaeology, *Makna lukisan dinding gua daerah Pangkep dalam kehidupan mesolitik; Perspektif semiotika - Charles S. Peirce* (2018, Yogyakarta: Kanisius). He is currently developing research on post-processual landscape archaeology on the west coast of West Kalimantan. Blasius Suprapta can be contacted at: blasius.suprapta.fis@um.ac.id.

Blasius Suprapta | DOI: 10.17510/wacana.v22i3.962.

Keywords
Flora and fauna; The Malang Highlands Region; Old Javanese literature; Old Javanese inscriptions; twelfth to fourteenth century.

1. Introduction[1]

The Malang Highlands is a geological region, located in the administrative area of the Malang Residency, East Java, Indonesia (Figure 1). The definition Malang Highlands was first used by a Dutch geologist E.C.J. Mohr (1922) when conducting a geological study of the area. Mohr suggested that the area was originally a deep basin, flanked by the Southern Mountains in the south, the Old Kawi and the Old Arjuna volcanoes in the west, the Tĕnggĕr Mountains in the north, and the Old Mahāmeru volcano in the east.

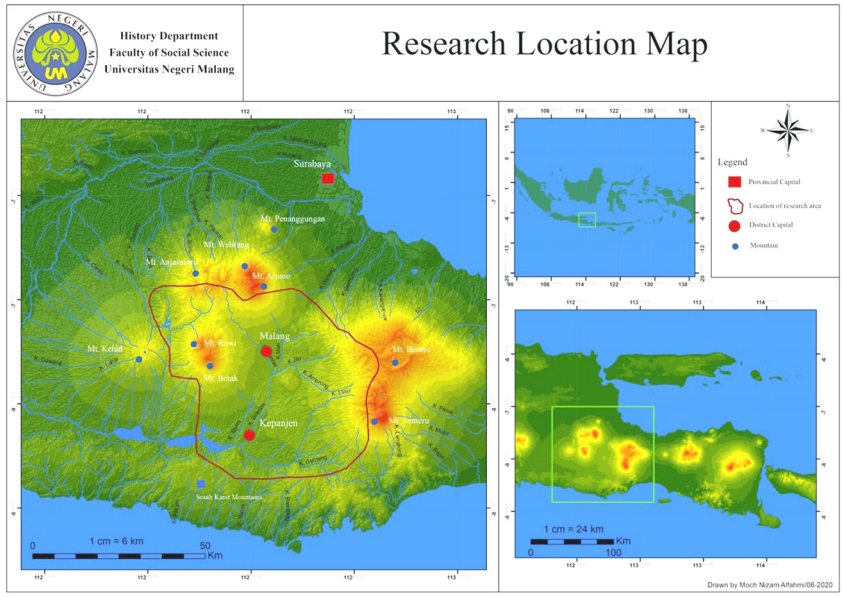

Figure.1. Research Location Map: Malang Residency, Malang, East Java, Indonesia.

Over aeons of time, the edges of the basin were gradually filled with various *tuffs* and *efflata* from the eruption of the three old volcanoes, resulting in the damming of various streams and finally, fed by these streams, the basin evolved in an ancient lake. The volcanoes continued to erupt, pouring out lava and filled the ancient lake basins. Towards the beginning of the Holocene Period, the ancient lake dried up and became a vast highland area, known as the Malang Highlands geological area (Van Bemmelen 1949).

[1] This paper is one of the results of research in the year 2008-2009 in the Malang Highlands Region, Malang, East Java, Indonesia about the development of the Hindu-Buddhist civilization between the ninth and the fourteenth centuries based on archaeological sites, Old Javanese inscriptions, Old Javanese literature, and ethno-archaeology, funded by the Directorate of Research and Community Service, Directorate General of Higher Education, Ministry of National Education.

Over a long period of time the geological region became famous for its fertility and, at the beginning of the modern era, a Hindu-Buddhist civilization, the *Akuwu* of Tumapĕl, was established there and around 1104 Ś - 1144 Ś. It successively evolved into two large kingdoms in the land of Java: those of Siŋhasari in 1144 Ś - 1197 Ś and Majapahit 1216 Ś - 1281 Ś. The establishment of the latter kingdom marked the end of the war between the kingdoms of Daha, Kadhiri, and Tumapĕl, a feat accomplished by Śri Rajasa Bhaṭâra Sang Amûrwabhûmi who brilliantly succeeded in, defeating the king of Daha, Siraji Daṇdang Gĕṇdis, in battle north of Gantér in 1144 Ś = AD 1222[2]. The kingdom he founded flourished and achieved its apotheosis during the reign of *Prabhu* Śri Kĕrtanagara in 1194 Ś / 1190 Ś - 1214 Ś, at the end of the thirteenth century (Brandes 1920). Between 1214 Ś - 1216 Ś the Siŋhasari kingdom was ruled by Siraji Djajakatong king of Daha. In 1216 Ś, Kertanagara's son-in-law Raden Wijaya, with the help of Wiraraja, regent of Sumenep on the island of Madura, reinforced by Tartar army troops from China managed to defeat Siraji Djajakatong and Raden Wijaya became king taking the title of Keŗtārjaya Jayawardhanā. The crowning of Raden Wijaya as king in 1216 Ś, marked the establishment of a new kingdom in Java, that of Majapahit (Brandes 1920). The Majapahit kingdom reached the height of its power during the reign of Hayam Wuruk 1272 Ś - 1311 C (AD 1350 – 1389) (Poesponegoro, Marwati Djoenoed et al. 2010).

Information about the development of the *Akuwu* of Tumapĕl - Siŋhasari – Majapahit kingdom civilization would be unthinkable without reference to the sources in the Old Javanese literature written Majapahit I and Majapahit II. The literature of Majapahit I was composed in the fourteenth century, in Old Javanese, while that of Majapahit II was penned in the fifteenth and sixteenth centuries in Middle Javanese (Soekmono 2002). The themes of the literature of Majapahit I deals the development of the Hindu-Buddhist civilization in the Siŋhasari period, most notably in the *Kakawin* Nāgarakŗtāgama in 1287 Ś (AD 1365). Landmarks in the Middle Javanese literature composed during the central period of Majapahit II are the *Kidung* Tantu Panggĕlaran (1557 Ś = 1635)[3],

[2] The *Kakawin* Nāgarakŗtāgama (in 1365), *Canto* 40--1, line 1 states that Śri Rajasa Bhaṭâra Sang Amabwabhûmi was born in the year of *saka lautan dasa bulan* (1104 Ś) or 1182, towards the end of the twelfth century. The reign of Śri Rajasa Bhaṭâra Sang Amabwabhûmi was in 1144 Ś (1222) – 1169 Ś (1274). The reign of *Prabhu* Śri Kĕrtanagara was in 1214 Ś (1292) – 1216 Ś (1294), end in the thirteenth century.

[3] The *Kidung* Tantu Panggĕlaran was composed by *Mpu* Kutritusan in 1557 Ś = 1635, hence early seventeenth century. However, it should be noted that this book contains a collective memory recording about the history of *Mataram Kuno* in Central Java in the ninth century and it mentions the name of the capital city *Mdang Kamulan* (Piqeaud 1924: 60). In a nutshell, it is a collection of historical memories about *Mataram Kuno* in East Java, including the name of the earliest village in the Malang Highlands, *Pangawan*. This ancient village has existed since the tenth century, as is recorded in the *Gulunggulung* Inscription 851 Ś, front side, line 5. In addition, it preserves a collective memory of the existence of *Gunung Pawitra*. The name of this mountain is mentioned in the *Cunggrang* Inscription 851 Ś front side, line 9 (Brandes 1913: 72). Furthermore, it also includes the name of *Gunung Brahmā*, whose name is first mentioned in the *Muñcang* Inscription 866 Ś, front side, line 13. The name of this mountain was later recorded on the *Walandit* Inscription 1304/1337 Ś on the first plate, line 4, as *Sang Hyang Gunung Brahmā* (Pigeaud 1960b: 120). The *Kidung* Tantu Panggĕlaran also refers to *Gunung Kawi* and

Sĕrat Pārārāton Atawa Kātuturānirā Ken Āngrok (1535 Ś = 1613), and the *Kidung* Rangga Lawe (1775 Ś = 1853).

Various literary sources of the Majapahit I and Majaphit II eras, include information about the social and political life, culture, and society of the Siŋhasari kingdom. Among the references are a number mentioning the variety of flora and fauna which had attracted the attention of the Hindu-Buddhist community. No in-depth study of various the flora and fauna, of this period has ever previously been attempted. A preliminary study of the transcription of the *Sĕrat* Pārārāton Atawa Kātururānira Ken Āngrok 1535 Ś was carried out by Brandes (1920), but he limited himself to a linguistic study of the meanings of various names of flora and fauna. Brandes focus was Ken Āngrok's political ambitions which he nurtured during the period of his wandering in the Malang Highlands Region, east of *Gunung Kawi*.

Another researcher, Pigeaud (1924) transcribed and studied the *Kidung* Tantu Panggĕlaran 1557 Ś, which relates the foundation of Hindu-Buddhist cosmology of the area, namely the process of moving the holy mountain, Mahāmeru, from India to the land of Java and associates the geogeny of the many volcanoes in the Malang Highlands Region to the holy mountain, indisputably assumed to be holy mountain *Sang Hyang* Mahāmeru in India. These sacred mountains are Mount *Katong* (Kelud volcano), Mount *Kawi* (Butak-Kawi volcano), Mount *Arjjuno* (Arjuno volcano), Mount *Ardi Kumukus* (Welirang volcano), Mount *Pawitra* (Penanggungan volcano), Mount *Brahma* (Bromo volcano), and Mount *Sang Hyang Mahāmeru* (Semeru volcano). However, Pigeaud's work does not include any study on the diversity of flora and fauna in the environment of the seven sacred mountains.

---

the name of this mountain likewise occurs in *Sĕrat Pārārāton*, in which it is closed related to the intricacies of *Ken Angrok*'s life in 1104 Ś - 1149 Ś; the birth - death of *Ken Angrok* (Pigeaud 1960b: 31). The *Kidung* Tantu Panggĕlaran also contains collective memories of the existence of *Gunung Kampud* and *Gunung Kemukus*. *Gunung Kampud* is also mentioned in the *Kakawin* Nāgarakĕrtāgama in *Canto* 1, verse 4, line 4 where it is related to the birth of Hayam Wuruk in Kahuripan 1256 Ś = 1324. *Gunung Kemukus* also occurs in the *Kakawin* Nāgarakĕrtāgama, *Canto* 55, verse 3, line 4 when King Hayam Wuruk visits *Jajawa* Temple in 1281 Ś = 1359. In the *Kakawin* Nāgarakĕrtāgama, *Gunung Kemukus* is called *saŋ hyan Adri Kumukus* (Pigeaud 1960b: 41). In addition to containing the collective memory of the names of the sacred mountains, the *Kidung* Tantu Panggĕlaran, preserves the collected memories of the names of ancient villages, such as *Tūryyan* and *Kukub-mandala*. The name of the ancient village of *Tūryyan* is first mentioned in the *Tūryyan* Inscription 851 Ś, I.a front side, line 5. The name of the ancient village of *Tūryyan*, later written in *Sĕrat* Pārārāton, is related to the period in which the Ken Angrok took instruction in religious systems with *Mpu* Palot (Brandes 1920: 10). The name of the ancient village of *Kukub-mandala* is also recorded in the *Kakawin* Nāgarakĕrtāgama, *Canto* 78, verse 7, line 1, referring to the "*karesian*" buildings preserved by the Majapahit kingdom during the reign of King Hayam Wuruk 1272 Ś - 1311 Ś. On the basis of this description, it is possible to argue, that although the *Kidung* Tantu Panggĕlaran was composed by *Mpu* Kutritusan in 1557 Ś = 1635, the middle of the seventeenth century, it describes the collective memory of the existence of landscapes between the twelfth and fourteenth centuries at the time of the *Akuwu* of Tumapel - the Siŋhasari kingdom - Majapahit kingdom in the Malang Highlands Region or the *sawetaning Kawi*. In the same vein, the *Kidung* Tantu Panggĕlaran can be used as a source of the existence of flora and fauna in the twelfth to fourteenth centuries in the same region.

In addition to studying the *Kidung* Tantu Panggĕlaran, Pigeaud (1960a) also reviewed and retranslated the 1287 Ś *Kakawin* Nāgarakṛtāgama into English, divided into five volumes. Volume I is a transcription of the Old Javanese text of the Nāgarakṛtāgama 1287 Ś, Volume II translates his text into English, provided with extensive explanatory notes, and Volume III contains the Nāgarakṛtāgama transcription into English. This particular volume does discuss the names of various animal hunted in the forest of *Nandaka* (Nāgarakṛtāgama 1287 Ś, *Canto* 50-53). They have been carefully identified and linked to the names of local animals and are also included in the list with their species classification. For example, the *ggawaya* is identified as a wild buffalo or wild bull (*banteng*) and is associated with the classification *Bos javanicusl* (Nāgarakṛtāgama 1287 Ś, *Canto* 50, stanza 5, verse 1). Likewise, one the names of a plant in the *Nandaka* Forest, *kasha*, was identified as *glagah*, Kans grass or wild sugar cane as *Saccharum spontaneum* (Pigeaud 1960a). The *muñja* plant species is associated with grasses of the genus *Imperata*.

A subsequent researcher, Robson (1995), has also identified some of the flora and fauna in the *Nandaka* Forest in his transcription of the Deśawarnawa (Nāgarakṛtāgama) by *Mpu* Prapañca *Canto* 50, *Canto* 51, and *Canto* 53. Robson translates the names of flora and fauna from the Old Javanese into English. Examples include the name flora in *Canto* 50, stanza 1, verse 4, *kāśa* and *muñja* translated as types of forest grass. In *Canto* 50, stanza 5, verse 3 the names of the *wok*, *gawaya*, and *lulaya* are translated as a type of pig, forest bull, and buffalo. The identification of these fauna names was not complemented by zoological, ethno-botany, and geographical spatial studies.

The results of previous studies by researchers Brandes (1920), Pigeaud (1924, 1960a, 1960b, 1960c), and Robson (1995) clearly show that, so far, no real attempt has been made to study the diverse flora and fauna in Old Javanese literature – zoological, ethno-zoological studies, geographical spatial, and the utilization of various flora and fauna – in the Hindu-Buddhist community in the cultural landscape of the Malang Highlands Region in twelfth to fourteenth centuries. Research on one type of flora was carried out by the German scholar F. Junghuhn in September 1844. He described the types of cover plants which grow and flourish on the peak of Mount Butak-Kawi (Junghuhn 1849). In October 1861, another researcher, the Englishman A.R. Wallace, conducted research on various types of fauna in the forest environment at the foot of Mount Arjuno, specifically in the village of Djapanan. In the course his research, Wallace managed to identify the types of fauna; tigers, long- and short-tailed Javanese peacocks, green jungle fowl (*Gallus furcatus*), common partridge (*Gallus bankiva*), woodpeckers, river crayfish, hornbills (*Buceros lunatus*), and some serindit or yellow-throated hanging parrot (*Loiriculus pusilus*) (Wallace 2009). By the time these two researchers conducted research on flora and fauna in the area of Mounts Butak-Kawi and Arjuno in the nineteenth century, conditions in the Malang Highlands Area had probably changes since the twelfth to fourteenth century. In a nutshell, this study is original, and its **novelty** is its contribution to knowledge about the animal and

plants which lived and flourished in the landscape of the Malang Highlands six to seven hundred years earlier - zoologically, ethno-zoologically, from the point of view of spatial geography and their usefulness to the contemporary Hindu-Buddhist society, all on the basis of a reading of Old Javanese literature.

2. Method

Exploratory research began with readings in the library of the *Kakawin* Nāgarakṛtāgama by 1287 Ś Prapañca transcribed and translated by Kern (1919), Pigeaud (1960a, 1960b, 1960c), and Robson (1995), the *Kidung* Tantu Panggĕlaran composed by *Mpu* Kutritusan in 1557 Ś which was transcribed and translated by Pegeaud (1924), and the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngkrok in 1535 Ś which was transcribed and translated by Brandes (1920). The next stage of the research consisted of the readings of the three Old Javanese inscriptions. This was undertaken with the assistance of the work on Old Javanese epigraphy by Willem van der Molen (2011) seeking out data on flora-fauna Old Javanese inscriptions issued the kings in the territory of the Malang Highlands.

These Old Javanese inscriptions are the Gulunggulung (951 Ś), Lingga suntan (851 Ś), Cunggrang (851 Ś), Jrujru (852 Ś), and Muñcang Inscription (866 Ś) (Brandes 1913). Other inscriptions include those of Kubu Kubu (822 Ś), Katiden (1314 Ś) (Boechari 1985/1986), Ukir Nagara (1120 Ś) (M. Suhadi and K. Richadiana 1996), Walaṇdit (856 Ś), and the Katiden Inscription from 1317 Ś (Pigeaud 1960a). By conducting a diplomatic examination of the types of flora and fauna at the source of the inscription data, some new acts about the diversity of flora and fauna which once existed and were recorded in the landscape of the Malang Highlands emerged.

These data were analysed by adopting a zoological and ethno-zoological approach to reconstruct the environmental conditions which prevailed between the twelfth to fourteenth centuries (Watson 1979). The next step was to analyse the distribution of the habits of the flora and fauna in the Malang Highlands Region taking a geographical spatial approach (Yunus 2010) based on observations derived from the study of topographical maps. One comparative ethno-zoological analysis of the inventory of the distribution of flora and fauna in the Bromo-Tengger-Semeru National Conservation Forest area and R. Suryo Raya Forest Park. By taking a series of steps, it is possible to extrapolate interpretations of the diverse flora and fauna which had developed and have become entrenched in the landscape of the Malang Highlands area. This is followed by interpretation of the benefits offered to the life of the Hindu-Buddhist community by the variety of flora and fauna in the period under discussion.

3. Reading results and discussion

A. Reconstruction of the landscape of Malang Highlands Region twelfth to fourteenth century based on Old Javanese literature

Adopting the point of view of Vink (1983), search for an explication of the diversity of flora and fauna, begins with a discussion about the landscape

in which the local ecosystem is develop. This would be an impossible task without first giving a general description of the landscape of the Malang Highlands Region in the era under discussion. Based on the research of Van Bemmelen (1949), it has already been stated that the Malang Highlands Region is the site of an ancient lake which dried up after which its bed turned into a vast, fertile plateau. The western edge of the plain is flanked by the Kelud-Butak-Kawi volcanic group, in the north by the Arjuno-Welirang-Anjasmoro-Penanggungan volcanic group, on the eastern side by the Bromo-Tengger-Semeru volcanic group and in the south, it is flanked by the Southern Mountains.

Based on the reading of the *Kidung* Tantu Panggĕlaran composed by *Mpu* Kutritusan in 1557 Ś, a work which is a reflection of the thought world of the Hindu-Buddhist community in the period roughly from the ninth to the fourteenth century,[4] the goegeny of the Malang Highlands Region is couched in the legend which recounts that, before *Nusajawa* was inhabited by humans, the Hindu deities Brahmā and Vishnu descended into the world to recreate the sacred mountain, Mahāmeru in *Nusajawa*. They were followed by *Bhaṭāra* Guru along with other gods, who came to *Nusajawa* to witness their endeavours. The making of Mount Mahāmeru began by moving its original: the *Hyang Mandaragiri* from Jambudipa (Pigeaud 1924: 64-65), India (Soekmono 2002: 119) to island of Java by the deities who flocked to assist the *Sang Hyang* Brahma and the *Sang Hyang* Vishnu.

During the transference of *Sang Hyang Mandaragiri* from India to *Tanah Jawa*, a disruption occurred during which part of the base of the mountain broke off (*goweŋ*). The first fragment fell to Earth in the central region of *Nusa Jawa* and became Mount *Katong*. The second fragment crashed down and formed Mount *Wilis*. The third fragment which broke away formed Mount *Kampud*. During the next stage of the journey, the mountain broke a fourth time. This time the fragment which fell to Earth became Mount *Kawi*. Then, for a fifth time, a piece of the mountain detached itself and came to rest as Mount *Arjjuno*. Nor was this the last time the mountain crumbled. A sixth time yet another piece detached itself and it became Mount *Ardi Kemukus*. Eventually the removal of the mountain was halted at *Pawitra* and finally formed Mount *Pawitra*. Later the removal of the mountain was resumed and they moved steadily eastwards, towards the peak of Mount *Sang Hyang Mandaragiri*. Here yet another piece broke off and formed Mount *Bromo.* Finally, what remained came to rest on the peak of Mount *Mandangagiri* and there Mount *Mahāmeru*, called Mount *Nisada*, was worshiped as the *Mahāmeru Girirāja* in Java (Pigeaud 1924: 64–68).[5]

[4] The territorial boundaries in the ninth to the fourteenth century are based on the toponyms of the ancient capital of *Mataran Kuno* in Central Java, namely *Mdang Kamulan* (ninth century) and the toponym *karesian*, namely *Kukub-mandala* (fourteenth century).

[5] Geologically Mount *Katong* is identified with Mount Lawu, Mount Wilis with Wilis Volcano to the west of Kediri City, Mount *Kamput* is identified with Mount Kelud, Mount Kawi is identified as Botak-Kawi, Mount *Arjjuno* is the volcano Arjuno, Mount *Kemukus* as Welirang, Mount *Pawitra* as Mount Penanggungan, *Bromo* as Bromo, and *Mahāmeru* Mount is identified

Descriptions of the vast plains surrounded by the mountains which had been successfully moved from *Jambuḍipa*, India can be found in the *Sĕrat* Pārārāton 1535 Ś (Brandes 1920: 25) and the *Kidung* Rangga Lawe (Berg 1930: 41), in which they are referred to as *Siddhabhawana*.[6] Zoetmulder and Robson (1995) define *Siddhabhawana* as a region, vast land of residence, location, house (*bhawana*) that is supernatural, perfectly sacred, and holy (*sidda*). The results of diplomatic tests on the contents of the Ukir Nagara Inscription II a, lines 3 and 4 about *Siddhabhawana* refer to the region as unfortunate/cursed/inauspicious *sakrida* ***malang***. This is a reference to the wider Malang area (Suhadi and K. Richadiana 1996: 8-9).[7] The vast plains of *Siddhabhawana* are traversed by streams which in the diplomatic reading of the Katiden Inscription (1317 Ś) refers to a river called the *bañu*. The river divides the unfortunate *sakrida* area into two regions, the *sakuloning bañu* region and the *sawetaning bañu*, the areas east and west of the rivers. The *Bañu* referred to in the inscription can be associated with the present-day upstream river section of the Kali Brantas (Pigeaud 1960b; Yamin 1962; Figure 2).

with the highest volcano in the land of Java, Semeru.

[6] In the *Sĕrat* Pārārāton, the toponymy of *Siddhabhawana* is related to the attack of King Siraji Djajakatong of Daha, *Bhumi Kadhiri,* on the capital of the kingdom of Siŋhasari, *Siŋhasari nagara* in 1197 Ś. The *Sĕrat* Pārārāton records that, in order to attack the capital city, *Siŋhasari nagara,* Siraji Djajakatong divided the Daha army into two groups of troops. The first troops attacked from the south of the capital and were assembled on the banks of the Akso River. This troop was fully armed and trained, whereas the second troop attacked from the north and was a rowdy troop, not drilled in warfare and armed with drums and tasked with making noise. As they complied with their orders, the troops from the north were first attacked by the Siŋhasari army under the command of Raden Wijaya. Then, simultaneously, the first group of soldiers moved in from the south towards the capital on the offensive. They had to cross Akso River and then the Lawor River before entering the *Siddhabhawana* area. From here they made a direct assault on the capital city of the Siŋhasari kingdom and destroyed it. In the attack, it was said that *Prabu* Kĕrtanagra died in *Manguntur* (Brandes 1920: 25-26).

[7] The Ukir Nagara Inscription consists of three plates marked Inscriptions I, II, and III. Each one stands alone. The inscription was found in *Dusun* Ukir Negara, Serah Kencong, Wlingi, Blitar. Script transcription and translation were published by Issatriadi (1975) and are now kept in the *Mpu* Purwo Museum, Sidoarjo, East Java. Inscription II dates to 1120 Ś.

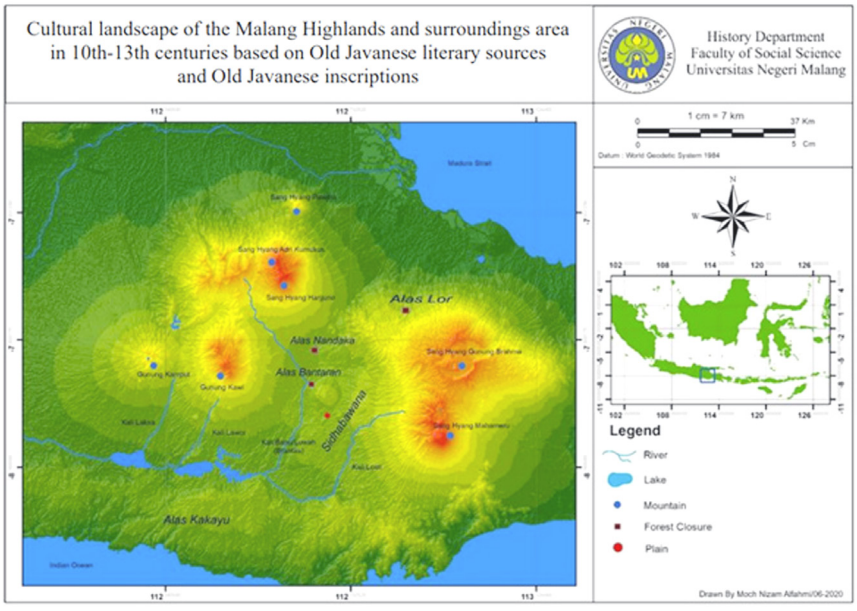

Figure 2. Reconstruction of Malang Highlands Region in the tenth to the thirteenth centuries based on Old Javanese literary sources and Old Javanese inscriptions.

In the area of *Siddhabhawana*, a vast plateau of poor *sakrida* based on a reading of the *Sĕrat* Pārārāton Atawa Katuturanira Ken Angrok (1144-1169 Ś) are a number of hills, *Rabut Katu*, *Rabut Gunung Lĕjar*, *Gunung Pustaka*, and *Rabut Jalu* (Brandes 1920). The results of a diplomatic test of the Ukir Nagara (1120 Ś), Katinden (1317 Ś), and Gulunggulung Inscriptions (851 Ś) and of the *Kakawin* Nagarakĕrtagama (1287 Ś), there are also a number of hills mentioned: *rĕdi Lĕjar*, *gunung Lĕjar*, *gunung Wangkedi*, and *Wdwawdwan* (Pigeaud 1960a).[8]

Based on the reading of the *Sĕrat* Pārārāton Atawa Katuturanira Ken Angrok (1144-1169 Ś), Nagarakĕrtagama (1287 Ś), and a diplomatic analysis of the contents of the Kubu Kubu (827 Ś), Gulunggulung (851 Ś), Muñcang (866 Ś), Ukir Nagara (1120 Ś), and Katinden Inscriptions (1317 Ś), much of the *Siddhabhawana* area was still primary forest, to wit: Skārpandan, Bantaran, *Alas Lor*, Térwak, Pandakan, *Alas Kalayu*, and Nandakawana (Ensink 1999). From this description, it can be assumed that between the twelfth and fourteenth centuries, the Malang Highlands Region was, as it still is, surrounded by mountains which were believed to be fragments broken off from Mount Mahāmeru and this vast highland area was called *Siddhabhawana* or *sakrida* Malang. The area was dotted with various hills and some primary tropical forest cover (Figure 2).

[8] *Rabut* Katu can be associated with present-day *Gunung* Katu; *rabut gunung Lĕjar* and *redi Lĕjar* can be associated with Gunung Layar, nowadays Turen, *rabut* Jalu can be associated with Mount Ukir, *gunung* Wangkedi with Mount Wedi, now Tengger and *wdwawdwan* can be associated with Mount Wedon, now Lawang.

The name of one of the sacred mountains, *Pāwitra*, can be identified in the Cunggrang Inscription (851 Ś = 929), that is around the middle of the tenth century. The toponym *Pāwitra* is found in the inscription in the seventh line of the recto side (Brandes 1920: 72) as follows:

> 7. *susukan sīma apa ...kna ri sang hyang dharmmāśrama ing* ***pāwitra***
> *nuang i sang hyang prāsāda silunglung sang siddha dewata rakkryan*

The contents of this inscription, permit the deduction that, before the Kitab Tantu Panggĕlaran was composed by *Mpu* Kutritusan in 1557 Ś, from the middle ninth to the seventeenth century, the geogeny of the sacred mountains in *Nusa Jawa* were still enshrined in narrative stories sacred by to the people at that time. Among these inhabitants were the Hindu-Buddhist communities who settled in the Malang Highlands Region from the late twelfth to the fourteenth century (Suprapta 2015).

B. The results of reading a variety of flora in the Malang Highlands Region between the twelfth and fourteenth centuries in Old Javanese literary sources.

A close reading of the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngrok (1535 Ś), reveals that the diverse flora in the Malang Highlands Region are noted in 2:5,10, which runs as follows: ... *ri Tĕgal ing* ***lalatĕng***, at 4:5-10, written: - ... *witing* ***jambu*** *olihira ananĕm*, - … *wohing* ***jambu*** *puniko*, 5:10 it written: - ... - ... *siro tumon ing* ***katu sawaringin*** *gönge*, 4:10 : -- ... *hana murub ing tĕngahing* ***alalang***, 4:15: - ... *hana murub ing tĕngahing* ***alalang***, 5:20: - ... *amamanek ta sira ring* ***witing tal***, ... - 5:20: ... - *dadi amĕrang sira* ***ron tal*** *antuk kakalih*, and 6:5 --- 15, it written: ... - : ... - *mangkat sira amaluku* ***pagagan*** ..., *mandala pijĕr amaluku* ***pakacangan*** ... (Brandes 1920: 3-10).

A thorough reading of the *Kakawin* Nāgarakĕrtāgama (1287 C) yields the names of a number of diverse plants then still growing in the cultural landscape of the Malang Highlands Region, presented in *Canto* 37 --- 1 --- 4 --- 5 and those used in the ceremony conducted on the occasion of King Hayam Wuruk's pilgrimage to the *dharma* temple of Śri Rajasa Bhaṭâra Sang Amûwabhûmi in Kagĕnĕngan. From Kagĕnĕngan, his pilgrimage continued to the *dharma* temples of King Anūsapi in Kidal and King Wisnuwardhana in Jajaghu. The next morning, he set off to Sinhasarinagara via the *talaga buṛ*, which is described as a beautiful lake surrounded by various flowers (Slametmuljana 1953: 32-35).

In *Canto* 37 --- 1, the description extols the beauty of the temple building, whose courtyard is filled with beautiful flowers, *puspa*, *bakulārjja*, and *kusumâdya*. *Canto* 37 --- 4 says that to the north of the *dharma* temple various flowering plants such as the *någapuspa* flower and grass were flourishing. In *Canto* 37 --- 5 it is written that, besides being covered with grass, the northern side of the temple was also scattered with the fallen leaves of *cāmara*, *danta*, *tapas*, and *bambu kuning* or *pring kuning*. In *Canto* 38 --- 1, it is said that, when King Hayam Wuruk passed *Talaga Burĕng*, the lake was very beautiful, with a bluish hue and surrounded by an abundance of flowers. *Canto* 38 --- 2 describes

that still up far uphill the road was lined with thick, green, and glistening grass (Ensink 1999; Kern 1919; Slametmuljana 1953; Pigeaud 1960a)

From reading of these two Old Javanese literary texts, a number of details of the flora of the region can be extrapolated. The types of flora referred to are *puspa, bakulārjja, kusumâdya, nāgapuspa, cāmara, danta, tapas, bunga rawa, bambu kuning, kelopo gading, lalatĕng, katu, waringin, alalang, witing tal, pari gogo,* and *kacang-kacangan*. Pigeaud translates *puspo* plants as *puspo* flowers, *bakulas* or *bakulārjja* as cape flowers that is: a type of Gardenia, *nāgapuspa* as *nagasari* trees (*Mesua ferrea*), *cāmara* as mountain pine trees, in fact she-oaks (*Casuarina equisetifolia*), *danta* as coconut palms, and *tapas* as Javanese areca palms (Pigeaud 1960c). Turning to the types of plants described in the *Sĕrat* Pārārāton, the list consists of *lalateng* identified as stinging nettles, *witing jambo* identified as *rose* apples: (*Syzygium jambos*), *alalang* as *alang-alang* or *ilalalang* plants, *witing tal* and *ron tal* as tal trees (in fact, Palmyra palms, *Borassus fiabellifera*), *katu sawaringin*, a creeper which grows on banyan trees, *pagagan* is associated with gogo rice grown in dry fields, and *pakacangan* some sort of legume. This type of plant has been known in Java since at least the Mesolithic period associated with the Sampung culture or Sampungian around 300 BC. Nowadays it thrives in wooded areas such as on Butak-Kawi, so it can be classified as a shrub (Suprapta 2015).

Suprapta (2015) has classified these types of plants into undergrowth: *lateng, alang-alang, pari gogo*, and legumes and tree species. The trees are *katu* tree, banyan tree, water guava, *puspo* tree, she-oaks, Palmyra or lontar palm, areca palm, coconut palm, and yellow or string bamboo, often also called *pring apus*.

On the basis of information contained in various inscription, the Dinoyo (682 Ś), Kubu Kubu (827 Ś), Sangguran (846 Ś), Gulunggulung (851 Ś), Linggasutan (851 Ś), Jérujéru (852 Ś), and Jayapatra Wisnuwardhana (1172-1194 Ś), it is possible to compile a list of the types which once graced landscape of the Malang Highlands *yavaq-yavika-śayya, puśang sĕrĕh, bawaŋ, ciñca, kalapa, ma[ŋ] glar kawuŋ, wulu niŋ, ciñca, h ryyas, atak péhang, ciñca kilang, sku[l], tlu, ciñca twak, mirica kacang, hadas kusumā, jamuju, hadas, jjlang, jamuju, wungkudu,* and *kacang* (Brandes 1920; Suprapta 2015; Trigangga 2003). Poerbatjaraka (1951) identified *yavaq-yavika-śayya* as a type of wet rice plant. Boechari has stated that *puśang sĕrĕh* plants are forest betel plants and *bawaŋ* shallots, *ma [ŋ] glar kawuŋ* is associated with *petung*, giant bamboo, *wulu niŋ* is associated with tamarind trees, *péhang* is associated with the name of forest banana plant, *sku [l]* is associated with wet rice and upland rice, and *ciñca twak* is associated with Palmayra/palm trees. The name *ciñca kilang* made up of *ciñca*[9] and *kilang* to drink. *Ciñca* is related to fruit wine. While the *kilang* is associated with a sugar cane, both *ciñca* and *kilang* are included in the category alcoholic drinks, so presumably related to *twak* which is generally associated with the type of palm wine. Suprapta (2015) links the *mirica* vine to the black pepper vine, a plant endemic to the Bromo-Tengger-Semeru Conservation Forest. Likewise, the plants *hadas kusumā, jamuju, hadas, jjlang, jamuju,* and *wungkudu* are also associated with endemic plant species in Bromo-Tengger-Semeru and R. Suryo Coservation Forest in Arjjuno.

[9] A sort of gelatinous mixture made from the climbing plan *Cyclea app*.

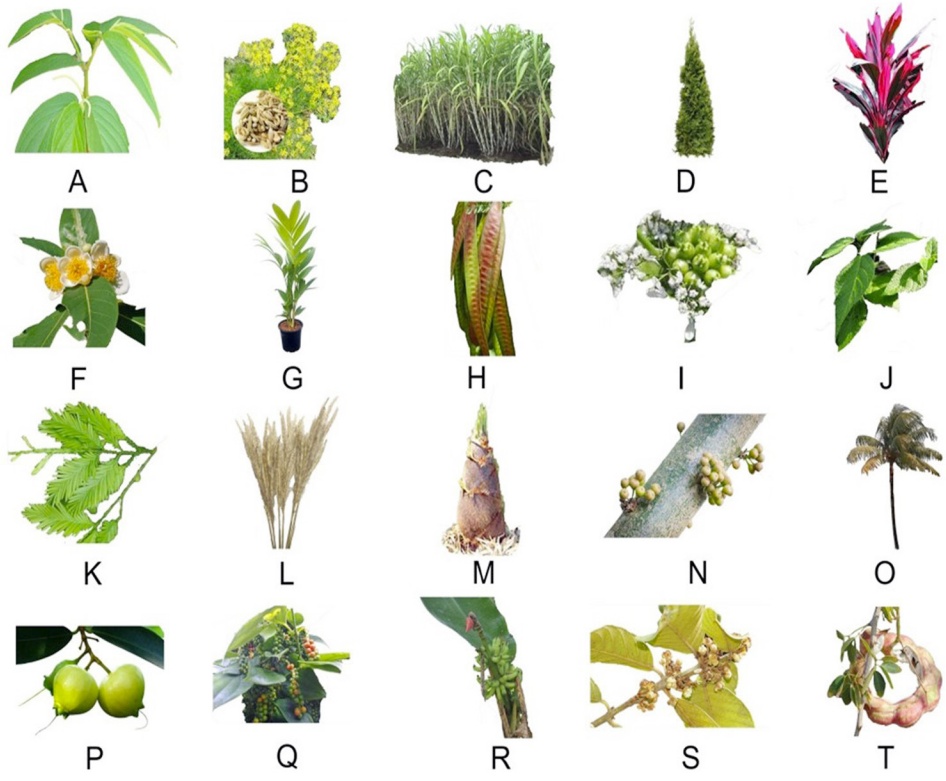

Figure 3. Various flora based on the reading Old Javanese literature and Old Javanese inscription in 12-14 century in the Malang Highlands Region: a. forest betel: *sirih hutan* (*Piper sp*.) b. hadas kusuma plant or star-anise: *hadas kusumā* (*Funiculum vulgae*), c. sugar cane: *tebu* (*Saccharun officinarum*), d. camara gunung: *cāmara: cemara gunung* (*Cupressus lusitania Mill*), e. *wungkudu*, Indian mulberry (*Morinda citrifolia*) f. puspo tree: *puspo* (*Schima wallichii Korth*), g. palm tree: *tapas*: *pinangan Jawa* (*Pinangan coranata*), h. legumes: *kacang-kacangan, kemlandingan* (Papiloneceae), i. *Ketumbar*/ coriander (*Coriadrun satium*), j. stinging nettle: *lalateng, lateng* (*Labtorsea sp*.), k. jamuju plant: *jamuju* (*Podocarpus imbricatus*), l. *alang-alang, ilalang* (*Laptorsea sp*.), m. *bambu petung* (*Dengrocalamus asper*), n. katu tree: *katu* (*Ficus sp*.), o. coconut palm *danta*: (*Cocos mucifera*), p. Jambu or rose apple *Jambu klampok*: *Syzygium jambos*, q. Mrica/ pepper: *mrica* long pepper: (*Piper retrofractum*), r. forest banana plant: *gedang alas* (*Nusa sapientum*), s. Palmyra palm: *tal* (*Listea sp*.), and t. *Asam* /tamarind tree (*Pithecolobium dulche*).

Based on a reading of the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngrok, the *Kakawin* Nāgarakĕrtāgama and the results of a diplomatic analysis of various inscriptions, it is possible to compile a list of the flora, growing and flourishing in the cultural landscape of the Malang Highlands Region at the times these works were written (Figure 3). Various types of flora can be distinguished as various sorts of plants and trees. The plants which were economically important and cultivated by people in that area were wet rice, upland rice, legumes, sugar cane, coconut, palms, and *petung* bamboo. The endemic plant species which

thrive only in the Bromo-Tengger-Semeru forest area, such as *mirica kacang, hadas kusumā, jamuju, hadas, jjlang, jamuju,* and *wungkudu,* are categorized as spice and medicinal plants as *jamu* plants. Because these plant types are endemic plant species, in the Jayapatra Inscription Charter (1172-1194 Ś) King Wisnuwardhana established rules for the sale and purchase of these herbs and spices (Stutterheim 1928).

C. The results of reading a variety of fauna in the Malang Highlands Region in the twelfth– to fourteenth-century Old Javanese literature

A reading of the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngrok (1535 Ś), produces the mention of the name of one type of animal. In Section 3: 6, is written: ... *ring Lĕbak, angon* ***kĕbo*** *sepasang*. The sentence is translated by Brandes (1920: 5) "in the village of Lĕbak, Ken Angrok is tending a pair of *kĕbo* or buffaloes". This is the only description of any fauna in this work. However, a further two readings of works of Old Javanese literature reveal that there were two types of categories of this animal: wild and domesticated, the latter used for agriculture, ploughing in both wet and dry rice-fields.

Various other types of animals in the Malang Highlands can be gleaned from a reading of the *Kakawin* Nāgarakĕrtāgama (1287 C), for instance, in *Canto* 50, 51, 52, 53, and *Canto* 54[10] (Ensink 1999: 60-62; Kern 1919: 128-137; Pigeaud 1960a: 56-61). The descriptions of the various types of fauna are enumerated in a scene in which King Hayam Wuruk goes hunting in the forest of Nandakawana, when the king visited Singasari in the Malang Highlands, after visiting Pasuruhan in 1281 Ś=1359 (Pigeaud 1960a). As explained earlier, the Nandakawana Forest might have been adjacent to the Bantaran Forest. At the time being discussed, the forest could be categorized as primary forest. When the king hunted in this forest, thought to be in the vicinity of the eastern slopes of Mount Arjuno (Figure 1), he used an ox cart.

In *Canto* 50, stanza 4 a type of animal called a *ma mṛga* is mentioned and in *Canto* 50 --- 5 --- 6 various types of animals are listed: *gawaya, göh, wök, lulāya, Śalya, cihna, godeya, plawaga, widala,* and *mrgendra*. *Canto* 51 --- 3 --- 4, written in the *tantri* verse style, again mentions various animals, among them *gawaya, serabha, wrssabha, tarakṣā,* and *mrgendra*. *Canto* 52 --- 4 reports that the *Śwa* animals were raging, while in *Canto* 54 --- 2 more species of animals are recorded: *kāryyaŋ, sūkara, kṛsnacāra, ruru*, and *cihnā* (Kern 1919: 130; Pigeaud 1960a: 50). The various types of animals said to be wild animals which inhabited the forest of Nandakawana and were considered game animals.

Whereas, the various types of animals mentioned in the *Kakawin* Nāgarakĕrtāgama are categorized as wild animals, the animal species described in the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngrok are categorized as domesticated animal (Suprapta 2015). Based on the analysis of Kern, Pigeaud, and Robson, the types of wild animals mentioned in the

[10] In their manuscript transcriptions, Kern (1919) uses the terms *Zang*, Pigeaud (1960a) *Canto,* Robson (1995) also uses *Canto*, and Slametmuljana (1953) uses *Pupuh*. The author follows Pigeaud and Robson.

Kakawin Nāgarakĕrtāgama: *Canto* 50, 51, 52, and 54, consist of various species of deer: *mṛga*, bulls: *ggawaya*, oxen: *göh*, wild boar: *wök*, bull: *gawaya*, forest buffalo: *lulāya*, some sort of rodent: *Śalya*, monitor lizard: *godeya*, a larger species of rodent: *cihna*, bobcat: *plawaga*, monkey: *widala*, Javan rhinoceros: *ggawaya*, buffalo: *serabha*, tiger: *tarakas*, civet cat: *mrgendra*, black antelope: *kṛsnacara*, porcupine: *ruru*, and a sort of rodent: *cihna*.

A couple of designations which are still being debated are what the type of animals *Śalya* and *cihnā* were. Kern connects these two types with the species of hares found on the steppes in China. Wallace's research (Wallace 2009) made absolutely clear that these animals have never been found in the wild in Java. It seems much more like that the sort of wild animal to which the name - *Śalya* and *cihnā* can be associated were various sort of rodents often called *warok* rats. This type of animal resembles a rabbit and is categorized as a wild animal and as a game animal hunted by the people of Java (Suprapta 2015). There is also still quite a debate about what sort animal a *mrgendra* was, Robson connects with the king of the forest animals, while Slametmuljana connects with the lions. The evidence seems to point to the definition of the species as the Javanese tiger, which is often referred to in various forms of Old Javanese literature as the king of the jungle. This is also supported by the results of Wallace's research that lions have never existed in Java.

An analysis of the reading of the *Sĕrat* Pārārāton Atawa Kātuturānira Ken Āngrok, also comes up with a type of animal referred to as ***kĕbo*** *sepasang, kĕbo* clearly associated with buffalo, an animal which has long since been domesticated. However, a species of wild buffalo: *lulaya*, could still be found in twelfth to fourteenth centuries.

A diplomatic analysis of a number of inscriptions - the Dinoyo I (682 Ś), Kubu Kubu (827 Ś), Sangguran (846 Ś), Gulunggulung (851 Ś), Linggasutan (851 Ś), Jĕrujĕru (825 Ś), and Prasasasti Jayapatra Singhasari (1191 Ś) - reveals the names of various animals in the Malang Highlands Region: *gâvah, mahişa, kbo, sapi, celaŋ, hurang, hayam, alap-alap, hayâm, knas iwak,* and *kura* (Brandes 1920; Suprapta 2015; Trigangga 2003). The first three are bovines: *gâvah*, buffalo: *mahişa*, buffalo: *kbo*, cow: *sapi*. Other creatures mentioned are swine: *celaŋ, celeng*, river crayfish: *hurang,* native chicken: *hayam*, deer: *knas*, tortoises: *kura*, and crested kite: *alap-alap*.

Again, the animals at that time can be further subdivided into game species and animals which have been domesticated. Game types are animal species *celaŋ*: wild pig, *hurang*: river shrimp, *knas*: deer, *kura*: tortoise, and *alap-alap*: crested kites. These game animals played an important part in religious ceremonies, for instance, the granting of a tax exemption (*sima swatantra*). The types of domesticated animals utilized in religious ceremonies are *hayam*: native chickens, *gâvah*: ox, *mahişa*: buffalo, *kbo*: buffalo, and *sapi*: cow (Suprapta 2015; Figure 4).

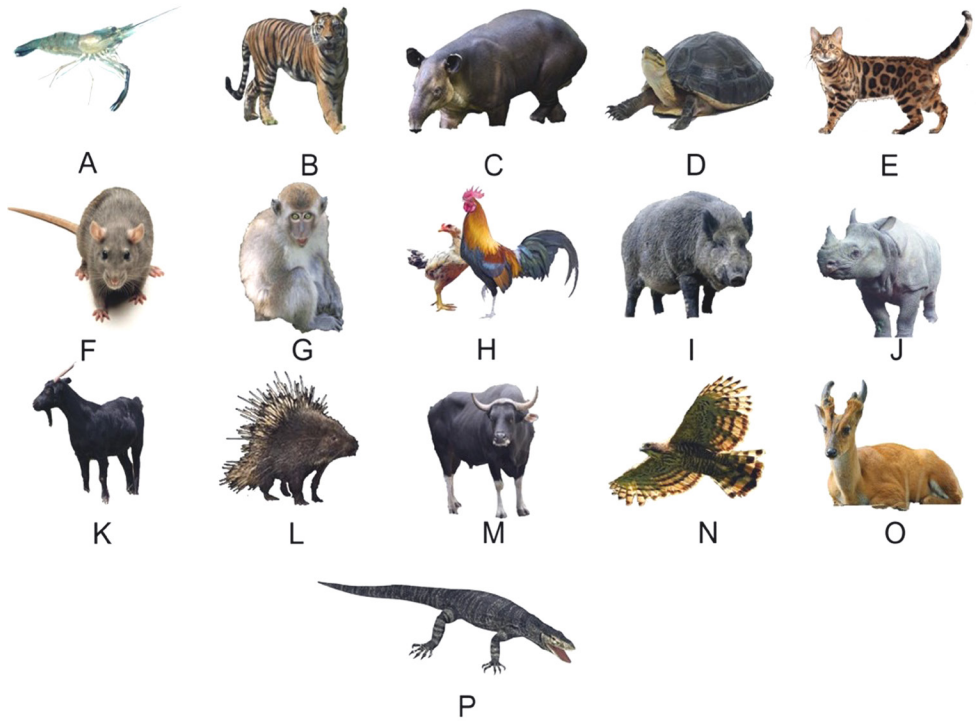

Figure 4. Various fauna based on the reading of Old Javanese literature and Old Javanese inscriptions in 12th-13th century in the Malang Highlands Region: a. river crayfish: *hurang* (Crusteae), b. tiger: *mrgendra* (*Felis tigris*), c. black antelope: *krnāsara* (*Naemorhedus javaensis*), d. tortoise: *kura* (*Cuora amboinensis*), e. bobcat: *lawaga: kuwok* (*Felis catus*), f. *warok* rat *Śalya*: *tikus werok* (*Bandicota setifera*), g. macaque monkey: *widāla* (*Macacus cynomolgus*), h. *kampong* chicken: *hayām* (*Gallus rasores*), i. wild boar: *wök:celeng* (*Sus vitatus*), j. Javan rhinoceros: *ganda* (*Rhinoceros sondaicus*), k. mountain/black goat?: *ksnāka* (*Naemorhaedus jawaensis*), l. porcupine: *ruru* (*Hystrix brachyura*), m. wild cattle: *ggawaya* (*Bos sondaicus*), n. the crested peregrine falcon: *alap-alap* (*Accipiter trivigatus*), o. deer: *mrga* (*Cervus equus*), and p. monitor lizard: *godewa* (*Varanus salvator*).

D. Discussion

The reading results of a variety of flora and fauna in Old Javanese between the late twelfth and fourteenth century have yielded authentic data which open the way for making a more detailed analysis of the species determination, zoological, ethno-zoological, and interpretation of geographical spatial in relation to the distribution of vegetation in a variety of flora and fauna. The results are set out in Table 1 and Table 2.

Literature reading results Old Javanese literature and inscriptions	Plant Determination		Classification of plants	Zone of altitude above sea level	Information
	Plant name	Nomenclature			
puspa	puspo/ nagasari tree	*Schima wallichii Kort*	tree	539-561 m	forest vegetation
bakulārjja	tanjung tree	Mimusops Elengi	tree	539-561 m	forest vegetation
nāgapuspa	nagasari/ puspo tree	*Schima wallichii Kort*: Mesua ferea	tree	539-561 m	forest vegetation
cāmara	cemara gunung tree	*Copresssus lusidania Mil*	tree	539-561 m	forest vegetation
danta	coconut tree	*Cocos nucifera*	tree	539-561 m	plant vegetation
tapas	Javanese areca palm tree	*Pinangan coranata*	tree	539-561 m	plant vegetation
bambu kuning	yellow bamboo	*Bambusa vulgaris*	grass	539-561 m	forest vegetation
kelopo gading kalapa	coconut palm	*Cocos nucifera*	tree plant	539-561 m	plant vegetation
lalatĕng	lateng	*Laportea sp*	understorey	588-601 m	forest vegetation
katu	katu tree	*Fikus sp*	tree	588-601 m	forest vegetation
waringin	banyan tree	*Ficus benjamina: Moraceae*	tree	588-601 m	forest vegetation
alalang	ilalang	*Imperata cylindrica*	grass	588-601 m	forest vegetation
tal	Palmyra palm	*Listea sp*	tree	588-601 m	plan vegetation
pari gogo	dry-field rice	*Oryza praecox*	understorey	588-601 m	plant vegetation
kacang-kacangaan	pulses/ Legumes	*Leguminosae*	understorey	588-601 m	forest vegetation
jambo	Rose apple/ guava	*Syzygium jambos*	tree	588-601m	forest vegetation
yavaq-yavika-Śayya	rice and barley	*Oryza praecox* and *Ponicum miliaceum*	understorey	500-550 m	plant vegetation
puśang sĕrĕh	betel vine	*Piper sp*	understorey	400 -724 m	forest vegetation
bawaŋ	Shallot	*Allium acalonicum*	understorey	400-724 m	plant vegetation
Ciñca	rendered as "fruit wine"	the types of plants?	understorey	650-707 m	plant vegetation
h ryyas	forest banana plant	*Musa sapientum*	understorey	650-707 m	forest vegetation

Literature reading results Old Javanese literature and inscriptions	Plant Determination		Classification of plants	Zone of altitude above sea level	Information
	Plant name	Nomenclature			
ma[ŋ]glar kawuŋ	related to tamarind trees	*Pithecolobium dulche*	tree	650-707 m	forest vegetation
ciñca twak	related to Palmyra palm	*Listea sp*	tree	599-614 m	forest vegetation
mirica kacang	pepper plants, and *ketumbar* (coriander) plants	*Piper restrogractum Coriadrun satium*	understorey	2091-2263 m	forest vegetation
hadas kusumā	fennel, Javanese star-anise	Funiculum vulgare	understorey	2091-2263 m	forest vegetation
jjlang	tree cabbage	*Cordyline fructicosa*	understorey	2091-2263 m	forest vegetation
wungkudu	ditto	*Caordyline fructicosa*	understorey	2091-2263 m	forest vegetation
tlu	species of large bamboo	Dendrocalamus asper	tree	650-707 m	forest vegetation

Tabel 1. Determination of flora in the Malang Highlands Region twelfth to fourteenth century.

Based on the data organized in Table 1, it seems that between the twelfth and fourteenth century the cultural landscape of the Malang Highlands Region, supported at last 28 species of flora. Using botanical nomenclature (Yatim 1999), the types of flora can be divided into understorey plants, trees, forest vegetation, and cultivated plant. The types of cultivated plant mentioned are upland dry-field rice, wet rice, millet, onions, beans, and coconuts. The types of plants found in the forest environment include Palmyra palm, coconut palms, forest bananas, various herbs and spices such as *mrica*, coriander, *jamuju*, *panjlang*, and *mangkudu*, which also had medicinal purposes.

A diplomatic reading of the Katiden Inscription (1317 Ś) contains an important note that the people living around Mount Lĕjar (*Gunung* Layar) were strictly instructed to protect one of the grasses, the *alang-alang*: *halalan*, and not burn it. In return, the community around the mountain was allowed to collect forest products in the *kekayu* forest, but it was forbidden to fell trees or to collect turtle eggs where the *kekayu* forest met the coast (Pigeaud 1960a; Yamin 1962). In the present perilous state of the environment preservation observed by the community at the behest of the state at that time.

To complement the study of distribution of diverse flora, below is a second table listing the diversity of fauna recorded in the Malang Highlands Region between the twelfth and fourteenth century.

Literature reading results Old Javanese literature and inscriptions	Fauna determination		Type of animal	Zone of altitude above sea level	Information
	Animal name	Nomenclature			
mṛga	deer	*Cervus equnus*	wild animal	456-479 m	related to hunting
ggawaya	wild cattle	*Bos sondaicus*	wild animal	456-479 m	related to hunting
goh	wild cattle or forest cattle	*Bos sondaicus*	wild animal	456-479 m	related to hunting
wök	wild boar	*Sus vitatus*	wild animal	456-479 m	related to hunting
lulāya	wild buffalo	*Bos bubalis*	wild animal	456-479 m	related to hunting
godeya	monitor lizard	*Varanus salvator*	wild animal	456-479 m	related to hunting
cihna	*warok* rat	*Bandicus setifera*	wild animal	456-479 m	related to hunting
plawaga	bobcat	*Felis cotus*	wild animal	456-479 m	related to hunting
widāla	monkey	*Macacus cynomolgus*	wild animal	456-479 m	related to hunting
ganda	Javan rhinoceros	*Rhinoceros sondaicus*	wild animal	456-479 m	related to hunting
kṛsnacāra	black antelope	*Naemorhaedus jawaensis*	wild animal	456-479 m	related to hunting
ruru	porcupine	*Hystrix brachyura*	wild animal	456-479 m	related to hunting
mrgendra	king of the forest / tiger	*Felis tigris*	wild animal (mythological)	456-479 m	related to hunting
Śwa	*celeng* or wild boar	*Sus vitatus*	wild animal	456-479 m	related to hunting
gâvah	cow or ox	*Bos indicus*	wild animal	500-550 m	related to hunting
mahiṣa,	buffalo	*Bubalus bubalus*	domesticated animal	500-550 m	related to agriculture
kĕbo	domesticated buffalo	*Bubalus bubalus*	domesticated animal	320-311 m	related to agriculture
sapi	domesticated oxen	*Bos indicus*	domesticated animal	400-724 m	related to agriculture
celaŋ	*celeng* or wild boar	*Sus vitatus*	wild animal game animal	400-724 m	related to the founding ceremony of *sima*

Literature reading results Old Javanese literature and inscriptions	Fauna determination		Type of animal	Zone of altitude above sea level	Information
	Animal name	Nomenclature			
hurang	river crayfish	Crustaceae	game animal	650-707 m	related to the founding ceremony of *sima*
alap-alap	crested peregrine falcon	*Accipiter trivigatus*	falconry	599-614 m	related to the founding ceremony of *sima*
hayâm	*kampong* chicken	*Gallus rasores*	domesticated animal	650-707 m	related to the founding ceremony of *sima*
knas iwak	barking deer	*Muntiacus muntjak*	game animal	650-707 m	related to the founding ceremony of *sima*
kura	tortoise	*Cuora amboinensis*	game animal	650-707 m	related to the founding ceremony of *sima*
hantiganing pasiran	related to sea turtles	*Chelonia mydas*	prohibited to hunt these animals	0 m	relating to the prohibition of animal capture on the coast

Tabel 2. Determination of fauna in the Malang Highlands Region twelfth to fourteenth century.

Extrapolating data from Table 2, it can be seen that there were at least 32 types of fauna indigenous to the Malang Highlands Region between the twelfth and fourteenth century. The various types of fauna can be categorized into wild animals which lived in primary forests and domesticated animal related to agricultural activities. The wild animals can be divided into animals capture to be used in the ceremony held to grant a tax exemption of *sima* and wild animals such as sea turtles on which there was a hunting prohibition.

It is important to note that in era between the twelfth and fourteenth centuries, in the Malang Highland Region landscape live rare animals such as Javan rhinoceros, tapirs, wild buffalo, and wild cattle still inhabited the region (Figure 4). By the time Wallace did his research in nineteenth century

(Wallace 2009: 72-73), these animals were no longer to be found there. At present these animals can only be found in national parks at Ujung Kulon, Meru Betiri, and Alas Purwo.

The interpretation of the reconstruction of flora and fauna distribution in the Malang Highlands Region in the twelfth to fourteenth centuries in that particular geographical space, was carried out using a reference approach to the vegetation analysis of Bromo-Tengger-Semeru National Park (*Laporan Inventarisasi Flora* 1997) and R. Soeryo Raya Forest Park (UPT TAHURA R. Soerjo 2010). Based on the data presented in Tables 1 and 2, it is possible to reconstruct to some extent at least the distribution of flora and fauna in the Malang Highlands in the twelfth to fourteenth centuries. The distribution of flora and fauna, at an altitude of 400-750 m above sea level, is categorized as lowland rainforest with various types of plants which were used by the people in that period. The types of plants in question are rice (*Oryza praecox*), millet (*Panicum miliaceum*), sugar cane (*Saccharum officinarum*), forest bananas (*Musa sapientum*), and types of legumes and pulses (*Papilonaceae*). There were also cultivated trees and grasses, such as tamarind (*Pithecolobium dulche*), *betung* bamboo (*Dengrocalamus asper*), Palmyra palm (*Listea sp.*), Javanese areca (*Pinangan coronata*), coconut palm (*Cocos nucifera*), and rose apple (*Acymena acuminatissina*).

Besides these cultivated trees, there were lowland rain forest trees such as the *katu* tree (*Ficus sp.*), *puspo* tree (*Schima wallichii Korth*), and cypresses (*Cupressus lusidania Mil*). There were also large tracts of lowland rain forests such as the Skārpandan, Bantaran, Térwak, and Nandakawana Forests. It is possible that the vegetation of these forests consisted of the trees mentioned above plus tamarind trees (*Pithecolobium dulche*), *betung* bamboo (*Dengrocalamus asper*), and Palmyra palms (*Listea sp.*), interspersed with plants such as *lateng* (*Laportea sp.*) and reeds (*Imperata cylindrica*).

The botanical distribution at an altitude of 750-1,500 metres above sea level was possibly still dominated by a large variety of rain forest trees which grew in high density cluster (*Laporan Inventarisasi Flora* 1997). In this altitude zone, in addition to trees a number of undergrowth plants such as forest betel (*Piper sp.*), mrica (*Piper retrogractum*), coriander (*Coriadrum sativum*), *hadas kasuma*/star anise (*Funiculum vulgare*), *jamuju* (*Podacarpus inbricatus*), *pañjlanglang* (*Cordyline fructicosa*), and *wungkudu* (Table 1) were to be found. Some of the lower-growth species are categorized as herbs or medicinal plants and in the thirteenth century regulations were issued by the state, the kingdom of Siŋhasari limiting the buying and selling these types of plants (Stutterheim 1928).

Based on TNBTS inventory results, undergrowth such as betel vines (*Piper sp.*), mrica (*Piper retrogractum*), coriander (*Coriandrum sativum*), star anise/ *hadas kasumā* (*Funiculum vulgare*), and *pañjlang* (*Cordyline fructicosa*) were found only in the Bromo-Tengger-Semeru region. Whereas the *jamuju* (*Podacarpus imbricatus*) and "*wungkudu*" species are only found in the Arjuno-Anjasmoro-Welirang area at an altitude of 750-1,500 m above sea level, so they can be included as endemic plants (UPT TAHURA R. Soerjo 2010; Stutterheim 1928).

The area at an altitude of 1,500-2,500 m above sea level, is a transitional area (*ecotone*) containing two different types of vegetation: meadow vegetation

and mountain forest vegetation. At this height, undergrowth such as forest betel (*Piper sp*.), mrica (*Piper retrogractum*), coriander (*Coriadrum satvium*), and *pañjlang* (*Caordyline fructicosa*) are no longer found, but star anise *hadas kusumā* (*Funiculum vulgare*) can still be found (*Laporan Inventarisasi Flora* 1997).

At an altitude of 400-750 m above sea levels in a lowland rainforest vegetation environment, based on what has been recorded in the Nāgarakĕrtagama, 50: 4--5, --- 6, 51: 2 --- 3 --- 4, various types of fauna wild like *mrga*: deer (*Cervus equnus*), *ggawaya*: banteng (*Bos sondaicus*), *wök*: boar or wild boar (*Sus vittatus*), *lulāya*: forest buffalo (*Bos bubalis*), *Śalya*: rodents (*Lepus cuniculus*), *godeya*: monitor lizards (*Varanus salvator*), *plawaga*: bobcats (*Felis catus*), *widāla*: macaque monkeys (*Macacus cynomolgus*), *ganda*: Javan rhinoceros (*Rhinoceros sondaicus*), *wrsabha*: wild cattle/banteng (*Bos sondaicus*), *krnāsara*: antelope (*Naemorhedus*), *ruru*: porcupines (*Hystrix brachyura*), and *mrgendra*: king of the forest/tiger (*Felis tigris*) (Ensink 1999; Yatim 1999), and other wild birds such as *alap-alap* (*Accipiter trivigatus*) and river creatures *hurang* or shrimp (Crustaceae).

At an altitude of 1,500-2,500 m above sea level, based on a vegetation analysis (UPT TAHURA R. Soerjo 2010), the land was possibly inhabited by various species of fauna, such as *mrga*: sambar deer (*Cervus equina*), *wök*: wild swine (*Sus vittatus*), *godeya*: monitor lizards (*Varanus salvator*), *plawaga*: bobcats (*Felis catus*), *widala*: macaques (*Macacus cynomolgus*), *ruru*: porcupines (*Hystrix brachyura*), and *mrgendra*: king of the forest/tiger (*Felis tigris*), plus several species of bird such as crested goshawk (*Accipiter trivigatus*), partridge, chicken (*Gallus verius*), and peacocks (*Pawo muticus*) (Wallace 2009). An examination of these description shows that the types of flora and fauna in the Malang Highlands Region between the twelfth and fourteenth centuries at an altitude of 750 m-2,500 m above sea level did not differ greatly from those to be found in the Arjuno-Welirang-Anjasmoro region and Bromo-Tengger-Semeru at the present time. So not much has changed.

Certainly, some of the animals have alas disappeared from the area, probably as result of loss of habitat, overexploitation, and environmental changes cause by the enormous eruption of *Gunung* Kamput in the period, recorded in the *Kitab* Pārārāton (Brandes 1920). This needs further research.

4. Conclusion

Looking at the data presented above, it is possible to draw some conclusions about the variety of flora and fauna in the Malang Highlands Region six to eight hundred years ago. The reading results have yielded a record of 28 types of flora and 32 types of fauna, spread in the Malang Highlands Region at altitudes of 400-750 m, 750-1,500 m, and 1,500-2,500 m above sea level.

The distribution of the 28 types of flora, consists of both understorey plants and trees. Undergrowth species such as upland rice and wet rice (*Oryza praecox*), millet (*Panicum miliaceum*), sugar-cane (*Saccharum officinarum*), forest bananas (*Musa sapientum*), and legumes (*Papilonaceae*) were the types of plants which would have sustained the community. In addition, some of the other

types of plants which still flourish there are tamarind tree (*Pithecolobium dulche)*, bamboo *betung* (*Dengrocalamus asper*), the Palmrya palm (*Listea sp*), Javanese areca palm (*Pinangan coranata*), coconut palm (*Cocos nucifera*), and rose apple (*Acymena acuminatissina*).

Undergrowth species such as betel vines (*Piper sp.*), mrica (*Piper retrogractum*), coriander (*Coriandrum sativum*), star anise *hadas kasumā* (*Funiculum vulgare*), and *pañjlang* (*Cordyline fructicosa*) are only found in the Bromo-Tengger-Semeru region, so they can be included as endemic plants. Whereas *jamuju* (*Podacarpus imbricatus*) and "*wungkudu*" species are only found in the Arjuno-Anjasmoro-Welirang area at an altitude of 750-1,500 m above sea level, so that they can be included as endemic forest plants. Some of the lower-growth species are categorized as herbs or medicinal plants the buying and selling of which were strictly regulated in the thirteenth century by the state, the kingdom of Siŋhasari.

Looking at the organization of the sale and purchase of four plants, based on a diplomatic analysis on the Gulunggulung Inscription (551 Ś), it would seem fair to say there must have been some management of primary forests in Bantaran. Importantly, half the forest products were specifically used for the maintenance of sacred buildings. A reading on the Katiden Inscription (1317 Ś) revealed the same set of circumstances; the people who lived around *Gunung* Lĕjar were required by the state to monitor the *alang-alang* grass on the mountain and not to set it alight. In return, the community was allowed to take forest products from the Kekayu Forest, but was strictly forbidden to fell trees. Likewise, there was a prohibition on taking turtle eggs where the forest reached down to the coast. Therefore, it would seem that, even as early as the twelfth to the fourteenth century, there were state regulations to safeguard the conservation of natural resources; early environmental preservation in the Malang Highlands Region.

This reading in search of the distribution of fauna, has yielded about 32 species of fauna, consisting of wild animals, animals, and animals which had been domesticated. Domesticated animal such bovines were very much associated with agricultural activities in the *sawah* and *tegal*. There were a number of types of rare wild animals; banteng/wild cattle (*Bos sondaicus*), *lulaya*: forest buffalo (*Bos bubalis*), *ganda*: Javan rhinoceros (*Rhinoceros sondaicus*), *wrsabha*: wild cattle of Java (*Bos sondaicus*), and *krnāsara*: black antelope/black mountain goat (*Nemorhaedus jawaensis*). By the nineteenth century when Wallace made his notes, these animals had all disappeared. This extinction of endangered wild animals needs further research. Based on a diplomatic analysis of various inscriptions, it is known that the capture of wild animals such as *wok*: wild swine (*Sus vittatus*), kite (*Accipiter trivigatus*), shrimp (*Crustacea*), and coastal turtles (*Chelonia mydas*) was carried out in connection with ceremony for the issuing of a *sima*. Wild boar was captured, the meat was processed to preserve it and as part of the offerings on the occasion of the granting of a *sima*. Based on the results of this reading, it can be concluded that between the twelfth and fourteenth century in the Malang Highlands Region,

there were still large numbers of fauna. Some wild animals were the hunting preserve of kings; the uses of others were restricted to religious ceremonies, such as the issuing of a *sima*.

References

Bemmelen, R.W. van. 1949. *The geology of Indonesia. Vol I A. General geology of Indonesia and adjacent archipelagos*. The Hague: Government Printing Office.

Berg, C.C. 1930. *Rangga Lawe: Middeljavaansche historische roman*. Weltevreden: Albrecht.

Boechari. 1985/1986. *Prasasti Koleksi Museum Nasional, Jilid 1*. Jakarta: Proyek Pengembangan Museum Nasional.

Brandes, J.L.A. 1913. *Oud-Javaansche oorkonden; Nagelaten transscripties*. Batavia/'s Hage: Albrecht/M. Nijhoff. [Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen Deel LX.]

Brandes, J.L.A. 1920. *Pararaton (Ken Arok) of het boek Der Koningen van Tumapĕl en van Majapahit*. 's-Gravenhage/Batavia: Martinus Nijhoff/Albrecht. [Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen Deel LXII.]

Ensink, J. 1999. "Review of Mpu Prapañca (1995, *Deśawarṇana (Nāgarakṛtāgama)*, Translated by Stuart Robson)", *Journal of Southeast Asian Studies* 30(2): 383-384.

Junghuhn, F.W. 1849. *Java, deszelfs gedaante, bekleeding en inwendige structuur* (Vol. 2). Amsterdam: PN van Kampen.

Kern, H. 1919. *Het Oud-Javaansche lofdicht Nāgarakrtāgama van Prapañca* (1365 A.D.). Tekst, vertaling en bespreking, overgedrukt uit de Verspreide Geschriften, Deel VII-VIII van H. Kern; Met aanteekeningen van N.J. Krom. 's-Gravenhage: Nijhoff.

Mohr, E.C.J. 1922. *De grond van Java en Sumatra*. Amsterdam: J.H. de Bussy.

Molen, W. van der. 2011. *Kritik teks Jawa; Sebuah pemandangan umum dan pendekatan baru yang diterapkan kepada Kunjarakarna*. Jakarta: Yayasan Pustaka Obor Indonesia.

Pigeaud, T.G. Th. 1924. *De Tantu Panggĕlaran; Een Oud-Javaansch prozageschrift; Uitgegeven, vertaald en toegelich*. 's-Gravenhage: Smits.

Pigeaud, T.G.T. 1960a. *Java in the 14th century; A study in cultural history*, 5 vols. The Hague: Martinus Nijhoff.

Pigeaud, Th.G.Th. 1960b. *Javanese texts in transcription in Java in the 14th century; A study in cultural history. The Nāgara-Kĕrtāgama by Rakawi, Prapañca of Majapahit, 1365 AD*. Vol 1. The Hague: Martinus Nijhoff. [Koninklijk Instituut voor Taal-, Land- en Volkenkunde Translation Series 4.]

Pigeaud, Th.G.Th. 1960c. *Notes on the texts and the translations in Java in the 14th century; A study in cultural history. The Nāgara-Kĕrtāgama by Rakawi, Prapañca of Majapahit, 1365 AD*. Vol 2. The Hague: Martinus Nijhoff. [Koninklijk Instituut voor Taal-, Land- en Volkenkunde Translation Series 4.]

Poerbatjaraka. 1951. *Riwayat Indonesia Djilid I*. Djakarta: Jajasan Pembangunan.

Poesponegoro, Marwati Djoened, Nugroho Notosusanto, R.P. Soejono, and R.Z. Leirissa. 2010. *Sejarah nasional Indonesia, Vol. 2: Zaman kuno.* Jakarta: Balai Pustaka.

Robson, S. 1995. *Deśawarnana (Nāgarakertāgama) by Mpu Prapañca*. Leiden: KITLV Press. [Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde 169.]

Slametmuljana. 1953. *Prapantja Nagarakretagama; diperbaharui kedalam bahasa Indonesia*. Jakarta: Siliwangi.

Soekmono, R. 2002. *Pengantar sejarah kebudayaan Indonesia 2*. Yogyakarta: Penerbit Yayasan Kanisius.

Stutterheim, W.F. 1929. "Transscriptie van een defecte oorkonde op bronzen platen uit het Malangsche", in: *Oudheidkundig Verslag 1928,* pp. 106-108. Weltevreden/'s-Gravenhage: Albrecht/Nijhoff.

Suhadi, M. and K. Richadiana. 1996. *Laporan penelitian eipgrafi di wilayah Provinsi Jawa Timur.* Jakarta: Pusat Penelitian Arkeologi Nasional, Departemen Pendidikan dan Kebudayaan.

Suprapta, B. 2015. *Makna gubahan ruang situs-situs Hindhu-Budha masa Siŋhasari abad XII-XIII Masehi di Saujana Dataran Tinggi Malang dan sekitarnya.* PhD thesis, Universitas Gadjah Mada.

Laporan Inventarisasi Flora. 1997. *Laporan inventarisasi flora (tanaman obat-obatan dan tanaman hias) di Taman Nasional Bromo Tengger Semeru (TNBTS).* Malang: Departemen Kehutanan Direktorat Jenderal Perlindungan Hutan dan Pelestarian Alam.

Trigangga. 2003. *Tiga prasasti jaman Raja Sindok.* Jakarta: Museum Nasional.

UPT TAHURA R. Soerjo. 2010. *Profil Taman Hutan Raya Raden Soerjo.* Malang: Dinas Kehutanan Provinsi Jawa Timur.

Vink, A.P.A. 1983. *Landscape ecology and land use.* London: Longman.

Wallace, A.R. 2009. *Kepulauan Nusantara; Sebuah kisah perjalanan, kajian manusia dan alam.* Depok: Komunitas Bambu.

Watson, P.J. 1979. "The idea of ethnoarchaeology; Notes and comments", in: C. Kramer (ed.), *Ethnoarchaeology; Implications of ethnography for archaeology,* pp. 277-287. New York, NY: Columbia University Press.

Yamin, M. 1962. *Tatanegara Madjapahit: Jaitu risalah sapta-parwa berisi 7 djilid atau parwa, hasil penelitian ketatanegaraan Indonésia tentang dasar dan bentuk negara Nusantara bernama Madjapahit, 1293-1525* (Vol. 4). Djakarta: Prapantja.

Yatim, W. 1999. *Kamus biologi.* Jakarta: Yayasan Pustaka Obor Indonesia.

Yunus, H. S. 2010. *Metodologi penelitian wilayah kontemporer.* Yogyakarta: Pustaka Pelajar.

Zoetmulder, P.J. and S.O. Robson. 1995. *Kamus Jawa Kuna-Indonesia* (Vol. 2, P-Y). Jakarta: Gramedia.