



Empowerment and Development of Biodiversity Assets as Natural Parks and Educational Tourism Destinations at KCBN Muarajambi Through the MBKM Program of Universitas Jambi

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Abstract. Research in the Muarajambi National Cultural Conservation Area from 1975 to 2021 has produced various findings that have brought progress to science. The results of the latest interpretation are known as an educational center from the 7th to 12th centuries AD, whose remains are spread over an area of 3,981 ha, with 82 temple structures that are still hidden and 12 temples that have been restored. The Muarajambi National Cultural Conservation Area, in addition to storing a wealth of cultural heritage, assets, traditions, arts, and local knowledge, also store biodiversity assets, both flora, and fauna, that has existed since the period of occupation or their use as an educational center. The results of archaeological research have gradually opened up knowledge of the paleobiodiversity of Muarajambi KCBN, which is important for the restoration phase to be studied for the sake of environmental conservation, education, and tourism. This field is based on a review of research at KCBN Muarajambi, which is still very minimal; therefore, Universitas Jambi, as a higher education institution, takes the role of conducting research entitled; Empowerment and Development of Biodiversity Assets as a Nature and Educational Tourism Destination at KCBN Muarajambi through MBKM Program. This study used a multidisciplinary method; archaeology, biology, management, law, and cultural tourism. The results of the study reveal that there is a wealth of biodiversity in KCBN Muarajambi, which is inter-related and has become an important part of the culture at KCBN Muarajambi. This research is also a forum for implementing MBKM for students of Universitas Jambi who are involved in helping with data collection and analysis. The research outputs are in the form of the conceptual design academic manuscripts, biodiversity development maps, maps of natural and educational tourism development, as well as recommendations to relevant stakeholders, namely BPCB Jambi, Muarajambi Regency Tourism Office, Muarajambi Village Government, and the wider community.

Keywords: Biodiversity · Culture · KCBN Muarajambi · Tourism

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1 Introduction

Jambi, in the classical period, the 7th to 15th centuries AD, had become an international area visited by seekers of knowledge from various parts of the world, including the most intense ones from India and China. The Karang Brahi inscription, which was found at Merangin-Jambi, shows the number of years that are contemporaneous with the Kota Kapur inscription in the Palembang region, namely the 4th century AD. This data shows that Jambi has undergone a process of cultural and religious acculturation with Indian civilization, at least from the 4th century AD. Two centuries later, a student from China named It-Sing, wrote in his travel notes entitled; Nan-hai-chi-Kuei-nai-fa-ch “aun,” which was later translated by Takakusu into English entitled “A Record of The Buddhist Religion as Practised in India and the Malay Archipelago during AD 671–695”. It-Sing explained his departure for Mo-Lo-Yo, then stopped at a large port at the mouth of the river, before finally, together with the ship belonging to the king of Mo-Lo-Yo, following the river upstream to an important educational center to learn Sanskrit grammar before continued his studies at Nalanda-India. On that note, It-Sing also said that for anyone who wants to study at Nalanda-India, it is better to study at Mo-Lo-Yo [1].

It-Sing describes the education center in the Mo-Lo-Yo country as a place located on the banks of a large river, and high walls surround many buildings. At that place, at least 1000 monks were studying, and they came from various nations. It-Sing also provides a geographical description of the center of education, namely, in the middle months and towards the end of the year, the sun shines without a shadow, or in other words, the area is close to the equator. Several trials have been carried out at several archaeological sites and sites, but of the many sites, only one is as close to the suit as It-Sing describes in his records from the 7th century AD [2]. The latest data states that 12 buildings have been reconstructed, and at least 82 points are still waiting to be followed up. There are many buildings and structures made of brick in various forms. There are statues of Prajnaparamitha, Dwarapala, a brick stupa, and Buddhist mantras written on metal and terracotta plates [3].

Muarajambi National Cultural Heritage Area as an educational center in the 7th century AD, in addition to developing knowledge through the five disciplines, taught, as described in Agus Widyatmoko’s dissertation (2015), that it is assumed, based on comparative studies between Nalanda, in India and Tibet which is still carry out the educational tradition of Guru Atisha’s teachings, namely the “Panca Widya”; medicine, engineering, art, literature, philosophy, and psychology [4]. To develop learning while creating landscapes that support daily activities, biodiversity was developed around the area at that time. This study is even more interesting when compared to the current state of the biodiversity of the Muarajambi National Cultural Conservation Area. So the research question arises, how is the biodiversity of the Muarajambi Cultural Conservation Area at present, and what kind of involvement and forms of learning implementation can be done at KCBN Muarajambi related to the field of biodiversity.

To answer the research questions, a multidisciplinary approach was used between archeology, biology, social science, and law, which resulted in information and maps of the distribution of biodiversity in the Muarajambi National Cultural Heritage Area

(KCBN), as well as in the collection and identification of biodiversity data for study program students. Archaeology, biology, forestry, government science, and law are actively involved in the implementation of MBKM and non-MBKM programs.

2 Method

Biodiversity Research in the Murajambi Cultural Conservation Area uses a multidisciplinary approach of collaboration between archeology, biology, forestry, government science, and legal studies in formulating regulations for biodiversity protection at KCBN Muarajambi, which are considered very minimal. An archaeological approach in collecting and identifying biodiversity in the past at the research site, as well as a biological approach in collecting data and identifying biodiversity at the research site at the present time. The government science collects data related to the involvement of the Muara Jambi Village government in biodiversity conservation at the research site. The results of data collection will be processed into a map of the distribution of biodiversity as well as the basis for compiling an academic paper on the draft regulation of the Muaro Jambi district in terms of protecting the biodiversity of the Muarajambi National Cultural Heritage Area as a cultural forest.

The archaeological method approach carried out in the Muarajambi National Cultural Heritage Area in identifying past biodiversity uses the pollen analysis method from the excavation box in the laboratory to identify plants that lived in the past [5]. The identification of current biodiversity uses the single plot method; with this method, the sample is taken in a single large plot, and in it are scattered small plots to be analyzed. Thus, a single large plot is considered to be representative of the location to be analyzed. This method can be used if the condition of plant vegetation and fauna area in the research area is relatively the same in terms of topography, soil pH, and soil water content. The layout of the single plots and the size of each plot are shown in Figs. 1 and 2 [6].

Then the single plot was further specified by collecting data with a sampling intensity of 0.5%, with a total of 40 plots. Where each plot is detailed as a sampling plot in the area of Muarajambi KCBN, which is divided into 2 clusters (1 and 2), and each cluster has 40 grids. Each cluster is handled by a flora and fauna team consisting of 2 biology students and two archeology students assisting in the identification of archaeological sites and mapping. Likewise, other clusters are handled by a team of flora, fauna, and archaeologists who go to the field every day for seven days.

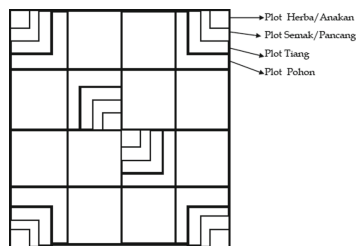


Fig. 1. Single-plot method layout

To facilitate data collection and mapping of biodiversity, each cluster has a grid with a size of 200x200 m, each of which has ten grids. The plot will be placed by purposive sampling, meaning by looking at certain criteria. The number of plots is determined by the following formula [7].

$$f = \frac{n}{N}$$

Information:

f = sampling intensity, n = number of plots, N = population

Then the number of populations that will be used to find the number of plots with the above equation is as follows.

Area: 315 ha

Plot size: 20x20 m = 400 m² = 0.04 ha

$$N = \frac{\text{Area}}{\text{plotsize}}$$

$$N = \frac{315\text{ha}}{0.04\text{ha}}$$

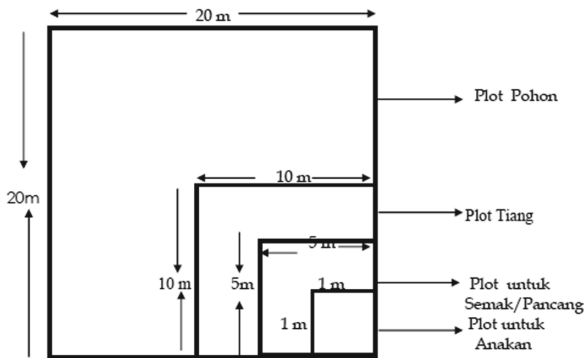
N = 7,875.

So, to determine the number of plots that will be used in the field during the study, it is as follows.

$$f = \frac{n}{N}$$

n = f x N

n = 0.5% x 7.875 = 3.93 rounded up to 40 plots.



The research data will be analyzed using Microsoft Excel by looking for density, relative density (KR), frequency, relative Frequency (FR), dominance, relative Dominance (DR), significant value index (INP), Shannon-Wiener diversity index, and species evenness [8].

Density (K)

K = number of individuals

The total area of the sample plot

Relative Density (KR)

KR = Number of a type x 100%

Number of individuals

Frequency (F)

F = number of sample plots found for a species

The total number of sample plots

Relative Frequency (FR)

FR = Frequency of a species x 100%

Frequency of all kinds

LBDS = .d2

Dominance

D = Total area of base bidang

Sample area

Relative Dominance (DR)

DR = Dominance of a species x 100%

The Dominance of all kinds

Important Value Index (INP)

INP = Relative Density (KR) + Relative Frequency (FR) + Relative Dominance (DR)

Species Diversity Index (H')

$H' = -\sum P_i \ln(P_i)$

Information:

H' : Shannon-Wiener Diversity Index

$$P_i = \frac{n_i}{N}$$

n_i : Number of individuals of type i

N: Total Number of individuals of all species

The diversity index value category, according to Shannon-Wiener, ranges from 1–3, namely:

$H' = < 1$, including low-level diversity

$H' = 1-3$, including a moderate level of diversity

$H' = > 3$, including a high degree of diversity

Evenness Type Evenness Index (E)

The evenness type evenness index (E) is calculated using the following formula.

$$E = \frac{H'}{\ln S}$$

Information:

E: Evenness Evenness Index

H' : Shannon-Wiener Diversity Index

S: Number of species

The category of evenness level of a species in a community has used the value of E as follows.

$E = 0 < 0.3$ (the level of evenness of the species is low)

$E = 0.3 < 0.6$ (the level of evenness of species is classified as moderate)

$E = > 0.6$ (the level of evenness of species is high).

3 Result and Discussion

From the results of biodiversity data collection activities carried out in the Muarajambi National Cultural Conservation area for seven days by two clusters; 1 and 2, by a team of biology students and archeology students, the results of data collection can be seen in a map of the distribution of biodiversity that has been processed based on field data analysis as follows.

Map of the distribution of biodiversity in the Muarajambi National Cultural Conservation Area. Based on the results of data collection, identification, and analysis of biodiversity in the Muarajambi national cultural heritage area, it can be seen the types and distribution patterns of biodiversity currently found in the area (see attachment map 1 and map 2).

Implementation of the MBKM program in the identification of biodiversity assets in the Muarajambi National Cultural Conservation Area. The implementation of the MBKM program for students of archeology, biology, forestry, government science, and law studies in biodiversity research at KCBN Muarajambi follows the guidelines that have been compiled in a daily log format in accordance with the study learning plan as well as on the activity theme, namely the identification of flora and fauna in the area.

Research activities from the results of monitoring in the field during activities and seeing the results of the research can be categorized that the MBKM program produces several student abilities; 1. Teamwork, 2. Scientific collaboration, 3. Broadening the horizons of multidisciplinary research, 4. Adaptation to the environment around the research, 5. Good and effective communication with the team and village community, 6. Exchange of knowledge with fellow teams and village communities. 7, deepening theoretical knowledge with direct practice under the guidance of expert lecturers in their fields.

However, in addition to the advantages of implementing the MBKM program in biodiversity research at the Muarajambi KCBN, there are also weaknesses. This can be seen from the results of daily log monitoring and evaluation during research activities in the field, 1. Requires quite a lot of funding compared to regular lectures, 2. Requires more preparation than lectures in class, 3. Requires more lecturer monitoring and guidance than regular lectures in class.

4 Closing

- 1) Biodiversity in the Muarajambi National Cultural Heritage Area has undergone a change in form compared to the period of its cultural layer in the 7th to 12th centuries AD

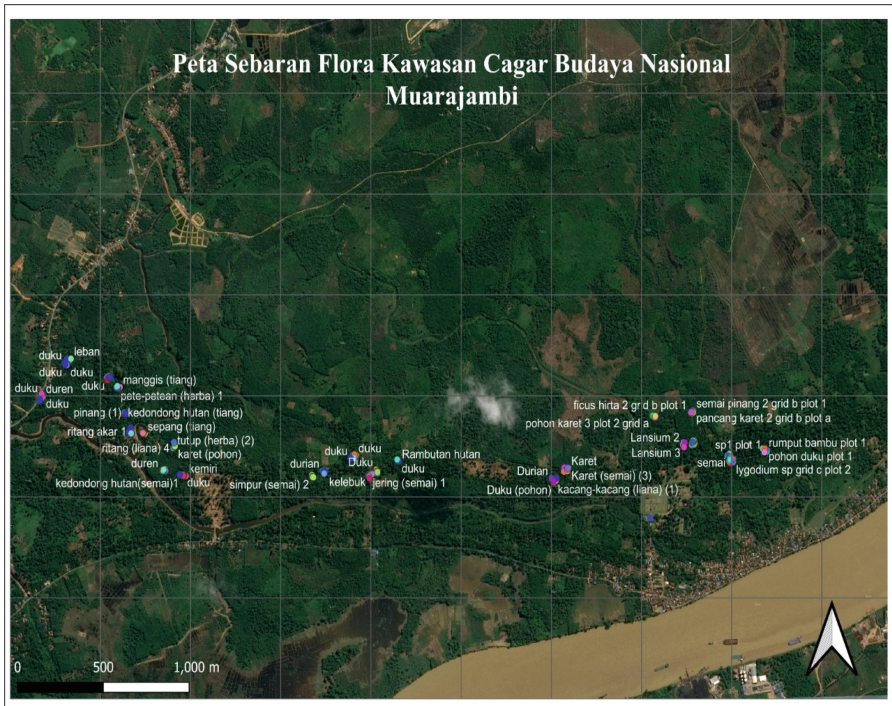
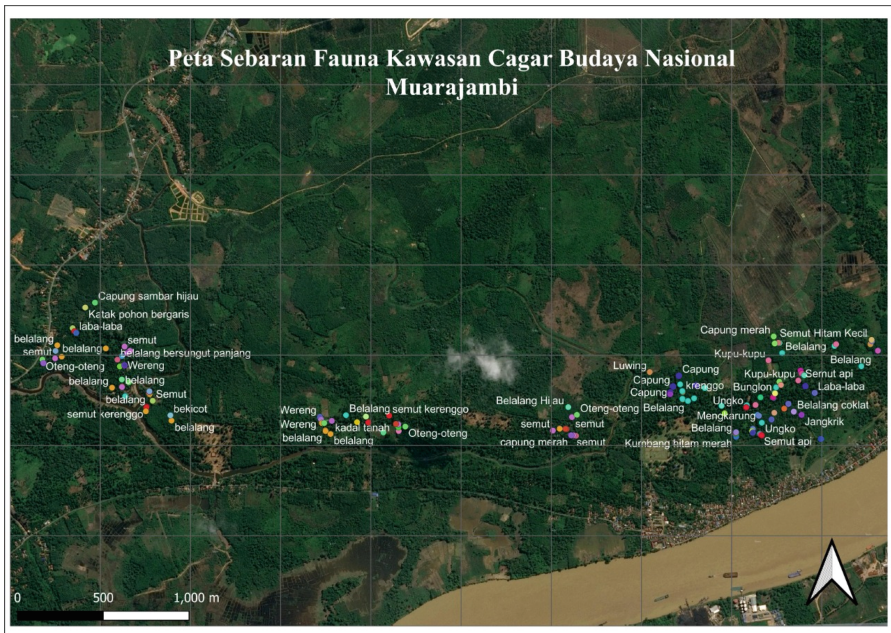


Fig. 2. Map 1 Flora in KCBN Muara Jambi

- 2) Many endemic and typical plants of Muarajambi as learning centers have disappeared and have been replaced by crops of economic needs such as rubber and oil palm
- 3) Some of the fauna depicted in the statues and reliefs of Muarajambi are difficult to find due to changes in biodiversity
- 4) The implementation of the MBKM program in biodiversity research at the Muarajambi KCBN is very effective for learning and assisting the development of the Muarajambi National Cultural Heritage Area as a center for multidisciplinary learning in the past, present, and future.

Attachment



Map 2 Fauna in KCBN Muara Jambi

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