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# KALPATARU

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BADAN RISET DAN INOVASI NASIONAL (BRIN)

dan

PERKUMPULAN AHLI ARKEOLOGI INDONESIA (IAAI)

2023

**Kalpataru** merupakan jurnal ilmiah yang memiliki ruang lingkup kajian prasejarah Asia Tenggara dan wilayah sekitarnya. Pertama kali diterbitkan pada tahun 1985 sebagai jurnal arkeologi tematik oleh Pusat Penelitian Arkeologi Nasional. Mulai edisi 2022, Kalpataru dikelola oleh Badan Riset dan Inovasi Nasional bekerjasama dengan Perkumpulan Ahli Arkeologi Indonesia (IAAI). Ruang lingkup jurnal dikhususkan pada kajian prasejarah, meliputi tinggalan budaya, manusia, dan lingkungan pada masa prasejarah dan proto-sejarah. Sudut pandang ilmu selain arkeologi, baik ilmu eksakta maupun humaniora dipersilahkan turut berkontribusi dalam jurnal ini. Kalpataru terbit dua kali dalam setahun, pada bulan Juli dan Desember.

***Kalpataru*** *is a peer-reviewed scientific publication on the prehistory of Southeast Asia and its surrounding areas. Initially released in 1985 as a thematic journal, it was published biannually by the National Research Centre of Archaeology. Starting in the 2022 edition, Kalpataru is under the co-management of the National Research and Innovation Agency (BRIN) and the Association of Indonesian Archaeologists (IAAI), shifting its journal's focus to a prehistoric archaeology theme with the scope of materials such as culture, humans, and environment during the prehistoric and proto-historic periods. The perspectives from cross-disciplines other than archaeology, both hard sciences and soft sciences, are welcome. Kalpataru is published biannually in July and December.*

# FOREWORD

All praise and gratitude to God Almighty, as finally, KALPATARU, Volume 32 Number 1 can be published. KALPATARU is a scientific journal that displays the latest prehistoric research results with a research scope in Southeast Asia, especially in Indonesia.

KALPATARU, Volume 32 Number 1, presents five articles with two themes regarding spatial archaeological research in the karst areas of Aceh and West Kalimantan, one article on the development of archaeobotany in Indonesia, one article on mollusks in South Sulawesi, and finally an article on paleoanthropology, especially teeth in Papua.

In more detail, the first article in this paper is entitled *Predicting The Locations Of Caves And Rock Shelters In Western Part Of Aceh Karst Using Geographic Information Systems* which explains the study of Geographic Information Systems (GIS), which are used to provide landscape and resource information and predictions about location. Several cave sites and inlets in the western karst area. Aceh. The second article is *Predictive Modeling Of Cave Settlements In Karst Area Of Kapuas Basin, West Kalimantan*. This article reviews predictions of the distribution of sites in the Kapuas Hulu Basin karst area, West Kalimantan, based on environmental variables, such as valley height, proximity to water sources, slope steepness, slope direction, and lineament density. This prediction model produces a map of potential areas for cave settlements. The third article is entitled *Indonesian Archaeobotanic Research Development*, which examines archaeobotanical research in Indonesia. Archaeobotanical analysis can strengthen and develop the interpretation of archaeological data. This analysis has considerable potential to be developed in Indonesia. The fourth article, entitled *Malacofauna From Cappa Lombo Site: Environmental Reconstruction And Subsistence Strategies Of The Bontocani Highland Karst Region, South Sulawesi*, reviews the types of mollusks found in cultural layers and aims to identify malacofauna remains at the Cappa Lombo Site, Bontocani, South Sulawesi. The fifth article is entitled *Dental Metric on The Late Holocene to Current Era Population from The Lowland Part of Indonesia-Papua*, which tries to reconstruct population history using dental metric measurements on 304 samples of archaeological sites in the lowlands of Indonesia-Papua.

Finally, the publication of KALPATARU Volume 32 Number 1 will provide and increase insight and knowledge that benefits society, both academics and the general public. Constructive criticism and suggestions are highly expected to improve the quality of KALPATARU.

Team Editor
KALPATARU

# KALPATARU

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**Prediksi Lokasi Gua dan Ceruk di Karst Aceh Bagian Barat dengan Sistem Informasi Geografis**

***Vol. 32 No.1, Juli 2023 pp. 1-12***

Sistem Informasi Geografis (SIG) adalah metode yang digunakan dalam penelitian arkeologi untuk memberikan informasi tentang lanskap dan sumber daya di permukaan bumi dan dikombinasikan dengan fenomena untuk memprediksi lokasi situs. Tulisan ini mengungkapkan beberapa hasil penggunaan metode SIG untuk menemukan lokasi gua dan inlet di karst bagian barat Aceh dengan sumber data SIG. Citra satelit, DEM, peta topografi, dan peta geologi ditumpangsusunkan dengan struktur geologi, litologi lokasi gua dan inlet. Hasil analisis menunjukkan bahwa terdapat 26 area yang dikelompokkan ke dalam lima klaster kemungkinan penemuan lokasi gua dan ceruk.

**Kata Kunci:** Model Prediksi, Karst, Gua dan Ceruk, Aceh

**DDC. 930.1**
**Ni Luh Gde Dyah Mega Hafsari, Vida Pervaya Rusianti Kusmartono, and M. Wishnu Wibisono**

***Predictive Modeling* Gua Hunian di Kawasan Karst. Cekungan Kapuas, Kalimantan Barat**

***Vol. 32 No.1, Juli 2023 pp. 13-26***

Sejak tahun 1970-an, daya tarik dan potensi arkeologi di kawasan hutan hujan tropis Kalimantan Barat mulai terungkap. Sejak saat itu, beberapa ekspedisi dan penelitian telah dilakukan baik oleh Pusat Penelitian Arkeologi Nasional, maupun Balai Arkeologi Kalimantan Selatan. Seperti yang dilakukan oleh tim yang dipimpin Vida P. R. Kusmartono pada tahun 2019, kegiatan eksplorasi dan ekskavasi telah dilakukan di kawasan karst Cekungan Kapuas, Kapuas Hulu. Meskipun demikian, situs hunian manusia prasejarah di kawasan ini belum semuanya teridentifikasi. Hal ini disebabkan luasnya cakupan dan beratnya medan penelitian di wilayah kawasan karst tersebut. Oleh karena itu, pada tahun 2020 telah disusun sebuah *predictive model* untuk memberikan gambaran akan probabilitas potensi gua hunian di kawasan ini. *Predictive model* ini menggunakan beberapa variabel lingkungan dan didasari atas hipotesa pengaruh kondisi sumber daya alam terhadap pemilihan lokasi hunian pada masa prasejarah. Variabel yang digunakan yaitu ketinggian lembah, jarak dari sumber air, kemiringan lereng, arah hadap lereng, dan kepadatan kelurusan. Analisis terhadap variabel ketinggian lembah, jarak dari sumber air, dan kemiringan lereng menghasilkan peta kelas aksesibilitas. Peta ini kemudian diintegrasikan dengan variabel kepadatan kelurusan serta melihat pengaruh arah hadap lereng menghasilkan peta yang menunjukkan probabilitas area dengan potensi gua hunian.

**Kata Kunci:** *predictive model*, hutan hujan tropis, Cekungan Kapuas, gua hunian

**DDC. 930.1**
**Yasmin Lana Amara, Ati Rati Hidayah, Alifah, Fathimatuz Zahro, Adana Presti Ariyanto**

**Perkembangan Penelitian Arkeobotani di Indonesia**

***Vol. 32 No.1, Juli 2023 pp. 27-46***

Penerapan pendekatan arkeobotani di Indonesia meningkat sejak dasawarsa terakhir, khususnya bagi penelitian arkeologi dari hasil ekskavasi di situs prasejarah. Tulisan ini memaparkan hasil dari kajian terhadap pustaka terkait dengan penelitian arkeobotani di Indonesia yang telah dipublikasikan. Mengingat bahwa Indonesia merupakan negara kepulauan dengan kekayaan tumbuhan tropis, maka pendekatan arkeobotani menjadi hal yang penting untuk mendukung atau melengkapi hasil analisis artefaktual lainnya. Metode yang digunakan dalam penulisan ini adalah studi pustaka. Hasil dari penelitian ini ialah terdapat peningkatan publikasi penelitian yang menggunakan data arkeobotani di Indonesia khususnya di situs prasejarah, padahal potensi untuk situs terbuka maupun situs yang lebih muda sangat besar. Penelitian arkeologi dengan menggunakan pendekatan arkeobotani perlu diperkenalkan lebih luas, untuk memperkuat intepretasi data arkeologi dan juga intepretasi dalam penelitian yang lebih menyeluruh. Tersedianya sarana dan prasarana serta SDM untuk menganalisis data arkeobotani membuka peluang untuk dilakukannya analisis ini lebih banyak lagi.

**Kata Kunci:** Arkeobotani; mikrobotani; pollen; phytolith; starch

**DDC. 930.1**
**Restu Budi Sulistyo and Fakhri**

**Identifikasi *Malacofauna* Situs Cappa Lombo: Rekonstruksi Lingkungan dan Strategi Subsistensi di Dataran Tinggi Kawasan Karst Bontocani, Sulawesi Selatan**

***Vol. 32 No.1, Juli 2023 pp. 47-62***

Temuan sisa fragmen cangkang moluska adalah data ekofak yang dapat menjelaskan kondisi lingkungan yang ditempati oleh manusia, khususnya dalam konteks masa Holosen di Sulawesi. Penelitian ini berupaya menjawab permasalahan terkait apa saja jenis-jenis moluska yang ditemukan dalam lapisan budaya, dan bertujuan mengidentifikasi sisa malacofauna yang ditemukan

di situs Cappa Lombo, Bontocani, Sulawesi Selatan. Metode pengumpulan data dilakukan melalui ekskavasi dan metode analisis dilakukan dengan identifikasi taksonomi, identifikasi morfologis eksternal, klasifikasi taksonomis dan pendokumentasian. Penelitian ini berhasil mengidentifikasi 11 famili yang terdiri dari 15 genera dan spesies. Moluska gastropoda terestrial terdiri dari famili *Alyacaeidae*, *Cyclophoridae*, *Ariophantidae*, *Bradybaenidae*, *Dyakiidae*, *Clausiliidae*, *Achatinidae*, dan *Camaenidae*. Gastropoda air tawar terdiri dari 2 famili, yaitu Pachychilidae dan Viviparidae, sedangkan kelas bivalvia hanya diwakili oleh famili Cyrenidae yang memiliki habitat di estuari. Berdasarkan identifikasi tersebut, penelitian ini menunjukkan rekonstruksi kondisi lingkungan di sekitar situs ini adalah hutan hujan basah yang cenderung tertutup vegetasi dan hutan tropis primer. Selain itu, pada masa huniannya, terjadi perubahan penggunaan lahan di sekitar situs ini. Data kehadiran moluska juga menunjukkan indikasi pengkonsumsian, meskipun bukan sebagai sumber diet primer, namun manusia pada masa Holosen di situs ini mampu memanfaatkan sumberdaya lingkungan perairan di sekitar situs yang mereka huni.

**Kata Kunci:** sisa fauna, moluska, Cappa Lombo, karst Bontocani, Sulawesi Selatan

**DDC. 930.1**
**Marlin Tolla, Hirofumi Matsumura, Dominik Bonatz, Kathrin Nägele, Cosimo Posth4**

**Metrik Gigi pada Populasi Holosen Akhir hingga Era Saat ini dari Dataran Rendah Papua-Indonesia**

***Vol. 32 No.1, Juli 2023 pp. 63-82***

Dalam upaya untuk memahami sejarah asal usul manusia di dunia ini, beberapa metode telah diterapkan oleh peneliti selama ini untuk mengidentifikasi kelompok populasi termasuk analisis ciri-ciri gigi manusia. Terbatasnya data tentang keanekaragaman manusia yang didasarkan pada studi osteologi dalam konteks arkeologi dari beberapa belahan dunia termasuk populasi yang mendiami dataran rendah Papua-Indonesia telah membatasi pengetahuan tentang sejarah asal usul serta penyebaran manusia. Berdasarkan hal tersebut, adapun tujuan dari penelitian ini adalah untuk merekonstruksi sejarah populasi dengan menggunakan 304 metrik gigi manusia yang ditemukan di situs arkeologi di dataran rendah Papua. Berdasarkan kronologinya, situs arkeologi tersebut diklasifikasikan menjadi dua bagian yaitu masa Holosen akhir dan Era Saat ini. Penggunaan analisis statistik diterapkan untuk membandingkan hasil penghitungan sample dataran rendah Papua dengan 17 kelompok populasi yang termasuk dalam penelitian ini. Hasil dari pengukuran statistik ini selanjutnya digunakan untuk merekonstruksi dan memvisualisasikan pohon filogenik dengan menggunakan *Neihbor-Joining* dan algoritma UPGMA. Hasil dari pengelompokan ini menyajikan data tentang kedekatan Asia Timur untuk kelompok Holosen Akhir dan Australo Melanesian untuk kelompok populasi Era Saat ini.

**Kata Kunci:** gigi, metrik, Papua, Holosen akhir, era saat ini

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**DDC. 930.1**
**Taufiqurrahman Setiawan and Azhari Fitra Nasution**

***Predicting The Locations Of Caves And Rock Shelters In Western Part Of Aceh Karst Using Geographic Information System***

***Vol. 32 No.1, Juli 2023 pp. 1-12***

*Geographic Information Systems (GIS) is a method used in archaeological research to provide information on landscapes and resources on the earth's surface and, combined with phenomena, predict the location of sites. This paper revealed some results of using this method in the case of karst in the western part of Aceh to find the locations of caves and inlets with GIS data sources. Satellite imagery, DEM, Topographic Maps, and Geological Maps, which overlayed with the geological structures, and the lithology of the location of the caves and inlets. The analysis results obtained that there were 26 areas grouped into five clusters of possible locations for caves and rock shelters.*

***Keywords:*** *Prediction Model, karst cave and rock shelter, Aceh*

**DDC. 930.1**
**Ni Luh Gde Dyah Mega Hafsari, Vida Pervaya Rusianti Kusmartono, and M. Wishnu Wibisono**

***Predictive Modeling Of Cave Settlements In Karst Area Of Kapuas Basin, West Kalimantan***

***Vol. 32 No.1, Juli 2023 pp. 13-26***

*Traditional Starting in the 1970s, the captivating archaeological potency in the tropical rainforest area of West Kalimantan started to be revealed. Since then, several expeditions and research had been conducted by The produced a map of accessibility.This map was then integrated with the lineament density variable and considered the direction of the slope to produce a map of potential areas for cave settlements.*

***Keywords:*** *inti-periphery, environment, Petojo Enclek Market, traditional markets, change*

**DDC. 930.1**
**Yasmin Lana Amara, Ati Rati Hidayah, Alifah, Fathimatuz Zahro, Adana Presti Ariyanto**

***Indonesian Archaeobotanic Research Development***

***Vol. 32 No.1, Juli 2023 pp. 27-46***

*The application of archaeobotany has been increasing for the last ten years in Indonesia, especially for studying the prehistoric human occupation. Indonesia has incredible biodiversity in flora, and the application of archaeobotanical methods and techniques is essential for understanding people-plant relationships in the past. It is also able to support and complement archaeological results and interpretations developed from analyses of other types of material culture. This paper examines archaeobotanical research in Indonesia through available published literature. The result demonstrates archaeobotanical analyses strengthen and enhance the interpretations of archaeological data and highlight the biases in the application towards prehistoric sites. Our research suggests that more recent archaeological sites have great potential for the application of archaeobotany. This approach needs to be introduced in the early stages of all project planning and research so that suitable recovery methods can be utilized, and adequate time and finances for analyses are factored in. The availability of facilities, infrastructure, and human resources to analyze archaeobotanical data will bring more opportunities for analyses in this field.*

***Keywords:*** *Archaeobotany, microbiological remains, phytolith, starch, macrobotanical remains*

*National Research Center for Archaeology and Archaeology Office in South Kalimantan. One of them was an exploration and excavation led by Vida P.R. Kusmartono from 2013-2019. Previous studies have shown that the area of Upper Kapuas Basin possesses numerous archaeological resources, however, many of the areas remain uncovered. This condition is caused by the extensiveness and difficulty of this area to be reached. For that reason, in 2020, we created a predictive model to give an overview of the probability of archaeological caves in this area. This predictive model uses environmental variables and is based on the hypothesis of the environmental resources variables in choosing cave settlements in the prehistory era. The variables used are the elevation of the valley, the proximity distance from the water source, the steepness of the slope, the direction of the slope, and the lineament density. Analysis of the variable elevation of the valley, proximity distance from the water source, and the steepness of the slope*

**DDC. 930.1**
**Restu Budi Sulistyo and Fakhri**

***Malacofauna From Cappa Lombo Site: Environmental Reconstruction And Subsistence Strategies Of The Bontocani Highland Karst Region, South Sulawesi***

***Vol. 32 No.1, Juli 2023 pp. 47-62***

*The remains of mollusk shell fragments are ecofacts that can explain the environmental conditions occupied by humans, especially in the context of the Holocene period in Sulawesi. This research answers questions related to the types of mollusks found in the cultural layer and aims identify malacofauna remains at the Cappa Lombo site, Bontocani, South Sulawesi. The data collection method was carried out through excavation, and the analytical method involved taxonomic identification, external morphological*

*identification, taxonomic classification, and documentation. This study successfully identified 10 families consisting of 15 genera and species. Terrestrial gastropod mollusks consist of the families Alycaeidae, Cyclophoridae, Ariophantidae, Dyakiidae, Clausiliidae, Achatinidae, and Camaenidae. Freshwater gastropods consist of 2 families, namely Pachychilidae and Viviparidae, while the bivalve class is only represented by the Cyrenidae family, which inhabits estuaries. Based on this identification, this research shows that the reconstruction of the environmental conditions around this site indicates a wet rainforest environment, which tends to be covered with vegetation and primary tropical forest. Additionally, during the occupancy period, there was a change in land use around this site. Data on the presence of mollusks also indicate consumption. Although mollusks were not a primary dietary source, humans during the Holocene at this site were able to utilize the aquatic environmental resources around the site they inhabited.*

***Keywords:*** *faunal remains, mullusk, Cappa Lombo, Bontocani Karst, South Sulawesi*

**DDC. 930.1**
**Marlin Tolla, Hirofumi Matsumura, Dominik Bonatz, Kathrin Nägele, Cosimo Posth4**

***Dental Metric on The Late Holocene to Current Era Population from The Lowland Part of Indonesian-Papua***

***Vol. 32 No.1, Juli 2023 pp. 63-82***

*In an attempt to understand human history in this world, the researchers have applied several methods to identify the group of populations based on the teeth trait characteristic. However, the lack of knowledge about human diversity from several regions in this world derived from the osteological study from archaeological context has limited the understanding of human history in many societies including the populations that occupied the lowland part of Indonesian-Papua. For this, the aim of this study is to reconstruct the population history by employing the dental metric measurement on the 304 samples from the archaeological sites in the lowland parts of Indonesian- Papua which are classified into two different groups, Late Holocene and Current Era. The multivariate statistics analysis was applied to compare the results from the Lowland Indonesian- Papua samples with 17 groups of the population included in this study. The results from the statistics measurement were further used to reconstruct and visualize the phylogenic tree by employing The Neighbor-Joining method and UPGMA algorithm. The result from this clustering group presents the data about East Asian affinities for the Late Holocene and Australo Melanesian for the. Current Era group.*

***Keywords:*** *dental, metric, Papua, Late-Holocene, Current-Era*