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GEOLOGY OF THE SACRED SITES OF THE UMÜKORI MAHSÃ (DESANA) AND YEPAMAHSÃ (TUKANO) PEOPLES IN SÃO GABRIEL DA CACHOEIRA, AMAZONAS, BRAZIL

Geologia dos lugares sagrados dos povos UMÜKORI MAHSÃ (Desana) e YEPAMAHSÃ (Tukano) em São Gabriel da Cachoeira, Amazonas, Brasil

Geología de los sitios sagrados de los pueblos UMÜKORI MAHSÃ (Desana) y YEPAMAHSÃ (Tukano) en São Gabriel da Cachoeira, Amazonas, Brasil

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ABSTRACT

The study highlights the increasing relevance of Sacred Natural Sites (SNSs) in Brazilian government policies, emphasizing their cultural, biological and geological importance that have been consecrated by native peoples throughout history. Recognizing the vitality of these areas as environmental protection strategies, a participatory approach was adopted, interconnecting anthropological, archeological and geological knowledge. The research aimed to recognize the correlation between geological/geomorphological elements and the indigenous cosmovision in the SNSs of São Gabriel da Cachoeira (Amazonas, Brazil) through dialogues and exchanges that record the memories of these indigenous communities. Data collection on geological aspects was obtained from bibliographic information and fieldwork, while accounts of sacred places were extracted from mythical narratives, known as *Kihti ukuse*, described by indigenous experts of the Upper Negro River (Amazonas, Brazil). The study employs the book "Sacred Mythology of the Desana-*Wari Dihputiro Põrã"* and the works of the artist Feliciano Lana as the Desana mythological reference. The analysis of the narratives revealed the connection between indigenous cosmology and local geodiversity, highlighting the importance of narratives in indigenous culture and their sacred places, including descriptions of elements such as the "Cobra Traíra" and constellations in the indigenous calendar (*yõkoãpa ma'a*). It is concluded that the approach provides access to indigenous narratives, incorporating geoconservation strategies to safeguard the geocultural heritage of indigenous peoples of the Upper Negro River to promote conservation and sustainable preservation of these areas of cultural and environmental significance.

Keywords: Geodiversity; Indigenous Cosmology; Yepamahsã; Umokori Mahsã.

RESUMO

O estudo destaca a crescente relevância dos Sítios Naturais Sagrados (SNSs) nas políticas públicas brasileiras, enfatizando sua importância cultural, biológica e geológica consagrada por povos nativos ao longo da história. Reconhecendo a vitalidade dessas áreas como estratégias de proteção ambiental, adotou-se uma abordagem participativa interligando conhecimentos antropológicos, arqueológicos e geológicos. O objetivo da pesquisa foi reconhecer a correlação entre elementos geológicos/geomorfológicos e a cosmovisão indígena em SNSs de São Gabriel da Cachoeira (Amazonas/Brasil) por meio de diálogos e trocas que registrem a memória dessas comunidades indígenas. Dados sobre aspectos geológicos foram obtidos por meio de informações bibliográficas e trabalhos de campo, enquanto os relatos sobre os lugares sagrados foram extraídos de narrativas míticas, conhecidas como *Kihti ukuse*, descritas por especialistas indígenas do Alto Rio Negro (Amazonas/Brasil). O estudo utiliza o livro "Mitologia Sagrada dos Desana-*Wari Dihputiro Põrã*" e as obras do artista plástico Feliciano Lana como referência mitológica Desana. A análise das narrativas revelou a interconexão entre a cosmologia indígena e a geodiversidade local, destacando a importância das narrativas na cultura indígena e em seus locais sagrados, incluindo descrições de elementos como a "Cobra Traíra" e as constelações no calendário indígena (*yõkoãpa ma'a*). Conclui-se que a abordagem proporciona acesso às narrativas indígenas, incorporando estratégias de geoconservação para salvaguardar o patrimônio geocultural dos povos indígenas do Alto Rio Negro e promover a conservação e preservação sustentável dessas áreas de significância cultural e ambiental.

Palavras-chave: Geodiversidade; Cosmologia indígena; Yepamahsã; Umokori Mahsã.

RESUMEN

El estudio destaca la creciente relevancia de los Sitios Naturales Sagrados (SNSs) en las políticas públicas brasileñas, destacando su importancia cultural, biológica y geológica consagrada por los pueblos originarios a lo largo de la historia. Reconociendo la vitalidad de estas áreas como estrategias de protección ambiental, se adopta un enfoque participativo, interconectando conocimientos antropológicos, arqueológicos y geológicos. El objetivo de la investigación fue reconocer la correlación entre elementos geológicos/geomorfológicos y la cosmovisión indígena en el SNS de São Gabriel da Cachoeira (Amazonas/Brasil) a través de diálogos y intercambios que registran la memoria de estas comunidades indígenas. Los datos sobre aspectos geológicos se obtuvieron a través de información bibliográfica y trabajo de campo, mientras que los informes sobre lugares sagrados se extrajeron de narrativas míticas, conocidas como *Kihti ukuse*, descritas por expertos indígenas del Alto Río Negro (Amazonas/Brasil). El estudio utiliza el libro "Mitología Sagrada de los Desana-Wari *Dihputiro Põrã*" y las obras del artista Feliciano Lana, como referente mitológico Desana. El análisis de las narrativas reveló la interconexión entre la cosmología indígena y la geodiversidad local, destacando la importancia de las narrativas en la cultura indígena y sus sitios sagrados, incluyendo descripciones de elementos como la "Cobra Traíra" y las constelaciones en el calendario indígena (*yõkoãpa ma'*a). Se concluye que el enfoque proporciona acceso a narrativas indígenas, incorporando estrategias de geoconservación, para salvaguardar el patrimonio geocultural de los pueblos indígenas del Alto Río Negro y promover la conservación y preservación sostenible de estas áreas de importancia cultural y ambiental.

Palabras clave: Geodiversidad; cosmología indígena; Yepamahsã; Umokori Mahsã.

1 INTRODUCTION

Sacred natural sites (SNSs) are a growing theme in discussions on Brazilian government policy, and are described as areas of cultural, biological and geological relevance that have been consecrated by native peoples throughout history (Thorley; Gunn, 2007; Verschuuren *et al*., 2010; Wild; Mcleod, 2008). SNSs are identified globally as having importance in nature protection strategies, reflecting the international recognition of the rights of indigenous peoples and their traditional knowledge for the conservation of biodiversity (Fernandes-Pinto; Irving, 2015) and, more recently, of geodiversity (Silva; Moura-Fé, 2018).

In the Amazon region, the SNS of the Lauaretê waterfall stands out since it is associated with the myths of the origin of indigenous peoples of the upper Negro River (Amazonas, Brazil) and was recognized as Brazilian intangible cultural heritage in 2006 (Iphan, 2008; Jaenisch, 2011). Places like this are described as *wametisé* (sacred places) by the indigenous peoples of the upper Negro River.

The indigenous narratives of the Negro River region indicate two categories of *wametisé*. These ancestral "transformation houses", which correspond to the places related to the journey of the snake-canoe, are considered places of great importance and power. The other category is the places related to the origin of the world and the beings who came to inhabit it in primordial times, such as the *waimahsã* (fish-people) who gave rise to the plant species of the Earth/forest (called *nʉhkʉ*), the water (*ahko*) and the air (*ome*) (Scolfaro, 2014).

The Desana (*Umükori Mahsã*) and Tukano (*Yepamahsã*) peoples have a very special relationship with geodiversity, most notably with landscapes. Their mythical narratives and *bahsese* (repertoire of expressions used by indigenous experts) are full of geographical references that delineate routes to special places related to the origin of the world and its first ancestors. There is a special and evident relationship that these peoples have with the territory and its landscapes and the way in which geography, in sociocosmologies, is constituted as a guiding principle of the history and current daily life of the peoples of the upper Negro River (Scolfaro, 2014).

In general, sacred natural sites (SNSs) in the state of Amazonas have been predominantly linked to archeological sites, notably through the analysis of petroglyphs found along the Negro River and its tributaries since the mid-twentieth century. This

association has been evidenced in studies such as those conducted by Ermanno Stradelli (1900), Theodor Koch-Grünberg (1907), Viveiros de Castro (1998) and Valle (2008, 2012). Given the scarcity of geoscientific investigations into these sacred sites, the motivation arose to formulate the hypothesis of examining whether there is a correlation between indigenous traditional knowledge, mythological narratives and conceptions about the Earth, from the geoscientific perspective.

Based on the aforementioned principles, this study aimed to investigate the connections between the components of geodiversity and sacred sites, based on the cosmological vision of the Desana (*Umükori Mahsã*) and Tukano (*Yepamahsã*) peoples in São Gabriel da Cachoeira (Amazonas, Brazil). To achieve this purpose, an integrated analysis of the mythical narratives (*kihti ukuse*) of these peoples was carried out, together with the interpretation of the geological elements of the study area.

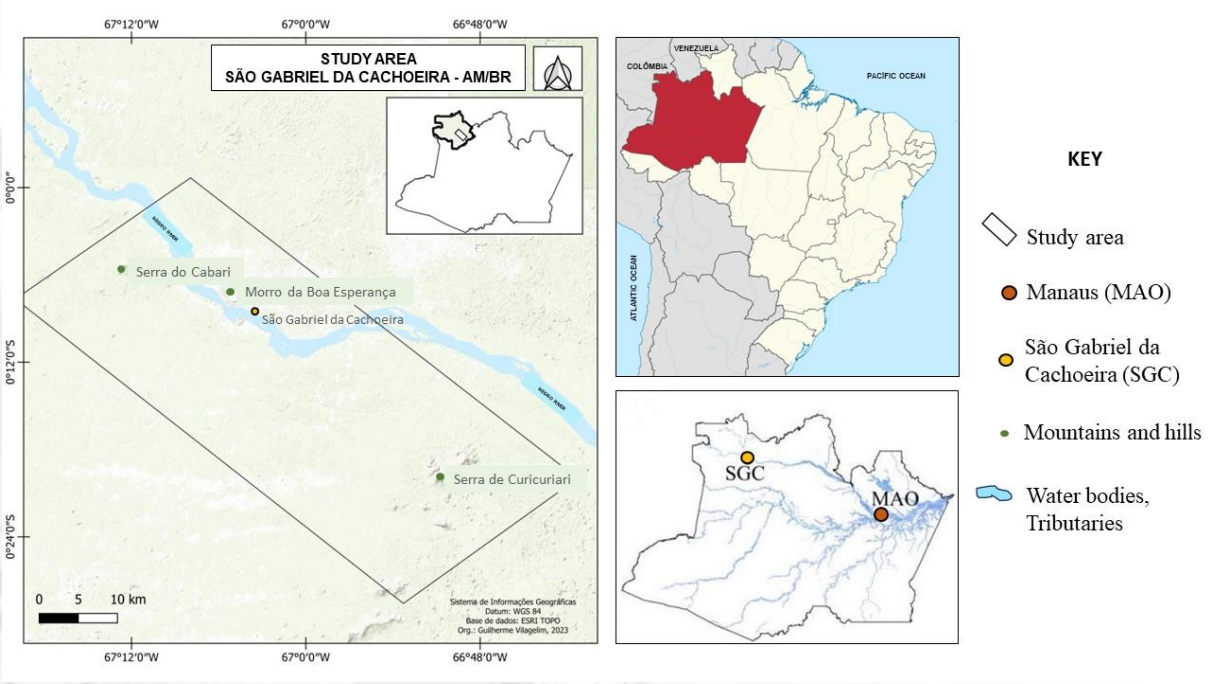
2 MATERIALS AND METHODS

2.1 Charaterization of the study area

The study area is located in the municipality of São Gabriel da Cachoeira, in the extreme northwest of the state of Amazonas, on the tripartite Brazil/Colombia/Venezuela border, known as the “dog's head”, which is about 1,061 km by river or 850 km by air from the state capital, Manaus (Figure 01).

São Gabriel, as it is commonly known, is characterized by a remarkable cultural diversity, with about 90% of the population composed of indigenous groups, distributed in five indigenous lands (ILs), forming 23 peoples who use 21 different languages (FOIRN, 2019). The population of the municipality is estimated at 51,795 (IBGE, 2023).

Figure 01 – Map showing the location of the study area, São Gabriel da Cachoeira, Amazonas, Brazil



Source: Authors (2023)

The total area that was delimited for the research covers approximately 79 km^2. The study area is concentrated on the area adjacent to the municipal seat of São Gabriel da Cachoeira and encompasses the Morro da Boa Esperança, the Serra do Cabari and the Serra do Curicuriari (Figure 01). The Morro da Boa Esperança, located in the city center, is accessed by a trail of approximately 500 meters, while the Serra do Curicuriari, located in the middle Negro River indigenous land I, is accessed by river, by travelling about 45 km along the Negro and Curicuriari Rivers. The Serra do Cabari, also in the middle Negro River indigenous land I, on the right bank of the Negro River, can be reached by two trails, one starting from the community itself (used in this study) and the other in the São Miguel community.

In order to achieve the objective of this research, we opted for an interdisciplinary approach involving both geology and anthropology. Preliminary data were obtained from the mythical narratives common to the Yepamahsã and Umükori Mahsã peoples, published in books by indigenous and non-indigenous authors. Another source was the illustrations and paintings of the artist Feliciano Lana, which are of great artistic reference since they depict the culture of his people.

The collection of specific data related to the geological aspects were obtained from bibliographic information such as the RADAMBRASIL project (Pinheiro *et al*. 1976,

Dall'agnol; Abreu 1976, Fernandes *et al*. 1977), which involved a geological survey that skirted the city of São Gabriel da Cachoeira. Other important references were the works of Reis and Monteiro (2005), CPRM (2006), Santos *et al*. (2000), Souza *et al.* (2009) and Souza (2009).

As for the information concerning the sacred places for the *Yepamahsã* and *Umükori Mahsan* peoples, this was obtained from two *kihti ukuse* (mythical narratives) common to the two peoples. For this, anthropological research developed by indigenous and non-indigenous researchers was used. However, the most relevant contribution to this work was based on the analysis of works by indigenous intellectuals of the upper Negro River, such as the works *Omerõ* Constitution and Circulation of *Yepamahsã* knowledge, Agency of the world by the *Kumuã Ye'Pamahsã*, the book Sacred Mythology of the *Desana-Wari Dihputiro Põrã*, and the works of the Desana artist, Feliciano Lana.

The field research took place in a participatory manner, involving a multidisciplinary team of geologists, anthropologists, archeologists and indigenous people from the communities involved. The primary objective of this stage, predominantly exploratory, was to identify the perception of the team involved in relation to the challenges faced in the development of the research, with a focus on their area of knowledge.

At this stage, conversations were also held at the Centro de Medicina Indígena *Baserikowi* (CMI) in Manaus, Amazonas, with indigenous experts, the Kumuã[1] Durvalino Fernandes (*Umükori Mahsã*) and Anacleto Barreto (*Yepamahsã*) about the content of the mythical narratives described in the Indigenous Reflexibility Collection, in the books Sacred Mythology of Desana-*Wari Dihputiro Põrã* and *Omerõ*. There were specific clarifications such as the position of the mountains described as *Bahsebo*/*Wariro*, the continuity of the land/forest spaces, referring to the area of ridges/mountains.

The delimitation of the study area was based on regional and local geological maps, which were used to define the main representative geological units/elements of the Serra do Curicuriari, Serra do Cabari and Morro da Boa Esperança that are related to the selected mythical narratives. The access to the communities visited involved predetermined geo-itineraries with the tourist guides of the city. Boats were used on some river routes and, for others, hiking trails with overnight stays in the Amazon rainforest.

[1] Plural of Kumu, corresponding to the indigenous experts of the upper Negro River.

For the mineralogical identification and the identification of rock textures, six samples were selected for creating thin sections and petrographic analysis at the Lamination and Microscopy Laboratory of the Geological Survey of Brazil (SGB) in Manaus. A transmitted light microscope (Olympus, BX41) was used with 2x, 4x, 10x and 40x lenses, the photomicrographs were captured with digital camera (Olympus X-775) coupled to the microscope; however, the main mineralogical identifications were achieved in the bibliographic references researched and described previously.

In addition to the necessary legal authorizations for access to the indigenous communities, the *bahsese* ritual of protection for access to the sacred places was performed by the *Kumu* Anacleto Barreto with the use of cigarettes (tobacco). The *bahsese* ritual consists of the proffering of words, expressions and pronouncements in which the specialist (*kumu*, *yai*, *baya*) communicates with the *waimahsãs*, who are beings who inhabit the spaces of the cosmos (the terrestrial-forest domain, water and air), but are not visible to ordinary people; they are the protectors of the places, landscapes and spaces where all beings circulate.

3 RESULTS AND DISCUSSIONS

3.1 *Kihti ukuse and the geodiversity*

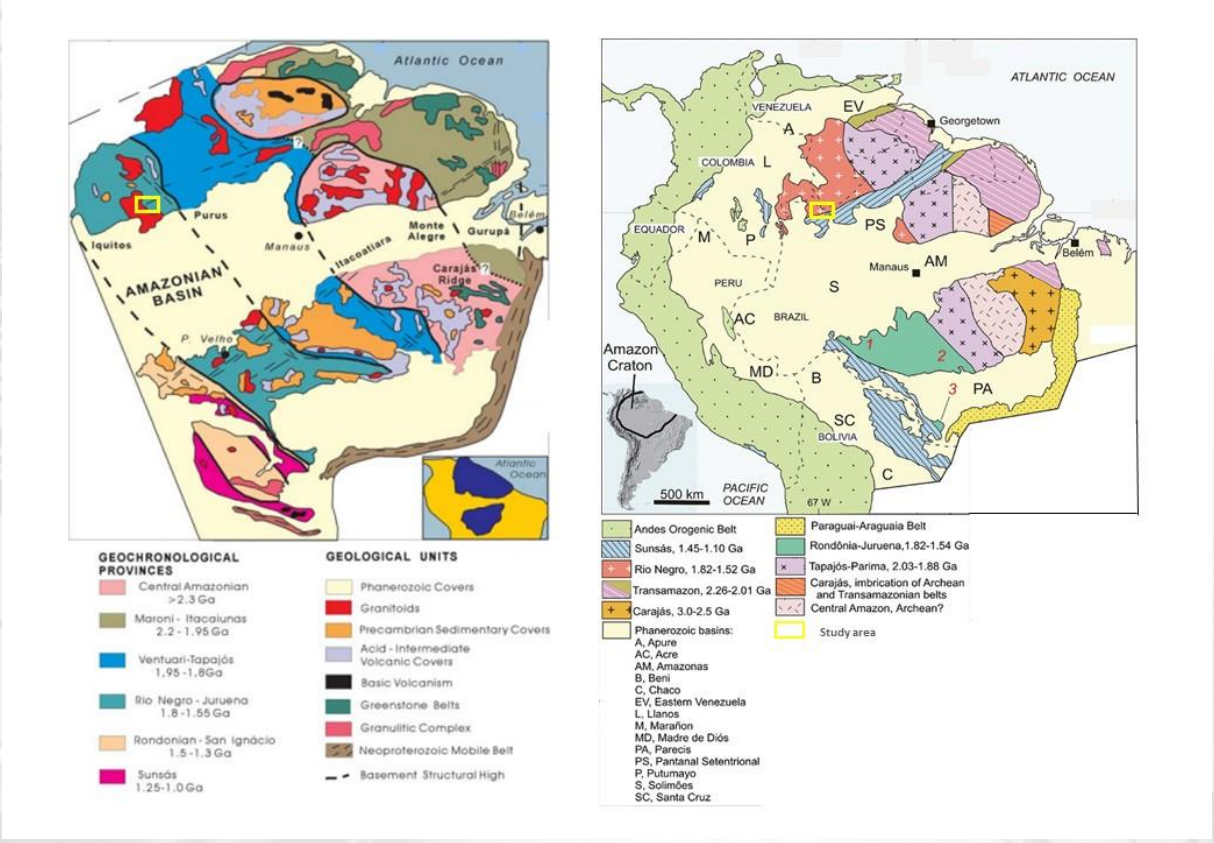
Two *kihti ukuse* of the *Umükori Mahsã* (Desana) and *Yepamahsã* (Tukano) peoples were used as indigenous mythical narratives: that of the Cobra Traíra (*Diadoé*) and that of Basebó/Wariró. In their cosmological narratives, these *kihti* show a direct connection with the diversity of materials and geological/geomorphological processes responsible for the formation of the landscapes of Morro da Boa Esperança, Serra do Curicuriari and Serra do Cabari. They are representative of narratives such as that of the Cobra Traíra described by Diakuru and Kisibi (1996), of the constellations (*yõkoãpa ma'a*) in the indigenous calendar, in addition to the narrative that involves the mountains, such as the observation point of the Morro da Boa Esperança (Barreto *et al.*, 2018).

Generally speaking, although the region is predominantly characterized by a flat landscape along the Negro River, it also exhibits elevated isolated forms, such as inselbergs, originating from weathered areas of the Guiana Shield, previously termed the "Branco River-Negro River pediplane" by Franco *et al*. (1975), consisting of a cratonic igneous-metamorphic basement, with lithologies that are more resistant to weathering and erosion.

The inselbergs, represented by the Serra do Curicuriari and the Serra do Cabari, are supported mainly by granitic plutons, such as syenogranites, monzogranites and granodiorites from the Tiquié, Uaupés River, Içana River and Inhamoim creek, dating from the Mesoproterozoic (Dantas; Maia, 2010).

Throughout geological time, this region of the upper Negro River was the scene of successive magmatic and tectonic events, ranging from 1.8 to 1.3 billion years ago. The study area is located in the Guiana Shield and Negro-Juruena River province (Figure 02 A), according to the proposal of Tassinari and Macambira (1999, 2004). This province was redefined as the Negro River province (Figure 02 B) by Santos *et al*. (2000), Santos (2003) and Santos *et al*. (2006).

Figure 02 – Geochronological provinces for the Amazonian Craton, according to A) Tassinari & Macambira (2004) and B) Santos *et al*. (2006)

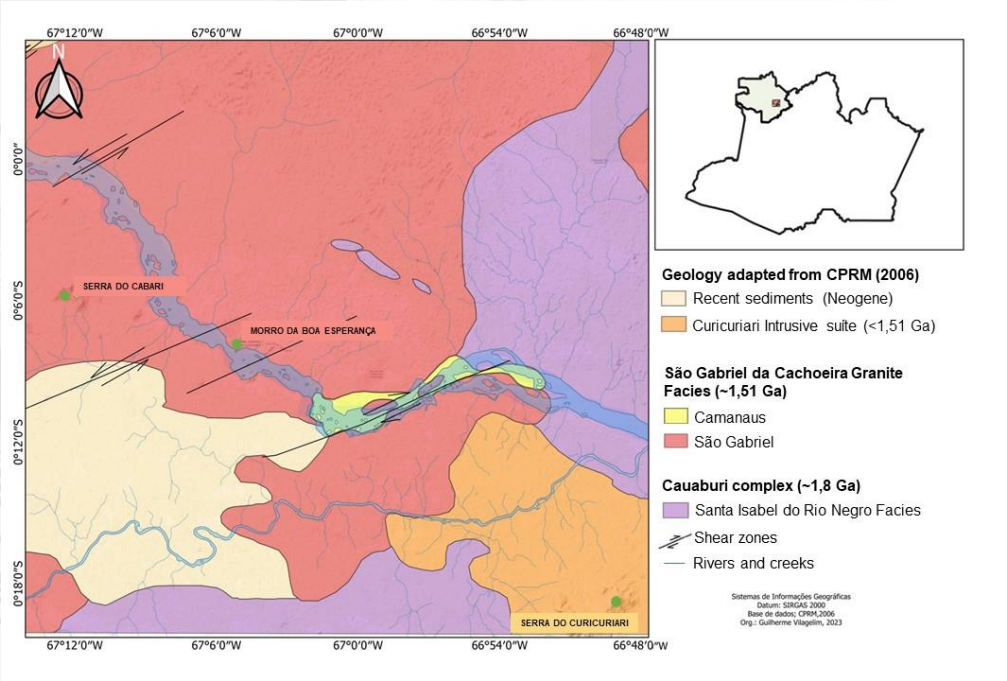


The Negro River domain is essentially composed of collisional granitoids, type I and S (Içana, Uaupés and Marauiá suites), which cover more than 80% of the exposed Proterozoic area; while, in the Juruena domain, intrusive rocks such as rapakivi granites and

charnockitoids predominate. This work adopts as nomenclature the "Negro River province", as proposed by Santos *et al.* (2000).

As can be seen in Figure 03, the study area, comprised of the sacred places described in the *kihti ukuse,* correspond geologically to granitoids with a sienogranite composition and to porphyritic monzogranite of the intrusive Curicuriari suite that outcrop in the homonymous mountain range. In the portion between Morro da Boa Esperança and Serra do Cabari, the São Gabriel da Cachoeira granite emerges, which belongs to the intrusive Uaupés River suite (Souza, 2009), specifically the São Gabriel facies.

Figure 03 – Geological map of the study area on the Negro River



Source: Adapted from CPRM (2006) and Souza (2009).

3.2 *Kihti Ñokoãtero and Diadoé*

The geomorphological compartments comprised by Morro da Boa Esperança, Morro da Fortaleza, beaches, islands and rapids are identified in the cosmological narrative of Cobra Traíra (*Diadoé*) as the setting of this mythical adventure that constitutes one of the myths of origin in the cosmogonic vision of the peoples of the upper Negro River.

Geologically, the Morro da Boa Esperança is formed by the granitic rocks of São Gabriel da Cachoeira, named by Souza (2009) for an elliptical granitic batholith with a NE-SW orientation along the Negro and Curicuriari Rivers, and belongs to the Rio Uaupés intrusive suite and the intrusive in the Cauaburi complex. This is where the São Gabriel

facies are defined, which are compsed of quartz-monzodiorite, granodiorites, monzogranites, milonites, granite deformed to milonitic, with NE-oriented mafic enclaves and occasional xenoliths.

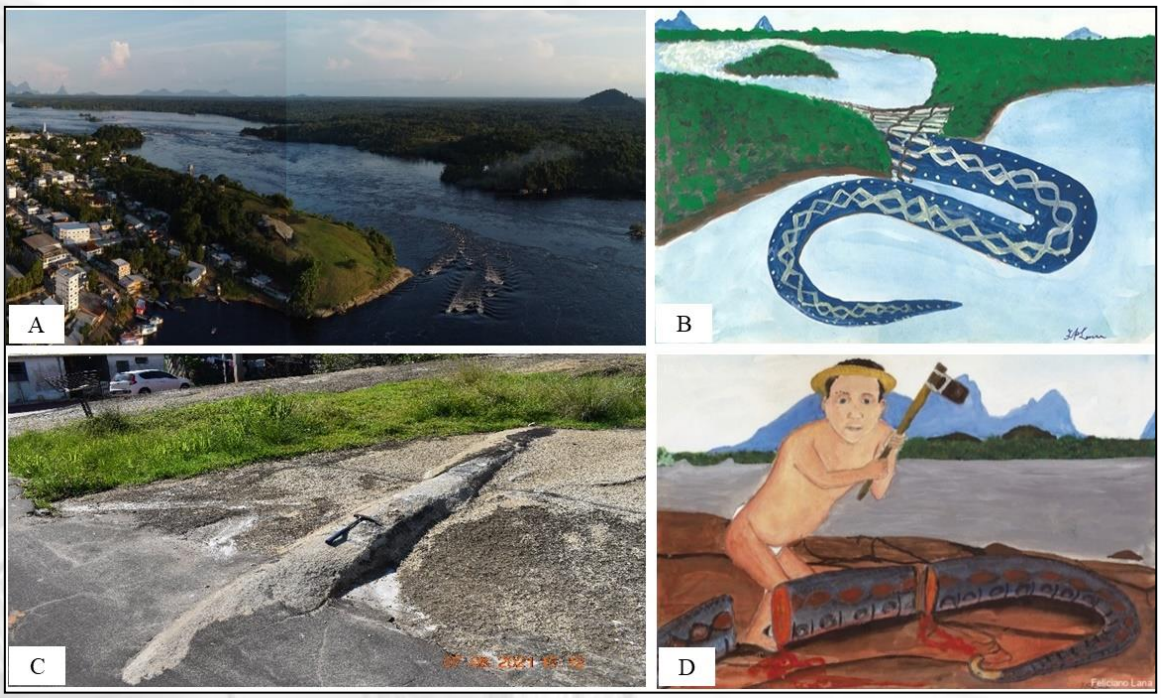
In this *kihti*, *Ñokoãtero-oãku* (“a star entity”), used the wounds of his son's body to be successful in fishing. The young men of the village discovered the method used by him and decided to take the child without his father knowing and use him for fishing, but they were not careful, which is why the serpent *Diadóe* devoured the child. Knowing what happened, *Ñokoãtero-oãku* goes looking for the killer snake along the Waupés River until capturing it in the rapids of the Negro River in front of the current city of São Gabriel da Cachoeira (Barreto *et al.,* 2018*).*

The drawings of the artist Feliciano Lana present the narratives of the origin of the universe recorded in more than seventy illustrations that correspond to the *kihti ukuse*. In Lana's paintings, it is possible to identify elements of geodiversity and correlate them to features in the landscapes of the study area. The narrow portion in front of the Morro da Fortaleza (Figure 04 A) corresponds to the exact place where *Ñokoãtero-oãku* (“a star entity”) placed the matapi[2] trap (Figure 04 B) to capture *Diadoé* (Diakuru & Kisibi, 1996).

During the hunt, *Ñokoãtero-oãku* placed the songbird as a lookout in the Serra *Gahkaminu*, which is the present-day Morro da Boa Esperança, to warn of the arrival of *Diadóe* in the region. After capturing the snake, *Ñokoãtero-oãku* quartered it and threw the pieces on the banks of the Negro River (Barreto *et al*., 2018; Diakuru & Kisibi, 1996). The parts of the snake are associated with occurrences of centimeter- to meter-thick granitic aplitic veins of the São Gabriel facies that appear intruding into the crystalline basement (Figures 04 C and 04 D). This aplitic rock intrusion of fine to medium texture is composed of minerals predominantly formed by small crystals of quartz and micas.

[2] Trap of fish

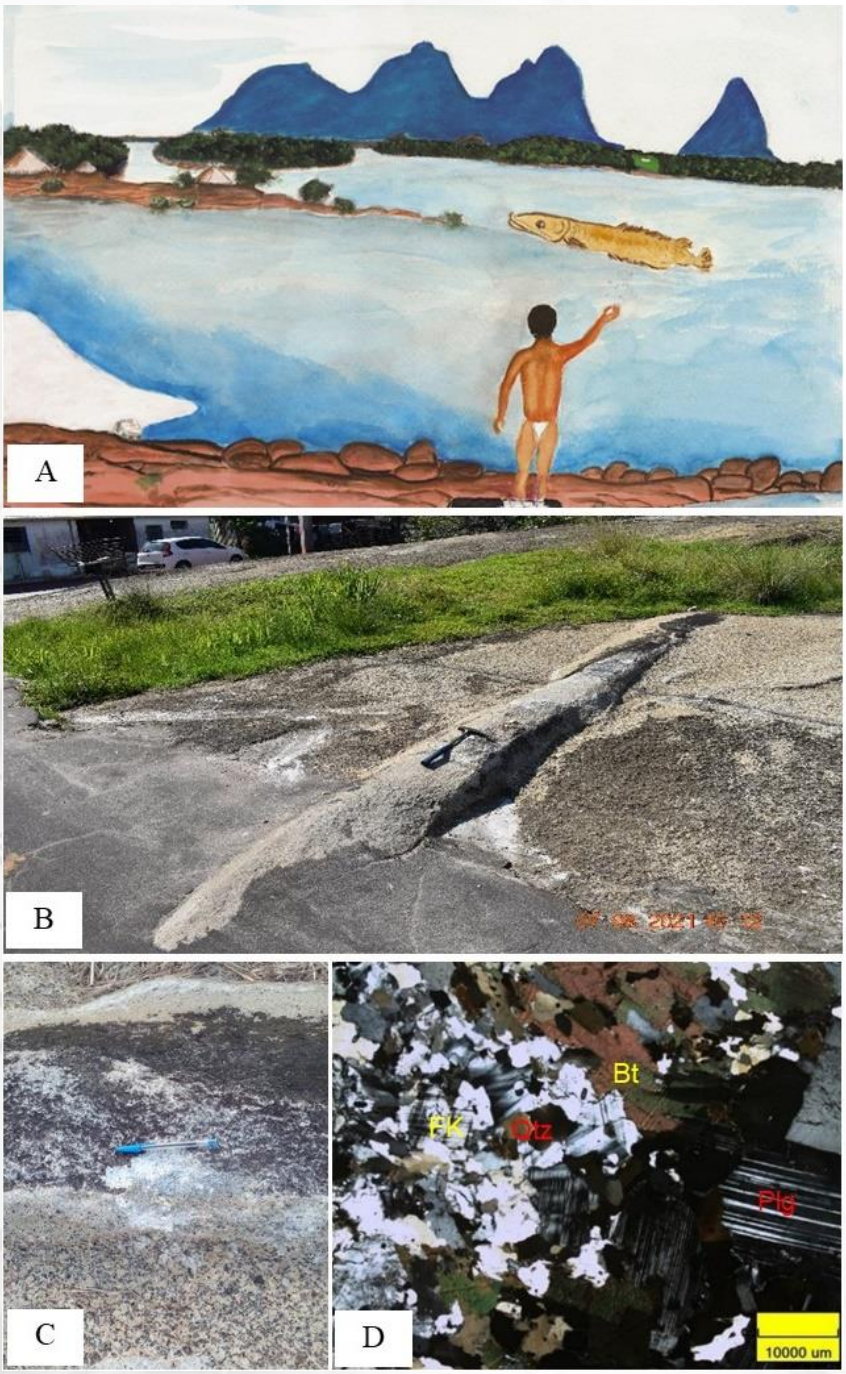
Figure 04 – Geological formations and cosmological narratives. A) narrow stretch of the Negro River in front of the Morro da Fortaleza; B) painting by Feliciano Lana – the capture of *Diadoé*; C) granite aplite/quartered snake; D) illustration of the quartering of the snake



Source: Authors' compilation (2023).

Before opening up the snake, *Ñokoãtero-oãku* shaved off its scales and threw them into the river: the large scales, he threw downstream, which turned into large fish, such as the pirarucu; the smaller scales, he threw upstream, which turned into traíras (Figure 05 A). To this day, the elders interpret the feature as being the snake that was quartered (Figure 05 B), from which it is possible to take "scales" from the "mythical" snake for the *bahsese* ritual. The scales, in the indigenous view, would correspond, mineralogically, to biotite and muscovite chips, minerals of micaceous and placoid habits (Figure 05 C). In Figure 05 D, it is possible to identifiy minerals of aplitic granite composed of biotite, plagioclase, potassium feldspar and quartz.

Figure 05 – A) painting by Feliciano Lana showing the granitic aplite; B) fragment of the granitic aplite; C) macroscopic detail of the granitic aplite; D) photomicrograph of the granitic rock intrusion showing the placoid minerals such as biotite (Bt), quartz (Qtz) and potassium feldspar (fK)

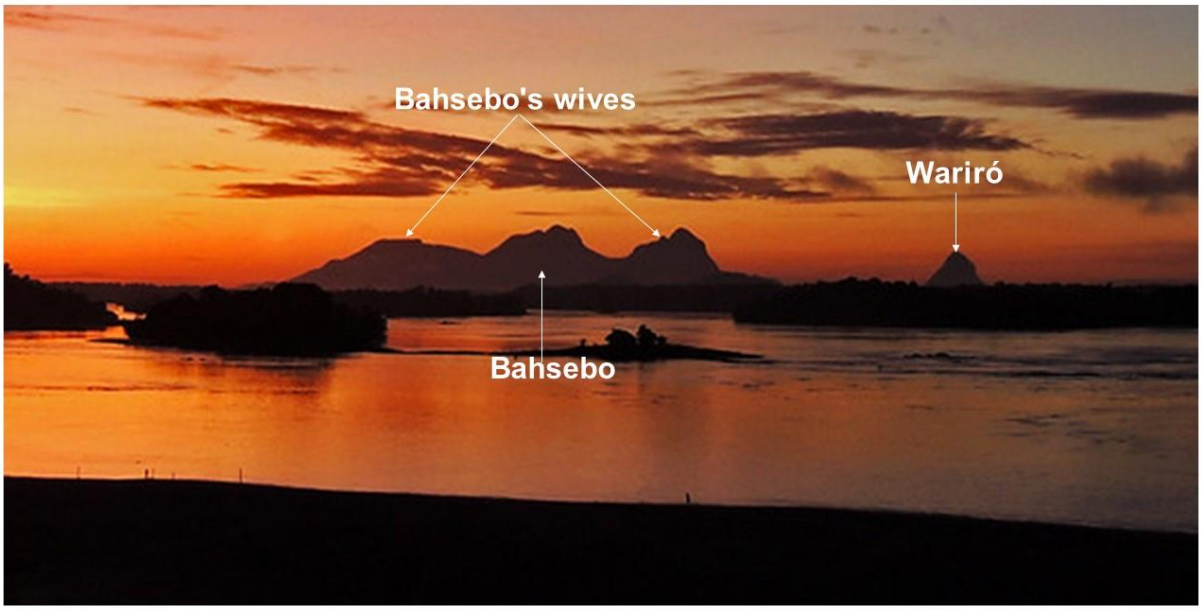


Source: Authors' compilation (2023)

3.3 *Kihti Yupuri Bahsebo*

According to the Tukano and Desana indigenous cosmological narrative, the four dotted inselbergs that form the Serra do Curicuriari are identified as follows: *Bahsebo*, located in the center; the following two arranged side by side, representing his wives; and the fourth, more isolated, is known as *Wariro*, *Bahsebo*'s father-in-law (Figure 06).

Figure 06 – Serra do Curicuriari by the worldview of the Desana and Tukano people, *Wariro*, his daughters and *Bahsebo*.



Source: Authors' compilation (2023).

The narrative portrays that at the time the *Wariroas* lived in the region, they did not yet know how to grow plants for their food. When *Wariro* learned that *Bahsebo* had knowledge about cultivating plants, he told his two daughters to lure him to their abode. They followed his instructions and, after that meeting, *Bahsebo* married *Wariro*'s daughters and taught them how to plant cassava and manage plantations (Diakuru & Kisibi, 1996).

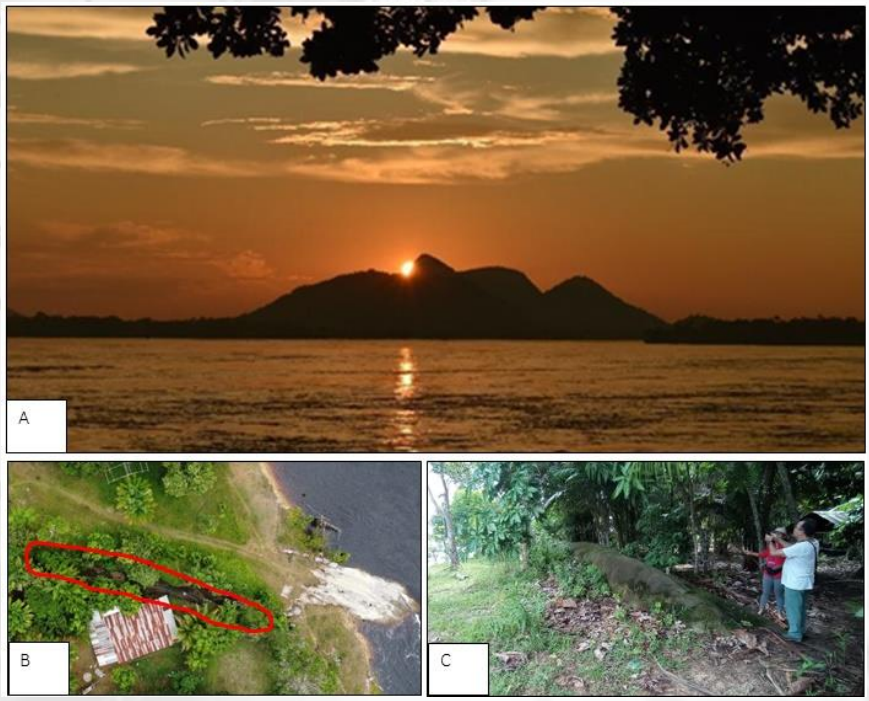
3.4 Cabari

The Serra do Cabari (Figure 07 A) consists of granitic rocks from the Uaupés River intrusive suite, which is part of the São Gabriel da Cachoeira batholith (Souza, 2009). It is

described in the Desana *kihti ukuse* as the place where *Wariró*'s daughters ate leaf-cutter ants and where *Basebó* first encountered them (Diakuru & Kisibi, 1996).

The area of the Cabari community is marked by the presence of archeological remains in the rocks, evidencing a strong relationship of indigenous peoples with the elements of geodiversity for at least three thousand years (Neves, 1988). In the port of the Cabari community, there is also an aplitic granite dike with a positive relief that draws the attention of those who observe it, as the local narrative depicts it as the figure of an electric feel (Figure 07 B and 07 C). The dike is revered by visitors and relatives when they visit the people of the community, as a sign of respect.

Figure 07 – A) photo of the Serra do Cabari; B) aerial image of the aplitic granite dike, identified with a red circle; C) aplitic granite dike (electric eel); D) cross-shaped petroglyph found in the aplitic granite dike; E) petroglyph drawn on the aplite; F) petroglyph with anthropomorphic shape; G) archeological finds (ceramics) found in the vicinity of the aplitic granite dike.



(continued)

(conclusion)

Source: Authors' compilation (2023)

It is also noted that some figures show the symbol of a cross (Figure 07 D), zoomorphic (Figure 07 E) and anthropomorphic features (Figure 07 F), ceramics (Figure 07 G), which still need to be investigated by archeologists, and shows the great wealth of archeological finds in the region.

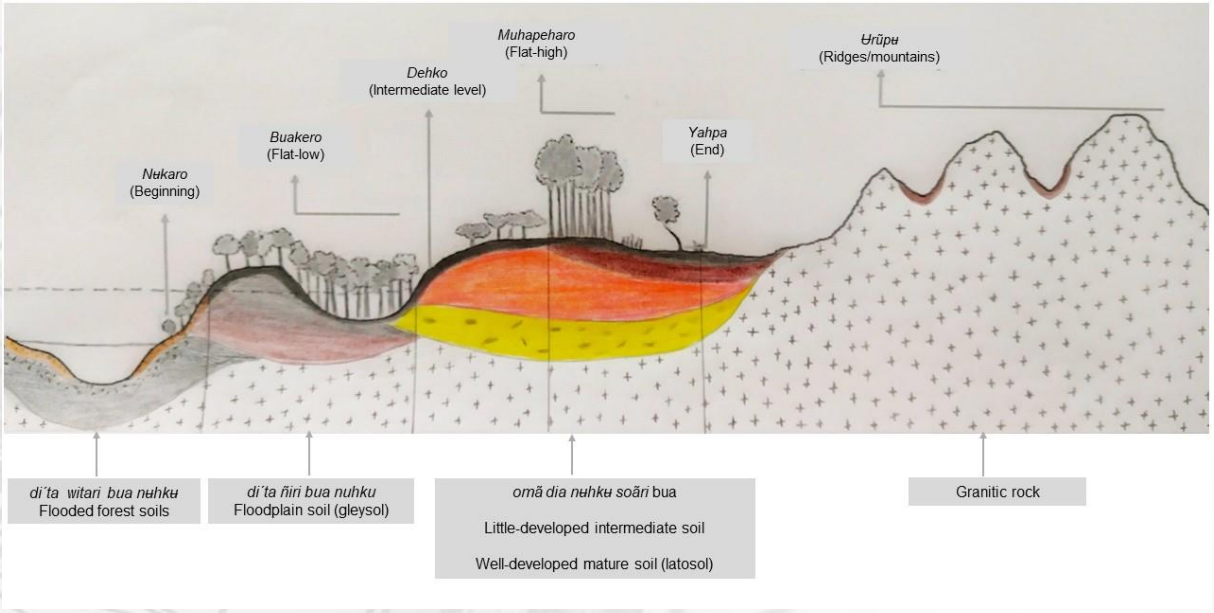
3.5 Soil management in the vision of the Kumuã Yepamahsã

In the book "Agency of the world by the *Kumuã Ye'pamahsã*" by Dagoberto Lima Azevedo (2018), at the start of the chapter "The Space *Di´tá Nuhku*" (land/forest) in the logic of *bahsese* ritual, the description of this space related to elements of geodiversity is observed. The *Yepamahsã* cite five distinctions in this space: *Yokʉbʉkʉro*, *Tataboha*, *Wiakoro*, *Diakoe* and *Tari*, which correspond respectively to mature forest, forest growing on sand, secondary vegetation, flooded forest and infertile land.

Other important significant distinctions relate to variation in the composition of the relief. In the view of the *kumuã Yepamahsã*, five forms of relief on the Earth's platform are distinguished and classified: *buakearo* (flat-low); *dehko* (intermediate level); *mʉhapearo* (flat-high); yapa (end); *nukaro* (beginning). In Figure 08, this categorization was diagrammed by Azevedo (2018) in the aforementioned work, with addition by the authors of the *Urũpu* relief, which corresponds to the area of ridges and mountains. The complementation of the profile on the right side of Figure 08 was elaborated based on the guidance of the *Kumu* Anacleto Barreto (Center for Indigenous Medicine (CMI), Manaus).

In each part of the represented morphological profile, there is a complex composition of the soil and rock: *di´ta wari bua nʉhkʉ* (forest growing on sandy land), *di´ta ñiri bua nuhku* (forest growing on black soil), *di´ta witari bua nʉhkʉ* (forest growing on clayey soil), *omã dia ñiri bua nuhku* (forest growing on frog-colored earth), *omã dia nʉhkʉ soãri* bua (forest growing on red earth), *pahsí* (layey silt) and *ewʉ buhtise* (white clayey silt), *ewu soãse* (red clayey silt), *ewʉ ñise* (black clayey silt). Based on the taxonomy of the soils and the geomorphological relief of the *Yepamahsã*, it was possible to correlate them to the profile of Amazonian soils (Figure 08).

Figure 08 – Division of the relief in the vision of the *Kumuã Yepamahsã* and soil profile



Source: Adapted from Azevedo (2018)

All the spaces are, in principle, *waimahsã* houses and some of them are traded by the *Kumuã* for human use. In this way, all the plantations that are created by humans were before the property of the *waimahsã* and will return to them when they are no longer used by the *Yepamahsã.*

In Azevedo (2018), it is possible to observe "*yepamahsã* geology", knowledge about landscape elements and soil management that guarantee the indigenous peoples of the upper Negro River health and well-being in the region they have inhabited for at least three thousand years (Neves, 1988).

Given this pedological diversity and its aptitudes and limitations of use, it is observed that the management described by Azevedo (2018) was and continues to be a well-adapted agricultural system among the prehistoric populations of the region among different ethnic

groups, mainly in the planting of cassava.

It is understood that soil quality and its capacity to sustain agricultural production are significantly shaped by the practices adopted by traditional communities. In the upper Negro River region, variation in soil texture plays a crucial role in the choice of crops, as illustrated in Figure 08. Root plants such as sweet potatoes and cassava tend to thrive in more sandy soils, while crops such as bananas and squash are preferably grown in clayey soils.

One interesting aspect is the contribution of the agricultural practices of prehistoric indigenous peoples to the formation of the "terra preta de indio" (black soil of the indians). This fertile land is the result of activities such as extractivism, deposition of edible plant residues and food preparation, and ceramic shards, which have altered the chemical properties of the soil, enriching it and making it more conducive to cultivation over time (German, 2001).

4 FINAL CONSIDERATIONS

The present study successfully achieved its objective of investigating the connection between the elements of geodiversity and sacred sites by exploring the mythical narratives (*kihti ukuse*) of the *Umükori Mahsã* and *Yepamahsã* peoples. These narratives reveal a unique perspective, where the natural elements of the landscapes are perceived as an extension of the daily life of these peoples, providing explanations for the origin of human beings, animals and all other components of nature.

Geoscientific analysis played a crucial role in characterizing the geological heritage of the studied sacred places. The *kihti ukuse* selected for the research enabled the precise identification of the geological/geomorphological elements present in their narratives. A notable example is the Serra do Curicuriari, identified in the Desana narrative as *Bahsebo*, his two wives, and his father-in-law *Wariro*. Likewise, the Morro da Boa Esperança is mentioned in the *kihti* of *Diadoé* as a lookout point to spot the arrival of the snake, and the narrowing in front of the Morro da Fortaleza is indicated as the place where the matapi trap was placed for the capture of the snake, and both perfectly illustrate this correlation.

In addition to identifying the connection between geodiversity and sacred places, the research reveals an intrinsic relationship between the environmental management practices of the indigenous peoples of the upper Negro River and geoconservation strategies. This link is of crucial importance since these indigenous practices date back

almost three thousand years. Although the geological heritage of the region is not directly mentioned in management practices, it can be identified in indigenous mythical narratives as involving sacred places, emphasizing its significance for the maintenance of traditional practices and for the conservation of this heritage for future generations.

In view of this, the need to expand similar research is highlighted, aiming at a better integration between indigenous geoscientific and cosmological knowledge. The development of specific geoconservation strategies for these territories emerges as a priority, aimed at conserving not only the natural heritage, but also preserving the rich cultural heritage associated with these sacred places.

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