

"Bau Nyale " from the perspective of Science, Local Wisdom and Ecotourism

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Abstract

Bau Nyale is an annual tradition of the Sasak people in Central Lombok, which is celebrated every year on the 20th of the 10th month according to the Sasak calendar. This tradition comes from a legend that lives in society about the sacrifice of a princess to maintain the peace and unity of her country. Through a multidisciplinary approach that combines the perspectives of science and ecotourism sustainability, this study aims to present a comprehensive understanding of the *Nyale* legend and phenomenon and their associated ecotourism implications. This research method includes a literature study, field observations and interviews. The results of this study provide a deeper understanding of the legend of Princess Mandalika, the *Bau Nyale* phenomenon, and the related ecotourism implications. It was found that *Nyale* rituals have significant ecological and social impacts, including potential reductions in *Nyale* sea worm populations and changes to local culture. Therefore, sustainable ecotourism management is needed to ensure the sustainability of this phenomenon in the long term. This research has important implications in cultural preservation and environmental conservation. It is hoped that this study can contribute to an understanding of the interaction between cultural traditions and ecotourism and become a basis for developing sustainable management strategies in the context of the *Bau Nyale* phenomenon.

Keywords: *Nyale, Science, Local Wisdom, Ecotourism.*

1. Introduction

Bau Nyale comes from the Sasak language, "bau" means to catch, and "nyale" means color worm. So the *Bau Nyale* tradition is the tradition of catching color worms. The *Bau Nyale* tradition is legendary and is believed to have a high sacred value for the people of Lombok. (Bachtiar et al., 2020). The existence of the *Bau Nyale* tradition is directly related to the folklore of the Sasak tribe in the 16th century AD, namely the legend of Princess Mandalika (Saharudin, 2016).

Princess Mandalika's legend is one of Indonesia's most widely known folklore, especially in Lombok, West Nusa Tenggara. This legend tells of a princess with extraordinary beauty and kindness that captivated many princes. To avoid bloodshed and division among the princes, Princess Mandalika sacrificed herself by jumping into the sea, then turned into a *Nyale*, a type of sea worm that only appears once a year.

The *Bau Nyale* tradition is usually held twice in one year. This tradition is usually carried out by people who live in coastal areas on the island of Lombok, especially on the

south coast of Central Lombok and East Lombok, such as Seger Beach, Kuta and the surrounding beaches. The *Bau Nyale* phenomenon has become an attraction for local and international tourists who come to Lombok to witness and participate in the *Bau Nyale* ritual. This ritual involves the locals collecting *Nyale*, believed to have mystical powers and can give blessings. However, it is also necessary to consider the impact of this phenomenon on ecotourism and the environment.

The *Bau Nyale* Festival is an annual tradition of the Sasak people in Central Lombok, which is held every year on the 20th of the 10th month according to the Sasak calendar. This tradition comes from a legend that lives in society about the sacrifice of a princess to maintain the peace and unity of her country. The meaning of this sacrifice is a teaching that has been passed down from generation to generation and is full of philosophical meaning as a teaching for the life of the local community. It is hoped that this article will explore the values implicit in the *Bau Nyale* tradition in axiological terms (classification of values). The implied values are moral and social.

The tradition of *Bau Nyale* is also seen from a scientific point of view, namely the existence of the worm itself (*nyale* worm) and the determination of the appearance of the worm or the implementation of the *Bau Nyale* tradition. *Nyale* worms are a collection of several species of Polychaeta living in the sea. The determination of implementing the *Bau Nyale* tradition for hundreds of years only relies on traditional predictions. A scientific determination needs to be made considering that the *Bau Nyale* tradition is a cultural event and an important economic asset to attract local and international tourists (Bachtiar et al., 2016).

This article aims to discuss the legend of Princess Mandalika and the *Nyale* phenomenon from a scientific point of view. It involves exploring what is known scientifically about the *Nyale* sea worms, why they appear each year, and how they relate to the marine ecosystem around Lombok. This article examines the impact of the increasing number of visitors who witness and participate in *Nyale* rituals on the natural environment and local ecosystems. In addition, the author also describes the technology and scientific approach to managing sustainable tourism and protecting the marine ecosystem which is home to *Nyale*.

By combining the perspectives of science and ecotourism, this research aims to provide a deeper understanding of the legend of Princess Mandalika, the *Nyale* phenomenon, and how we can use it sustainably without destroying the surrounding natural environment.

2. Material and Method

This research method uses a multidisciplinary approach that combines literature studies, field observations and interviews. The following is the approach of the applied method presented in Figure 1:

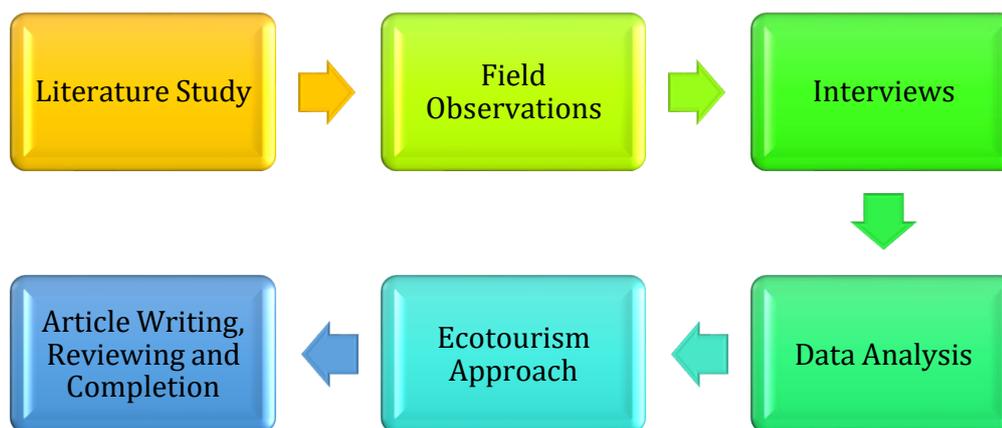


Figure 1. Research Method Flowchart

- a. Literature Study: Conduct a comprehensive literature study on the legend of Princess Mandalika, the *Bau Nyale* phenomenon, and its impact on ecotourism. Gather books, journal articles, research reports, and other credible sources relevant to this topic. This literature study will provide a theoretical foundation and in-depth understanding of the cultural, scientific and ecotourism aspects related to these legends and phenomena.
- b. Field Observations: Directly observe related locations, such as the *Bau Nyale* ritual location or related tourist attractions in Lombok. This observation will enable data collection on ecotourism practices, community participation and visible physical impacts. This observation involves recording ritual processes, community interactions, tourism infrastructure, and potential environmental problems that are visible.
- c. Interviews: Design survey questionnaires to collect data from visitors, local communities and other interested parties. The survey questions included their perceptions of the legend of Princess Mandalika, participation in the *Bau Nyale* ritual, and their opinion about its impact on ecotourism. In addition, conducting interviews with related experts, such as marine scientists, cultural experts, and tourism managers, to gain in-depth insights into scientific aspects and sustainability.
- d. Data Analysis: Analyzing data collected through literature studies, field observations and interviews. Analytical methods that can be used include qualitative analysis.
- e. Ecotourism Approach: Using an ecotourism approach in analyzing the impact of the *Bau Nyale* phenomenon on ecosystems and the environment and exploring sustainable management solutions. This involves assessing existing ecotourism practices, identifying sustainable and non-sustainable aspects, and formulating policy recommendations or actions that can be taken to minimize negative impacts and increase ecotourism sustainability.

3. Result and Discussion

3.1 *Nyale* worms

Nyale worms are worms that produce *nyale*. *Nyale* is the back part of the worm's body that is released specifically for reproductive purposes. *Nyale* worms consist of many types or species. The two dominating species are *Palola siciliensis* and *Lysidice collaris*. *Nyale* worms belong to the phylum Annelida because their bodies are segmented, and they already have a true coelom or body cavity. In the Annelida phylum, *nyale* worms are included in the Polychaeta class, namely the Annelida group that has many setae. (Bachtiar et al., 2019; Bachtiar & Odani, 2021)

The *Nyale* worm is a member of the Polychaeta worm with a large body, with a body size of tens of centimeters. The *nyale* worm body can be divided into 3 parts: the head, body and tail (pygidium). The body of the *nyale* worm, which is in front of the pygidium, is where the body segments increase, called a setiger. The setiger in front of the pygidium is brightly colored. Each setiger has a pair of parapodia on the lateral side (Campbell & Reece, 2008).

When approaching the reproductive season, the *nyale* worm body will be divided into two parts. The front (anterior) body is called the *atoke*, while the back (posterior) body is called the epitoke. The *atoke* functions as the vegetative body, while the epitoke functions as the generative body, which is known as *nyale* on Lombok Island. *Nyale* or epitoke function specifically for reproduction. Inside the red male *nyale* there are sperm, while the female *nyale* which is green contains egg cells. The final part of the epitoke is the tail of the worm. The tail of the *nyale* worm is short and is called a pygidium. Pigidium is part of the epitox. Here there are two characteristics: the senses and controlling the movement of *Nyale* after being separated from the *atoke*. During the growth period, a new setiger is added in the setiger in front of the pygidium (Bachtiar & Bachtiar, 2019).



Figure 2. *Nyale* Worm

(Source: <https://www.youtube.com/watch?v=vCAcmgbOyuQ&t=182s>)

Nyale worms are a collection of several species of worms of the Polychaeta type. Polychaeta are worms belonging to the annelid class. These worms generally live in the sea but can also be found in rivers and lakes (freshwater) and others on land (terrestrial). On the surface of the polychaeta body, stiff hairs or setae are covered with

cuticles so that they are smooth and stiff. The body of this worm has an interesting color, like reddish purple. Each body segment is equipped with a pair of locomotors or swimming devices called parapodia which function as breathing apparatus. *Polychaeta* body sizes differ, most are 5-10 cm, but some are less than 1 mm (eg *Diurodrilus*), and some reach 3 m, such as *Namalycastis rhodochorde*.

Nyale worms live in holes in the limestone of coral reefs. Worms live in microhabitats that are not exposed to sea waves and currents. *Nyale* worm habitat on coral reefs stretches from the intertidal area to a depth of 15 meters. In coral reefs, wormholes are only 5-10 cm in the limestone surface. *Nyale* worms have a very important ecological role as a link from algae to the second and subsequent consumers in the food chain. *Nyale* worms are omnivores. *Nyale* worm food consists of red algae, calcareous algae, and other small marine invertebrates. *Nyale* worms are food for many predators in the sea, for example, the snail *Conus* sp., the worm *Nereis* sp. and *Eunice* sp., *Chaetodon* sp., *Rhinecanthus* sp. and *Balistes* sp (Bachtiar et al., 2020).

Polychaeta worms do not have saddles (clitellum) like earthworms (Oligochaeta). Polychaeta has separate sexes, and some are hermaphrodites. Polychaeta reproduction can take place sexually or asexually. Fertilization can occur outside the body and inside the body. The fertilized egg grows into a larva known as a trachophore. Mostly, Polychaeta worms live freely (free living), but some are parasitic in other animals, such as *Polydora* from the family Spionidae. Polychaeta types include calm worms, shove worms, Wawo worms, palolo worms, and nipa worms (Fauchald, 1992).

The palolo worm is a hairworm from the Eunicidae family. The palolo worm is identical with two snouts, three antennae and a shovel-shaped head and no hook mouth. The adult worm measures about 40 cm and is divided into segments, each with hair-like pseudo-legs. There are also several sensory tentacles growing on the head. The male palolo is brownish red, while the female is greenish blue. These worms live on the coast of the southern Pacific. Palolo worms live in coral rocks, and to reproduce, they grow a special tail that contains sperm or egg cells. During the breeding period, this special worm's tail breaks and emerges to the surface of the seawater and then releases eggs or sperm in the form of a thick liquid. The scientific classification of palolo worms, according to Gray (1847), namely,

Kingdom	: Animalia
Phylum	: Annelida
Class	: Polychaeta
Subclass	: Errantia
Ordo	: Eunicaida
Family	: Eunicidae
Genus	: Palola, Lysidice
Species	: <i>Palola sicilensis</i> ; <i>Lysidice collaris</i>

(Source: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=335340>)

Wawo and palolo worms have a much higher protein content than chicken eggs and cow's milk. This worm has a protein content of 43.84%. While chicken eggs 12.2% and cow's milk 3.50%. Phosphorus levels in *Nyale* (1.17%) are also quite high when compared to chicken eggs (0.02%) and cow's milk (0.10%). *Nyale* even contains calcium (1.06%) which is still higher than the calcium content of cow's milk which is only 0.12%. Wawo and palolo worms can be consumed by processing according to taste. Usually, worms are processed into "*pepes*" or fried and used as a side dish.

3.2 Legend of Princess Mandalika

Bau Nyale contains cultural values related to the myths and folklore of the Sasak tribe, namely the legend of Princess Mandalika. In ancient times, there was a kingdom named "Sekar Kuning" from the State of Tonjeng Beru. Raden Panji Kusuma, or known as Raja Tonjeng Beru, is the leader of the Sekar Kuning kingdom, a wise and wise king, so that the people he leads live prosperously. Raja Tonjeng Beru had a consort named Dewi Seranting and was blessed with a beautiful daughter, Putri Mandalika.

Princess Mandalika is a very polite, polite, friendly and gentle princess. Her noble spirit, generosity, and beautiful face made Princess Mandalika endeared to her people. The news about the kindness and beautiful face of the princess spread to various kingdoms so that the princes of the various kingdoms wanted to marry Princess Mandalika to become queen consort in their kingdom. Because so many wanted and came to propose to the princess, King Tonjeng Beru finally decided on his daughter. Princess Mandalika also felt confused and finally decided to meditate to find clues about what had happened. After meditating, Princess Mandalika also invited all the princes and youths from various kingdoms to come on the 20th day of the 10th month of the Sasak calendar and gather at Seger Beach (near Kuta Beach, Lombok) early in the morning before the dawn call to prayer resounds.

On the date set by Princess Mandalika, all the princes and the youth and even people from the kingdom gathered on Seger Beach. As soon as the sun began to rise, Princess Mandalika and her parents, namely the King and Queen Tonjeng Beru and their bodyguards, came to meet all the invitees. At that time, the princess looked so beautiful, and she was wearing a very beautiful dress made of silk. Princess Mandalika and her bodyguard climbed Seger Hill. Then the princess said a few words addressed to all the guests present. Princess Mandalika revealed that she only wanted to see peace and tranquility on the island of Lombok. The princess did not want divisions in it. Princess Mandalika realized that if she accepted one or part of the proposals, there would be a dispute or division between those who did not accept her proposal. Therefore Princess Mandalika intends to accept all applications addressed to her. Suddenly, all the invitees on the beach were confused by what the princess said. Then suddenly, Princess Mandalika threw herself into the sea, and the waves immediately swept her away. The guards and people who saw the princess swiftly threw themselves

into the sea to save Princess Mandalika. Destiny said otherwise; the princess disappeared without the slightest sign.



Figure 3. The location is Sangkep Beleq

3.3 *Bau Nyale* from a Science Perspective

Not long after that, very many small animals appeared from the sea. The animal turned out to be a long worm which was later named *Nyale*, and the community believed that this worm was the incarnation of Princess Mandalika. Later, a *Bau Nyale* traditional ceremony became a tradition for the people of Lombok. This tradition is carried out once a year, around February-March.

Before the *Bau Nyale* Event, traditional leaders, religious leaders, community leaders and regional officials carried out Sangkep Beleq activities. Sangkep Beleq to determine the date of arrest or *Bau Nyale*. The Sangkep Beleq activity was located in Sasak Nde Tourism, Sengkol Village, Pujut District, Central Lombok, West Nusa Tenggara.

In February-March, on full moon nights or a few days afterward, *nyale* worms experience swarming, an event when sea worms of a certain type flock in abundance around the surface of the water to mate externally. At that time, *nyale* used to be caught by local residents on rocky beaches to be used as a traditional food ingredient. However, even though *nyale* have long been known by the people of Lombok as part of their wealth of marine biological resources, research on this biota is still rarely carried out.

For hundreds of years, coastal communities have only relied on traditional forecasts to determine the date of catching *nyale* worms. The government is promoting the *Bau Nyale* festival event internationally right after the holy meeting conducted by the traditional leader, Sangkep Beleq. Sangkep Beleq is a traditional meeting to determine the date of *Bau Nyale*, which is usually held in early December. The meeting resulted in a *nyale* swarming date the following year in February-March. Selama malam pemijahan, cacing polychaete melepaskan epitoke (atau *nyale*, Sasak).

The swarming *Nyale* will naturally be fragmented by the waves, which release the sperm and eggs packed inside into the seawater. The biological spawning of *nyale* worms is the final part of the reproductive process, which should be scientifically predictable like other marine invertebrates. *Nyale* worm spawning time is related to temperature, moon phase and tidal cycle (Bachtiar & Bachtiar, 2019).

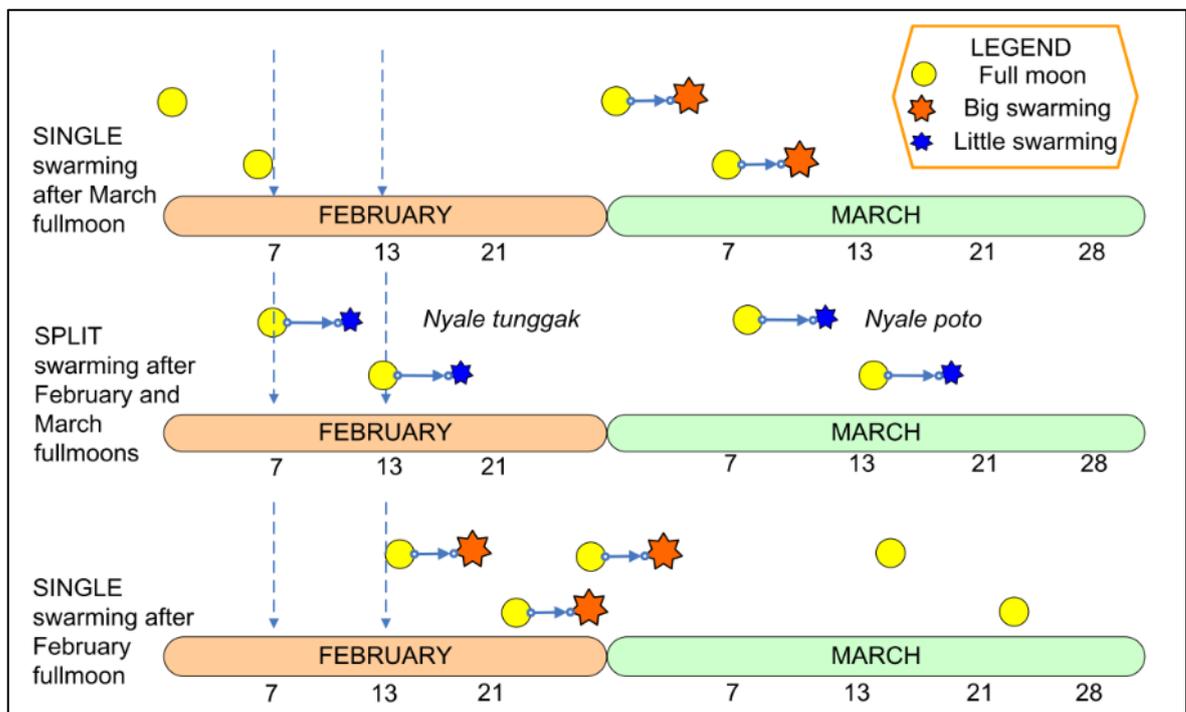


Figure 4. Illustration of three hypotheses to predict the spawning date of *nyale* worms in Lombok Island. A revision was made on the 13th of February's full moon (Bachtiar & Odani, 2021)

Scientific predictions reveal that from 2000 to 2100 (100 years), the spawning months of *nyale* worms will be distributed unevenly in March and February. These results show some significant differences from existing local wisdom about *nyale* swarming. It is estimated that February is the most common spawning month for *nyale* worms, but this prediction model shows that *nyale* swarms are more common in March than February, as detailed in Figure 4.

Scientific predictions also indicate that separate spawning does not occur every year. This prediction is contrary to the perception or belief of the community from

traditional leaders. They claim that *nyale* swarms always occur twice a year, namely in February and March. The gathering of the first *nyale* is called *nyale* tuuntung (in February) and the second is called *nyale* poto (in March). They also realized that the abundance of *nyale* between the two times was not the same, sometimes there were more in "tunggak" than in the "poto" (Bachtiar et al., 2022; Ratianingsih et al., 2020).

The existence of *nyale* worms in Lombok can be used as a learning resource for students. Bachtiar et al. stated that there was an increase in the biology teacher's knowledge about *nyale* worms through discussion activities and providing reading material, namely modules. Biology teachers need to include discussion of *nyale* worms in biology lessons on animal reproduction, ecology, anatomy, physiology, morphology and classification of animals. *Nyale* worm biology material is integrated into the applicable curriculum (Bachtiar et al., 2020). Through this integration, it is hoped that students' knowledge will increase and further foster their awareness to protect the existence of *nyale* worms, coral reefs and the habitats in these ecosystems.

3.4 *Bau Nyale* from a point of view of Local Wisdom of Lombok Community

Bau Nyale is a tradition originating from a legend that lives among the people about the sacrifice of a princess in maintaining the peace and unity of her country. The meaning of this sacrifice is a teaching passed down from generation to generation which is full of philosophical meaning as a teaching for the life of the local community. Local wisdom includes traditional knowledge and practices passed down from generation to generation, which play a key role in understanding and appreciating this phenomenon. Local wisdom values from the *Bau Nyale* tradition have two dominant values: social and moral.



Figure 5. Interviews with the Pujut and Penujak Communities who took part in the *Bau Nyale* Festival

The *Bau Nyale* tradition has real social value in community unity when they gather during the *Bau Nyale* procession. The existence of the *Bau Nyale* tradition invites people to remember the history of their ancestors and other leaders who have contributed to the *Bau Nyale* tradition. When staging the colossal drama Putri Mandalika, it was shown that the *nyale* came from the incarnation of Princess Mandalika's hair. Princess Mandalika is the main character, she is also a figure with

essential moral values, namely wisdom and willingness to sacrifice, which actually comes from a woman, Princess Mandalika.

Moral value is the value of goodness. In the *Bau Nyale* tradition, this value is seen in the actions taken by Mandalika when she decided to throw herself into the sea so that there would be no bloodshed in her country. The princess's good intentions are a realization of moral values that can be implemented in Indonesian society, especially the people of Central Lombok.

The *Bau Nyale* tradition contains values that can be obtained, namely:

- a. As a container for fostering piety to Allah *subhanahuwata'ala* God Almighty by being grateful for the existence of the *nyale* worms.
- b. Concern for nature, with us being more concerned about the condition and existence of the environment around us.
- c. *Bau Nyale* is a movement to preserve the natural environment
- d. Social. *Bau Nyale* is a container for integration and awakens solidarity and as a place for hospitality.
- e. Welfare. The smell of *nyale* is an economic driver.
- f. *Bau Nyale* as a tourism event
- g. *Bau Nyale* is a place for the expression of cultural values. The existence of this activity can motivate the younger generation to continue to care about and love the existence of culture and traditions around it and motivate the younger generation to preserve it.

3.5 *Bau Nyale* from an Ecotourism Perspective

Tourism development is carried out to increase community economic growth and is a planned and structured business. Tourism development should follow the principles of sustainability, which integrate ecological, social and economic sustainability. This strategic approach to sustainable tourism is recommended for small-scale, local management and benefits for the community. Ecotourism, besides providing benefits to local communities, also directly contributes to conservation activities. Integrated management is required from the planning, implementation, monitoring and evaluation stages that can integrate all stakeholders' interests (Sutiarso, 2018). Ecotourism can be used as an alternative to conserve natural resources through positive interactions between tourism, resources and local communities (Wahyuningsih, 2021).

On Lombok Island, the *Bau Nyale* is no longer just a cultural event but an important economic asset as a tourism attraction. *Bau Nyale* is a series of the *Bau Nyale* Enchantment Festival held at Seger Beach, the Mandalika Special Economic Zone (SEZ). The existence of the *Bau Nyale* tradition in this festival has resulted in a demand for a more accurate prediction of the date the *nyale* herds will leave. Thus tourists can make accurate and long-term itineraries when they want to see the *Bau Nyale* festival.

However, this scientific prediction should not ignore the traditional sacred meeting that exists to determine the date of catching the *nyale*, namely Sangkep Beleq. Because the meeting is part of the cultural protocol in the *Bau Nyale* tradition. Therefore scientific predictions must be understood as scientific contributions to strengthen cultural and economic development and to satisfy visitors (Bachtiar & Odani, 2021)

Bau Nyale is a ritual of catching sea worms which usually come out in the Kuta beach area in certain months. These green, brown, orange, to red worms, will come out in the middle of the night until the morning when the sea coast begins to recede. 16 beach points in South Central Lombok extend for tens of kilometers from east to west, such as Kaliaantan Beach, Kuta Beach or Selong Belanak Beach. The residents will later consume the worms caught in this ritual by being cooked and eaten together. The *Bau Nyale* ritual promotes the value of protecting the marine environment so that not only worms can be caught and consumed every year, but also the maintenance of coral reefs and fish and all habitats in marine ecosystems. (Susanto, 2018).

So far, studies on the socio-cultural impact of tourism have tended to assume that there will be socio-cultural changes due to tourist arrivals with 3 general assumptions as explained by Martin (1998). These changes include: (1) changes brought about as a result of instructions from outside generally from a superordinate socio-cultural system to a weaker receiving culture; (2) these changes are generally destructive for the culture of local communities and (3) these changes will lead to cultural homogenization, where local ethnic identity will sink (Rohani & Purwoko, 2020). Even so with the existence of the *Bau Nyale* Festival which has a socio-cultural impact on the local community.

The most fundamental thing in the process of developing and developing sustainable *Bau Nyale* tourism through the concept of ecotourism with local wisdom, actually lies in the extent to which development in the Mandalika area and its surroundings can establish synergy with the local construction of local values. Any development in Central Lombok must be able to build harmony with local cultural realities. Therefore, the synergy between the community, social organizations, community leaders, and the local government needs to be built and formed as strong as possible. Within this limit, local governments must be able to create new breakthroughs that can support. Especially through the design of policies, programs and work agendas that are in accordance with the sociological aspects of the Sasak people. As stated by (Hannan & Rahmawati, 2020) that in order to achieve all of this, it certainly requires the unity of the stake holders, as well as the existence of good, transparent and accountable governance.

In the educational aspect which is part of ecotourism, by integrating *nyale* as a learning resource, for example, Ecosystem material certainly has an impact on the sustainability of the *nyale* worms caught in the *Bau Nyale* festival which is held every year. Apart from that, it will also add insight to students about local wisdom and

ecotourism, and maintain this local wisdom and maintain the sustainability of the *Nyale* Worm ecosystem.

Conclusion

The *Bau Nyale* tradition is an annual tradition of the Sasak people in Central Lombok which is celebrated every year on the 20th of the 10th month according to the Sasak calendar. The *Bau Nyale* tradition has two dominant values, namely social values and moral values. Real social value can be seen in the unity of the community when they gather during the *Bau Nyale* procession. Princess Mandalika is a central figure, who is conditioned by true moral values, namely wisdom and a willingness to make sacrifices even though she is a woman. Moral values are values of kindness that can be seen in the actions taken by the daughter of Mandalika when she decided to throw herself into the sea so that there would be no bloodshed in her country. The princess's good intentions are a realization of moral values that can be implemented in Indonesian society, especially the people of Central Lombok.

Nyale worms are worms that produce *nyale*. *Nyale* is the back part of the worm's body that is released specifically for reproductive purposes. *Nyale* worms are a collection of several species of worms of the Polychaeta type. The worm collection consists of the species *Eunice (Palola) viridis* and *Lysidice collaris*. Polychaeta is worms that belong to the class Annelida. The view of science, especially science, is that the phenomenon of the *Bau Nyale* occurs as a result of the nature of the worm itself. During the mating season, the worms will come out in groups towards the sea's surface (coastal) and look for the safest place from predators (corals) to hatch their eggs. In addition, this animal will not come out if not in time. Environmental conditions such as climate, rain, thunder, and accompanying lightning will cause this worm to reproduce its "sex". So the timing of the *Bau Nyale* festival can be scientifically predicted based on the reproductive cycle, in this case the worm spawning process.

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The most fundamental thing in developing and developing sustainable tourism of *Bau Nyale* through the concept of ecotourism with local wisdom lies in the extent to which development in the Mandalika area and its surroundings can establish synergy with the local construction of local values. Any development in Central Lombok must build harmony with local cultural realities. Therefore, the synergy between the community, social organizations, community leaders, and the local government needs to be built and formed as strongly as possible.

References

- Bachtiar, I., & Bachtiar, N. T. (2019). Predicting spawning date of *nyale* worms (Eunicidae, Polychaeta) in the southern coast of Lombok Island, Indonesia. *Biodiversitas*, 20(4), 971–977. <https://doi.org/10.13057/biodiv/d200406>
- Bachtiar, I., Handayani, B. S., Japa, L., & Bahri, S. (2022). Learning Module Development on the *Nyale* Worm Biology for Highschool Students and Teachers. *Jurnal Penelitian Pendidikan IPA*, 8(2), 1000–1004. <https://doi.org/10.29303/jppipa.v8i2.1322>
- Bachtiar, I., Japa, L., & Bahri, S. (2020). Peningkatan Pengetahuan Guru Biologi SMA Negeri Tentang Biologi Cacing *Nyale* di Kabupaten Lombok Timur. *Journal of Chemical Information and Modeling*, 3(4), 311–316.
- Bachtiar, I., Japa, L., Bahri, S., & Handayani, B. S. (2016). *Modul Pembelajaran Biologi Cacing Nyale*. Mataram University Press: Mataram.
- Bachtiar, I., Japa, L., Santoso, D., Bahri, S., & AR, S. (2019). Peningkatan pengetahuan guru IPA SMP/MTS tentang biologi cacing *nyale* di Kecamatan Pujut Kabupaten Lombok Tengah. *Jurnal Pendidikan Dan Pengabdian Masyarakat*, 2(4), 433–437.
- Bachtiar, I., & Odani, S. (2021). Revisiting the spawning pattern of *nyale* worms (eunicidae) using the metonic cycle. *Ilmu Kelautan: Indonesian Journal of Marine Sciences*, 26(2), 87–94. <https://doi.org/10.14710/IK.IJMS.26.2.87-94>
- Campbell, N. A., & Reece, J. B. (2008). *Biology, Volume Eighth Edition 3. Translation: Damaring Tyas Wulandari*. Erlangga: Jakarta.
- Fauchald, K. (1992). Review of the types of palolo (Eunicidae: Polychaeta). *Journal of Natural History*, 26(6), 1177–1225. <https://doi.org/10.1080/00222939200770681>
- Hannan, A., & Rahmawati, F. (2020). Strategi Pembangunan Pariwisata Daerah Berkelanjutan Melalui Konsep Ekowisata Berbasis Kearifan Lokal Di Indonesia , respon dan perhatian pemerintah terhadap agenda 59 tahun 2017 tentang Pelaksanaan Pencapaian Tujuan Pembangunan kebijakan yang lebih terfo. *Entita*, 2(1), 97–119.
- Ratianingsih, R., Puspita, J. W., Farida, & Jaya, A. I. (2020). The mathematical model of Eunice Siciliensis lifecycle: A study on Lombok Baunyale Festival Preserving Effort. *Journal of Physics: Conference Series*, 1490(1), 1–8. <https://doi.org/10.1088/1742-6596/1490/1/012021>
- Rohani, E. D., & Purwoko, Y. (2020). Dampak Sosial Pariwisata Terhadap Masyarakat Desa Ekowisata Pampang Gunung Kidul Menuju Desa Ekowisata Berkelanjutan. *Jurnal Sosiologi Reflektif*, 14(2), 237. <https://doi.org/10.14421/jsr.v14i2.1853>
- Saharudin, S. (2016). Perilaku Liminal Masyarakat Sasak-Lombok Dalam Bêkayaq Bau Nyalé Dan Pataq Paré. *SASDAYA: Gadjah Mada Journal of Humanities*, 1(1), 87. <https://doi.org/10.22146/sasdayajournal.17036>

Susanto, D. A. (2018). Social Construction of Traditional Proverb and Customary Law For Balancing Ecology. *Totobuang*, 6(1), 47–58.

Sutiarso, M. A. (2018). Sustainable Tourism Development Through Ecotourism. *OSFPreprint*, September, 1–11.

Wahyuningsih, S. (2021). Potensi Mangrove Sebagai Ekowisata Berkelanjutan (Review). *Jurnal Ilmiah Kemaritiman Nusantara*, 1(2), 28–37.