



The Connection between Sky and Earth to Maintain Sustainability: A Case Study of Dayak Engkadin's Natural Resource Management

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Abstract. Research shows that in many civilizations, humans' ancestors used celestial objects to determine the course of life on Earth. These practices occurred before modern technologies were invented and were passed down to the next generations orally. In this modern era, people tend to leave these practices and move to modern technologies. However, indigenous communities in different parts of the world still maintain their tradition, including the traditions related to the sky. In Indonesia, one of the indigenous communities that still maintains sky-related traditional practices is the Dayak Engkadin tribe. In the Dayak Engkadin's daily life, celestial objects serve as important signs that reflect people's life rhythm, so they maintain their sky-related traditions to sustain themselves. Starting from that fact, this article focuses on how the Dayak Engkadin tribe uses the moon, stars, and sun to maintain sustainability on Earth. The data were gathered through an in-depth interview with Dayak Engkadin's leader, and then analyzed using the Sustainable Development Goals (SDGs) framework. The analysis shows that the sky-related traditions preserved and practiced by the Dayak Engkadin tribe help maintain harmonious relations with God and nature. Furthermore, by practicing their traditions, the Dayak Engkadin tribe can manage its natural resources effectively and support the achievement of SDG 15, Life on Land.

Keywords: Celestial Objects, Dayak Engkadin, Starlore, Sustainable Development Goal.

1 Introduction

Before modern technology was invented, human ancestors from different parts of the world used celestial objects and sky phenomena to guide their lives on Earth. Some examples of how various ancient civilizations used the sky to guide lives on Earth are compiled in an edited book by Selin & Xiaochun [1], which argues that the study of the sky is the first science. They consider that people had to make sense of what they saw in the sky and then use that knowledge to make sense of the rest of the world. They studied celestial object movement to help them keep time, direct them in hunting, navigating, planting, establishing leadership and community ideals, and forecasting and explaining terrestrial happenings.

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One chapter from Selin & Xiaochun's edited book discusses the development of astronomy in Indonesia, starting from the traditional uses of star constellations to determine the planting season and as a navigator, the development of star maps by a Dutch explorer, and the development of modern astronomy science during the colonial period [2]. More recent research shows that in Indonesia, celestial knowledge is produced by the interaction of local and regional environments [3].

Evidence of the sky as a source of knowledge in Indonesia extends back to antiquity. The Saka calendar stored temporal progression in unique ways, using *suklapaksa* and *kresnapaksa* as well as day names derived from *saptawara*, *pancawara*, and *sadwara* before incorporating *wuku* into its system. During the Majapahit era, the temporal framework evolved to include aspects like *naksatra*, *yoga*, *karana*, *muhūrta*, *dewatā*, *grahacāra*, *parweśa*, *maṇḍala*, and *rāśi* [4]. Furthermore, the Balinese use *Pengalantaka Eka Sungsang Ka Paing*, a calendrical diagram established in 1979, to determine the phases of the new and full moons for ritual purposes, a custom that is still used today [5].

Another community, the Javanese, used the Crux constellation as a navigational reference to determine the Qibla direction [6]. Another research shows that the Prambanan Temple's architecture included astronomical principles, including its orientation and the use of the sun and moon in the *maṇḍala* [7]. Furthermore, the Mandar people have traditionally relied on stellar observations for sea navigation [8], whereas the Madurese used celestial bodies for agricultural, maritime, and navigational purposes, interpreting solar, lunar, and eclipse phenomena through localized cosmological frameworks [9].

In modern times, several indigenous cultures in Indonesia continue to use celestial observations for cultural and utilitarian reasons. The Sundanese people of Ciptagelar Village, Sukabumi, West Java, see the full moon as a significant and auspicious occurrence, marking it with a ceremonial rite known as *Mapag Purnama* [10]. Similarly, in Sinar Resmi, another village in Sukabumi, local farmers use stellar observations to guide agricultural activities, lowering the probability of crop loss due to natural calamities [11].

Reading those existing studies, it can be seen that there is no study about the Dayak tribe and its sky-related knowledge. So far, the most recent study about the Dayak tribe and its sky-related knowledge is a study on the Dayak Ma'anyan and its folk astronomy and time [12]. Learning from this condition, this article can enrich the study of sky-related knowledge in Indonesia, in particular within the Dayak tribe, because this article discusses how the Dayak Engkadin uses the moon, stars, and sun to maintain sustainability on Earth.

The United Nations approved the Sustainable Development Goals (SDGs), also known as the Global Goals, in 2015 as a universal call to action to end poverty, safeguard the environment, and ensure that by 2030, all people live in peace and prosperity. The 17 SDGs are interconnected, meaning that actions in one area affect outcomes in others, and that development must strike a balance between social, economic, and environmental sustainability. Countries have agreed to prioritize improvement for those who are far behind [13].

The SDGs aim to promote human dignity and prosperity while protecting the Earth's essential biophysical processes and ecosystem services. They recognize that eradicating poverty and inequality must be combined with strategies that promote

long-term economic growth, peace, and justice; address fundamental social needs such as education, health, social protection, and job opportunities; and all of this while addressing climate change and improving environmental protection [14].

The SDGs have 17 goals and 169 targets. The 17 goals are no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation, and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice, and strong institutions, and partnerships for the goals. Among those 17 goals, this article focuses on goal number 15, life on land, by examining traditional practices observed by the Dayak Engkadin tribe to manage its natural resources to maintain harmonious relations with God and nature.

2 Method

This article was written in a descriptive manner aimed at exploring a specific Indonesian tribe, the Dayak Engkadin, traditional practices to manage its natural resources in accordance with the celestial objects. The data were acquired through an in-depth interview with Dayak Engkadin's leader. Besides, secondary data were collected from previous publications related to how indigenous communities use sky phenomena as a guide in managing their land and resources. Those data were analyzed using the Sustainable Development Goals (SDGs) framework. The investigation demonstrates that the Dayak Engkadin tribe's sky-related traditions, which are preserved and practiced, contribute to harmonious relationships with God and the environment.

3 Result and Discussion

3.1 Dayak Engkadin's Traditional Practices

The story of the Engkadin people is a long journey through rivers and dense forests. They once lived in an area crossed by the Ingin River, a landscape that silently witnessed the ebb and flow of their lives. Generally, they are the Dayak Tayap Tongah, Tayap Hulu tribe, also identified as the Dayak Kayong tribe, and consisting of Gerunggang, Tayap, and Kayong sub-tribes.

Their identity did not grow in just one place. Based on the history of the Engkadin community, they have moved at least four times to find a place to live that would be their hometown: starting from Tanjung Pura, Tambak Rawang, Sungai Tongah, and finally settling in Engkadin today, in Sepakat Jaya Village, Nanga Tayap Sub-district, Ketapang Regency, West Kalimantan. In the Engkadin area, there are places that are considered sacred, such as Belian Kikipan and Nibung Pasaran Cucuh. This place is guarded by the memory of Panglima Cucuh, a figure believed to be the protector of the hometown.

The Dayak Engkadin people's worldview is closely tied to nature, reflected in their spiritual connection and wise use of natural resources. Within their belief system, animals such as the pangolin and the crocodile are considered complete. They

also incorporate natural symbolism, such as the Kelasih (symbol of fire on a hill) and the Kelempiau (symbol of swinging branches). Even plants like the banyan tree hold profound meaning for them.

For the Dayak Engkadin people, farming is not just about food, but rather a dialogue with the universe. At the center of this dialogue, the shaman will read signs to determine the fate of the harvest. Before the first seed touches the ground, the shaman will read the signs of nature. Then, he will strike the ground with a machete. This begins with the shaman's request to determine the direction of planting rice and sticky rice. This sign is observed after the machete is lifted from the ground. If the ground leans more to the right, it is nature's mandate to plant rice on the right and sticky rice on the left, and vice versa.

Furthermore, nature's signs are also conveyed through a sacred ritual called *diurit*. To perform this ritual, the shaman measures a one-meter-long piece of wood while reciting a mantra: if nature approves, the wood will grow longer. If nature's blessing is granted, the wood will grow to 1.20 meters. Another form of dialogue with nature is the bird's voice. If you hear the sound of a bird while clearing land or doing other activities, it is a warning. If the sound goes from left to right, it is a warning of disaster for the immediate family, while the opposite direction is a warning for close relatives.

Furthermore, Dayak Engkadin people also believe that to get a successful life (earning a living, clearing land, and setting up a business), they have to pay attention to the moon, stars, and sun. They have a specific calculation based on the stars and the moon's movement. They also have four terms to divide the calculation, namely, the angel, the king, the warrior, and the servant. For example, a person from the Dayak Engkadin tribe gets an invitation to attend a party on the 23rd day of the moon's movement. Then, he calculates using the angel, the king, the warrior, and the servant term.

If the 23rd day coincides with a servant, then during the feast, he will be treated like a servant—that is, he will be disregarded. However, if the 23rd day coincides with an angel or a king, then he will be honored at the feast. The same calculation is also used before people clear the land. If someone plans to clean the land today, and today coincides with a servant, that person should postpone the plan to clear the land.

The life cycle of the Dayak Engkadin people is regulated by a traditional calendar that begins with several initial activities and ends with thanksgiving for the harvest. The year begins in May with *sapat tohon*. This is a transitional moment to banish the previous year's bad luck. Shamans will make *tetobos* (offering containers) from *segulang* wood carved to resemble scarecrows as a symbol of protection for each family. Traditional dishes include *lemang*, grilled chicken, and *tuak* (palm wine).

After the new year begins, in mid-May, the community performs the *menunjang* ritual. They go around the village from one rice barn to another to summon the rice spirits to keep them there. There is also a personal ritual, *ngobat padi*, where landowners burn incense over coconut shell embers to protect their high-quality seeds. August is the time for communal fish harvesting. The entire community descends to the river for the *nuba adat* (a traditional ritual for catching fish using a traditional *tuba*). The shaman will sprinkle water from the *tuba* root, and the entire community will harvest fish together throughout the day.

October is the beginning of the planting season, and a laboh tetobos nyansang (purification) ritual is performed. The water used to wash the rice, which is considered sacred, is put into a bamboo and covered with young areca palm leaves. This water is then sprinkled on the new field as a prayer for the soil to become fertile and to be kept away from pests. In March, before the harvest, there is meutik tohon, or the young rice harvest. The rice is threshed, then cooked in a large cauldron. The villagers will gather to menuku (pound the rice) together on a mortar until it becomes flakes, the flakes can be consumed directly, either dry or processed into wet with a mixture of brown sugar.

The cycle concludes in April with the makan tohon (great harvest). This tradition emphasizes that rice should not be cooked with modern tools. Instead, bamboo (muntik for sticky rice and buluh for rice) must be used. A shaman leads the mendorok ke duate ritual as a form of gratitude to the creator. The event concludes with a grand feast and offerings of pork and chicken, followed by lively traditional arts and entertainment. The table below shows the Dayak Engkadin's traditional calendar.

Table 1. Dayak Engkadin's Traditional Calendar

No	Ritual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Sapat Tohon												
2	Menunjang												
3	Nuba Adat												
4	Laboh Tetobos Nyansang												
5	Meutik Tohon												
6	Makan Tohon												

3.2 Dayak Engkadin's Traditional Practices and Sustainable Development Goal

The above explanation shows that for the Dayak Engkadin tribe, celestial bodies, stars, the moon, and the sun are important to calculate their lives on Earth. The Dayak Engkadin people pay attention to stars and the moon's movement, then combine it with the terms related to good days and bad days (the angel, the king, the warrior, and the servant) for conducting certain activities, like attending a party or clearing the land. Furthermore, the Dayak Engkadin tribes also mention bintang bulan matahari kereng tige (stars, the moon, the sun, the three of them) in the prayers.

Besides using celestial bodies to calculate good days and bad days, and including the celestial bodies in daily prayers, the Dayak Engkadin life cycle, manifested in the traditional calendar, also shows that in managing the natural resources, they maintain a harmonious relationship with Jebata (the Creator, understood as a majestic and unrivalled being who dwells in the highest place) [15]. The highest place here can be associated with the sky. It can be seen from the fact that a ritual is always made in every cycle to show people's respect for the creator and to banish the evil spirits.

The perception of a creator dwelling in the highest realm—associated with the sky—can be found not only in the Dayak Engkadin tribe, but also in other

communities. Some examples are the ruler of the heavens (Kinolani) in the folk tale of Wa Ode Kaengu Faari from the Muna tribe of Southeast Sulawesi [16]; Batang Garing or Batang Haring, meaning the tree of life is shaped like the blade of a spear pointing upwards towards the sky, and is believed to symbolize the Kaharingan religion of the Dayak Ngaju people, Ranying Hatala Langit, the source of all life [17]; and Mulajadi Nabolon, the Debata or God who created the world and the universe in the Batak Toba tribe [18].

The association of the creator or God or Jebata, who lives in the sky, shows that local communities or tribes consider the sky is important and inseparable aspect in their life. Since the sky is an inseparable aspect of life, the local tribes, including the Dayak Engkadin, always perform rituals to ask for protection from the creator in the sky. The Dayak Engkadin, in particular, mentions celestial objects in their prayers. They believe that by asking for protection from the creator in the sky and from the celestial objects, they can achieve a prosperous life in the form of a bountiful harvest or a successful business.

The above practices conducted by the Dayak Engkadin tribe are in line with SDG number 15, life on land, which goal is to protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. The land and natural resource management practices of the Dayak Engkadin people, which are in line with Sustainable Development Goal 15, can be grouped into two categories: the use of natural signs, including celestial bodies, to determine actions on Earth; and the use of traditional tools in rituals.

The use of natural signs and celestial bodies to determine activities on Earth is evident in the determination of the direction for planting rice and glutinous rice through prayers and rituals, the use of birds' sounds to identify misfortune, and the determination of auspicious and inauspicious days based on the movements of the moon and stars. Furthermore, the use of traditional tools is evident in the use of wooden offering containers, the ritual of ngobat padi involving the burning of incense over coconut shell embers, the use of traditional tuba for fishing, the use of rice-washing water to purify fields, and the use of traditional bamboo tools for harvesting and cooking rice.

Besides those practices, the Dayak Engkadin tribe's worldview also supports SDG 15. They pay attention to four categories of animals, namely, animals that move from tree to tree, like the orangutan, kelempiau, kelasi, and kukang; animals that live on the ground, like deer, pigs, porcupines, lizards, and ruwai; animals from the bird type, like tingang, tajak, mangku, segurak, burung sesakit, and burung kapan; and animals that live in water.

In addition, activities that have an impact on society need to be protected together, such as sacred forests, tembawang forests (a traditional agroforestry system characteristic of the Dayak tribe, which resembles a natural forest ecosystem), a mountain on an island, land where springs rise, and a ring-shaped hole. Those practices and worldview can support SDG 15 because they do not destroy the land; in fact, they protect the natural resources as they are. When the Dayak Engkadin people want to use the land, they perform certain rituals and pay attention to the natural signs. They also protect some areas, like sacred forests.

4 Conclusions

In the Dayak Engkadin tribe, the connection between sky and earth can be seen in how the people mention celestial objects in their prayers and how the celestial objects' movement helps them determine good days and bad days, including a good day for clearing land and farming. The use of natural signs and rituals at each stage of managing natural resources, clearing land, fishing, planting, and harvesting, also demonstrates that the Dayak Engkadin people regard the harmonious relationship between sky and earth as vital. Harmony between humans, nature, and God – in the case of the Dayak Engkadin tribe, with Jebata or the supreme creator – ultimately supports the achievement of Sustainable Development Goal 15, as these traditional practices do not harm nature.

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