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The Symbolic Cremation of Agricultural Pests: Traditional Ecological Knowledge for Sustainable Agriculture in the *Subak* System of Bali

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Abstract: The symbolic cremation ritual for agricultural pests (*Mrateka Sarwa Marana*), constitutes an important component of Bali's Subak system for sustaining agriculture through indigenous knowledge and collective ritual practices. This study examines the ritual process and the Traditional Ecological Knowledge (TEK) embedded in the *Mrateka Sarwa Marana* ritual. Employing a qualitative religio-cultural ethnographic approach, the research was conducted in Bedha Village, Tabanan, Bali. Data were collected through participant observation, semi-structured interviews with key informants, and library research. The findings show that the Mrateka ritual functions as a collective mechanism integrating ritual purification, ethical pest management, symbolic cremation, and community participation to strengthen ecological balance and social cohesion within the *Subak* system. The tradition also preserves TEK through irrigation management, synchronized planting, environmental sanitation, intergenerational knowledge transmission, and the complementary use of modern agricultural technology. The study proposes an integrative framework demonstrating how ritual, traditional ecological knowledge (TEK), and the *Subak* institution collectively contribute to sustainable agriculture and the achievement of the Sustainable Development Goals (SDGs).

Keywords: ritual *mrateka sarwa marana*; *subak*; traditional ecological knowledge; sustainable agriculture

1. Introduction

Bali's agrarian system is fundamentally grounded in a worldview that promotes harmonious relationships among humans and the divine (*parahyangan*), among members of society (*pawongan*), and between humans

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and the natural environment (*palemahan*), collectively known as *Tri Hita Karana* (Astuti, 2018; Roth, 2014; Wirawan & Rosalina, 2024; Wiryawan, 2024). In 2012, UNESCO inscribed *the Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy* on the World Heritage List, recognising this indigenous knowledge system as the foundation of Bali's traditional irrigation and agricultural governance. Beyond acknowledging its cultural significance, the inscription affirms the continuing relevance of this system for sustainable agriculture, environmental stewardship, and global sustainable development goals (SDGs).

This philosophical framework is institutionally embodied in the subak, an indigenous agrarian institution that integrates irrigation management, customary law, religious authority, and collective decision-making in rice cultivation (Roth & Sedana, 2015). More than a hydraulic irrigation network, subak functions as a socio-ecological institution in which agricultural production is inseparable from religious obligations, communal cooperation, and ecological responsibility. By sustaining agricultural productivity, strengthening community resilience, and ensuring equitable access to water resources, the subak system contributes directly to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty) through the protection of rural livelihoods and SDG 2 (Zero Hunger) through the promotion of sustainable food production and food security. Within this institutional framework, ecological sustainability is reinforced not only through the technical management of water and agricultural resources but also through ritual practices that maintain the moral and cosmological relationships among humans, nature, and the divine.

One ritual tradition embedded within the *subak* system is *Mrateka Sarwa Marana*, the symbolic cremation ritual for agricultural pests, the term used throughout this study according to local usage in Bedha Village. Literally, *Mrateka* means "cremation" or "ritual burning," *Sarwa* means "all," and *Marana* refers to organisms that damage agricultural crops. Thus, *Mrateka Sarwa Marana* can be understood as the symbolic cremation of agricultural pests. Unlike conventional pest-control practices that aim to eradicate pests, the ritual seeks to restore harmony among humans, nature, and the spiritual world through symbolic offerings and collective religious ceremonies. Although its procession resembles the *ngaben* cremation ritual, its purpose is not to symbolize destruction but to restore ecological balance through spiritual and ethical reconciliation. As part of the *subak* system, *Mrateka Sarwa Marana* represents a culturally embedded mechanism for addressing ecological disturbances while reinforcing the philosophical values of Balinese agrarian life.

The continuing relevance of *Mrateka Sarwa Marana* is closely linked to the ecological transformations affecting Bali's agricultural landscapes. Agricultural modernization, tourism-driven land conversion, climate variability, biodiversity loss, and the intensive use of chemical pesticides have altered the ecological dynamics of rice-field ecosystems, reducing resilience and increasing the frequency of rodent outbreaks (Ardana et al., 2024; Wahyuni et al., 2023). Farmers in Bedha Village, Tabanan Regency, report that these outbreaks recur approximately every decade and pose serious threats to rice production and local food security. Although communities initially relied on technical interventions, such as chemical pesticides and other pest-control measures, these approaches are increasingly perceived as ineffective, costly, and environmentally harmful. This situation highlights the limitations of technical solutions alone in addressing the complex socio-ecological challenges facing the Balinese agrarian system.

Within the Balinese Hindu worldview, environmental and agrarian disturbances are understood through the complementary concepts of *sakala* and *niskala*, which integrate material and spiritual dimensions in maintaining harmony among humans, nature, and the divine. Accordingly, recurrent rodent outbreaks are viewed not only as biological problems but also as signs of cosmological imbalance. This perspective explains the continuing relevance of *Mrateka Sarwa Marana* in contemporary Balinese agriculture. When technical interventions in the *sakala* realm, such as pest-control measures, are considered insufficient, communities complement them through the *niskala* realm by performing *Mrateka Sarwa Marana.* Rather than focusing solely on pest eradication, the ritual seeks to restore ecological harmony through symbolic, ethical, and spiritual practice (Jin, 2022; Scobie et al., 2023). By integrating material and spiritual approaches, *Mrateka Sarwa Marana* strengthens socio-ecological resilience while reflecting the Balinese cosmological understanding of environmental management

Beyond its role as a ritual response to agrarian disturbances, *Mrateka Sarwa Marana* functions as a socio-ecological institution that strengthens collective governance within the *subak* system. Farmers, *pamangku* (temple priests), and *desa adat* (customary authorities) actively participate in the ritual, reinforcing cooperation, shared responsibility, and coordinated responses to ecological challenges, particularly recurrent rodent outbreaks (Balan, 2025; Putra et al., 2025; Sedana et al., 2021). The ritual also preserves and transmits Traditional Ecological Knowledge through collective memory and ceremonial practices, including knowledge of seasonal cycles, climate variability, water management, and pest dynamics (Ardana et al., 2024; Wahyuni et al., 2023). Consequently, *Mrateka Sarwa Marana* strengthens social cohesion, supports community-based environmental governance, and enhances socio-ecological resilience within the Balinese agricultural system.

Despite its continuing ecological and cultural significance, the sustainability of *Mrateka Sarwa Marana* in Bedha Village is increasingly challenged by socio-economic change. Field observations indicate that the ritual is performed less frequently, and participation among younger generations has steadily declined. As younger community members become less involved in traditional farming, the intergenerational transmission of Traditional Ecological Knowledge (TEK) has weakened. This trend is driven by agricultural modernization, market-oriented production, rural demographic change, expanding non-agricultural employment, and formal education that places greater emphasis on scientific and technical knowledge than on local cultural traditions (Dewi et al., 2018; Santoso et al., 2023). Consequently, the declining practice of *Mrateka Sarwa Marana* threatens not only the preservation of TEK but also the community's capacity to maintain collective environmental stewardship and socio-ecological resilience.

Previous studies have examined the *subak* system, Balinese environmental philosophy, and Traditional Ecological Knowledge (TEK). However, these studies have paid limited attention to *Mrateka Sarwa Marana* as an integrated socio-ecological institution that connects ritual practices, traditional ecological knowledge, and community-based environmental governance. Most existing research has focused either on the religious symbolism of Balinese rituals or on the institutional functions of the *subak* system. As a result, the contribution of *Mrateka Sarwa Marana* to strengthening socio-ecological resilience has not been adequately explained. To address this gap, the present study investigates how the *Mrateka Sarwa Marana* tradition in Bedha Village preserves Traditional Ecological Knowledge and enhances socio-ecological resilience. By clarifying this relationship, the study contributes to a broader understanding of the role of indigenous knowledge in supporting sustainable agricultural governance under contemporary ecological change.

2. Literature Review

Previous studies have examined the *subak* system as an indigenous agrarian institution that integrates irrigation management, religious authority, and collective governance among farmers. Lansing (2006), describes *subak* as a self-organizing socio-ecological system in which coordinated planting schedules, water distribution, and synchronized cropping support both agricultural productivity and pest management. Accordingly, *subak* has been widely recognized as a model of sustainable common-pool resource management and an important example of Traditional Ecological Knowledge and community-based environmental governance (Dewi et al., 2018; Ma et al., 2019; Ramstedt, 2014; Roth & Sedana, 2015).

Beyond its technical functions, *subak* is embedded in Balinese Hindu cosmology, where agricultural activities are integrated with ritual practices that strengthen harmony among humans, nature, and the divine. As a result, agriculture is understood not only as an economic activity but also as a cultural and spiritual practice that reinforces social cohesion and environmental stewardship (Dewi et al., 2018; Roth & Sedana, 2015). This limitation is particularly evident in studies of agricultural pest management. Most previous research has examined pest control from technical and agronomic perspectives, such as integrated pest management, biological control, synchronized planting, habitat management, and the use of chemical pesticides (Ma et al., 2019). Although these approaches effectively reduce crop losses, they generally treat pest outbreaks as biological problems requiring technical solutions. By contrast, relatively few studies have explored how Balinese farming communities interpret ecological disturbances through cultural and cosmological perspectives. In this worldview, pest outbreaks are understood not only as ecological events but also as signs of disrupted relationships among humans, nature, and spiritual forces. Consequently, communities complement technical interventions with ritual practices that restore ecological harmony, strengthen social cohesion, and reinforce collective environmental responsibility (Roth & Sedana, 2015; Surata et al., 2025)

One ritual that reflects this ecological perspective is *Mrateka Sarwa Marana*, a ceremonial tradition practiced by several Balinese *subak* communities in response to pest outbreaks. The ritual serves as a collective mechanism for restoring harmony among agricultural land, the natural environment, and spiritual forces while strengthening cooperation among farmers. Beyond its religious significance, *Mrateka Sarwa Marana* integrates indigenous ecological knowledge with collective agricultural action to address ecological disturbances. Despite its continued practice, however, the tradition has received far less scholarly attention than the broader *subak* system, and its ecological functions, social significance, and contribution to community-based pest management remain insufficiently understood.

Although previous studies have advanced understanding of the *subak* system and its ritual traditions, an important research gap remains. Most studies explain ecological resilience through irrigation governance and institutional management, while research on ritual practices mainly emphasizes their religious and cultural significance. Consequently, limited attention has been given to how agricultural rituals function as ecological mechanisms for responding to pest outbreaks and strengthening socio-ecological resilience. This gap is particularly evident in studies of *Mrateka Sarwa Marana*, which rarely examine how the ritual integrates cosmological beliefs, indigenous ecological knowledge, and collective

agricultural action into community-based pest management. To address this gap, the present study investigates the *Krateka Sarwa Marana* tradition in Bedha Village as an integrated ecological practice within the *subak* system. The findings contribute to a broader understanding of how Traditional Ecological Knowledge supports community-based environmental governance and strengthens socio-ecological resilience in contemporary Balinese agriculture.

3. Method and Theory

3.1 Methods

This study employs a qualitative approach using a religio-cultural ethnographic research design grounded in the paradigms of cultural studies and the anthropology of religion (Gertner et al., 2021). This approach is considered appropriate because the *Krateka Sarwa Marana* tradition constitutes an agrarian ritual practice rich in symbolic, cosmological, and socio-religious meanings that articulate the relationship between humans, nature, and the Divine. As such, the tradition cannot be adequately understood through quantitative measurement, but rather through lived experience, interpretation, and the perspectives of the ritual actors themselves.

The research was conducted in the *Subak* of Bedha Village, Tabanan Regency, Bali. This site was selected because the *subak* community consistently performs the *Krateka Sarwa Marana* Tradition as an integral part of its agrarian belief system, the ritual framework of *panca yadnya*, and a cultural mechanism for responding to ecological disturbances, particularly agricultural pests. The fieldwork was carried out over a five-month period, from June to October 2025, encompassing the pre-ritual, ritual, and post-ritual phases. Participatory field observations were conducted throughout the implementation of the *Krateka Sarwa Marana* Tradition in the *Subak* area of Bedha Village. The observations indicate that this tradition constitutes an integral part of the agricultural ritual cycle, deeply rooted in the *subak* system and the rice-farming activities of the local community.

Research participants were selected purposively based on their level of knowledge, experience, and direct involvement in the ritual. The key informants comprised 15 individuals, including one *pakaseh* of *Subak* Bedha, four *subak* administrators, four *pamangku* and sulinggih directly involved in officiating the ritual, and six farmers who actively participated in the ritual processions. In addition, five supporting informants—consisting of traditional leaders and community figures with an in-depth understanding of the history, transformation, and meanings of the *Krateka Sarwa Marana* tradition were included.

The study used both primary and secondary data sources. Primary data were collected through participatory observation of the entire *Mrateka Sarwa Marana* ritual process—from preparation to post-ritual activities—and through in-depth interviews with *pamangku*, *bendesa adat*, *pakaseh*, and community elders to explore the ritual's meanings, functions, and objectives. Secondary data were obtained from documentation and a literature review, including published editions and documented transliterations of Balinese *lontar* texts, namely *Sri Purana Tattwa*, *Kuttara Dewa Tattwa*, *Usada Sawah*, *Babad Dewa*, *Sila Gama Catur Pataka*, and *Purwana Yama Tattwa*, as well as relevant scholarly publications. These *lontar* texts served as contextual documentary sources to support the interpretation of ethnographic findings rather than as objects of philological analysis. Accordingly, the study did not examine original manuscripts or conduct codicological analysis, critical editing, or new transliterations. Instead, information from the published *lontar* texts was triangulated with field observations and interview data to examine its consistency with contemporary ritual practices.

Data were collected through observation, interviews, and documentation. Participatory observation was employed to examine ritual practices, the structure of the procession, the use of ritual offerings (*upakara*), and the social roles of ritual actors. In addition, 15 semi-structured interviews were conducted with key informants involved in the tradition, each lasting approximately 30–60 minutes. Nine interviews were conducted in Indonesian and six in Balinese, depending on the communicative context and language preference of the informants. The interviews explored historical narratives, theological perspectives, and social experiences related to the implementation of the *Mrateka Sarwa Marana* tradition. Documentation, including photographs, field notes, and customary archives, was also collected to complement and triangulate the data obtained from observation and interviews.

Data analysis was carried out qualitatively through continuous processes of data reduction, data display, and conclusion drawing. The collected data were categorized into major thematic areas, including the definition of the ritual, stages of implementation, ritual functions, and its religious, socio-cultural, and ecological meanings. The analysis employed hermeneutic and contextual approaches, particularly in interpreting ritual symbols, lontar texts, and the mythology underlying the tradition (Toye et al., 2021). To deepen the analysis, functional–structural and symbolic theories were applied, alongside the concept of *Tri Hita Karana* as the principal philosophical framework for understanding the harmonious relationship between humans, nature, and the Divine as embodied in the practice of the *Mrateka Sarwa Marana* tradition. Data validity was ensured through source, method, and theoretical triangulation by

comparing findings from observation, interviews, and documentation, as well as by conducting member checks with key informants.

3.2 Theory

Ritual is widely recognized as a fundamental component of social and cultural life that extends beyond religious ceremonies. Anthropological studies describe ritual as a socio-cultural institution through which communities construct and transmit shared meanings, collective values, and social identity (Geertz, 1973; Turner, 1969). From a phenomenological perspective, these meanings emerge through lived experience and intersubjective interaction rather than from ritual performance alone (Husserl, 1970; Schutz, 1967). Therefore, understanding ritual requires examining both its observable practices and the meanings that participants attribute to them.

This perspective is particularly relevant to traditional agricultural communities, where ritual plays an important role in environmental governance and collective resource management. Previous studies show that agricultural rituals transmit local ecological knowledge, strengthen ethical responsibility toward nature, and reinforce collective cooperation in managing natural resources (Berkes, 2012). Within the Balinese *Subak* system, ritual is integrated with irrigation management, agricultural decision-making, and community organization, enabling *Subak* to function as a socio-ecological system that supports agricultural productivity and environmental sustainability (Lansing, 2006; Lansing & Fox, 2011). Therefore, rituals in *Subak* should be understood not only as religious practices but also as mechanisms for maintaining ecological values and collective responsibility.

Within Geertz's Interpretative Theory, culture is understood as a system of meanings expressed through symbols that can be interpreted as a "text" (Geertz, 1973; Cai, 2024). From this perspective, *Mrateka Sarwa Marana* represents a cultural text that expresses the relationship among humans, nature, and the divine. Using Geertz's *thick description* approach, the ritual is interpreted not merely as a ceremonial practice but as a symbolic expression of religious values, ecological knowledge, and social norms embedded in community life (Geertz, 1973). Accordingly, *Mrateka Sarwa Marana* functions not only as a response to agricultural pest disturbances but also as a symbolic mechanism for strengthening social solidarity, maintaining ecological balance, and sustaining community well-being (Geertz, 1973).

From the phenomenological perspective of Husserl (1970) and Schutz (1967) social reality is not seen as objective and separate from humans, but as a construction of meaning rooted in subjective everyday experience. Husserl's concept of the lifeworld (*lebenswelt*) refers to the world of lived experience prior

to scientific interpretation, and in this context, the practice of *Mrateka Sarwa Marana* can be understood as a manifestation of farmers' empirical experiences with recurring natural phenomena, particularly pest cycles (Husserl, 1970). Husserl's concept of intentionality further explains that consciousness actively constructs meaning from experience, so farmers' encounters with pests develop into symbolic and religious interpretations expressed through ritual practices (Husserl, 1983). Schutz (1967) later extended this idea into the social realm, arguing that social action is shaped by subjective meanings formed through experience and interaction, and introducing the concept of stock of knowledge, or accumulated knowledge passed down across generations. Therefore, through a phenomenological lens, *Mrateka Sarwa Marana* is not merely a religious ritual, but a meaningful social action rooted in lived experience, intentional consciousness, and the intergenerational transmission of collective knowledge, reflecting an ongoing interaction between subjective experience and social reality.

From an ecological perspective, Traditional Ecological Knowledge (TEK) refers to knowledge developed through long-term interactions between communities and their environment and embedded in cultural practices and belief systems (Berkes, 2012). TEK encompasses practical ecological knowledge as well as the values that guide sustainable human–nature relationships. From this perspective, *Mrateka Sarwa Marana* represents a local ecological knowledge system through which communities respond to recurring pest outbreaks and changing agricultural conditions. Likewise, the *Subak* system demonstrates the adaptive capacity of local institutions by integrating collective water management, social coordination, and shared rules for sustainable resource governance (Ostrom, 1990). Accordingly, *Mrateka Sarwa Marana* should be understood not only as a symbolic ritual but also as a culturally grounded ecological strategy that integrates spiritual values, Traditional Ecological Knowledge, and community-based resource management (Berkes, 2012; Ostrom, 1990).

From an ethical perspective, Aristotle's Theory of Eudaimonism explains that the ultimate goal of human action is *eudaimonia*, or holistic well-being achieved through virtuous living (Aristotle, 2009). In this context, *Mrateka Sarwa Marana* seeks not only agricultural success but also collective well-being by promoting values such as togetherness, self-restraint, and harmony between humans, nature, and the spiritual world (Annas, 1993). Thus, the ritual functions as an ethical practice that integrates material and spiritual dimensions through shared moral values. From a structural-functional perspective, rituals strengthen social solidarity, maintain social order, and reproduce collective values within society, including the *Subak* system (Durkheim, 1995). At the

same time, Symbolic Interactionism views ritual meanings as products of social interaction that are continuously interpreted and transmitted across generations (Blumer, 1969). Accordingly, *Mrateka Sarwa Marana* functions not only to reinforce social cohesion but also to preserve and reproduce cultural meanings within the community.

In the local context, the concept of *Tri Hita Karana* provides a philosophical framework for understanding *Mrateka Sarwa Marana* as a practice that maintains harmony between humans and God, among humans, and with the environment, as well as balance between the microcosm and macrocosm. From the perspective of Religious Ecology Theory, cultural practices also contain ecological values rooted in belief systems (Berkes, 2012). In this framework, *Mrateka Sarwa Marana* is not merely symbolic but reflects environmental ethics based on religious values and functions as a cultural mechanism that supports agricultural sustainability, pest control, and environmental conservation. Thus, the ritual represents the integration of symbolic, social, ecological, and spiritual dimensions and serves as an adaptive strategy to maintain sustainable balance between humans and nature (Berkes, 2012).

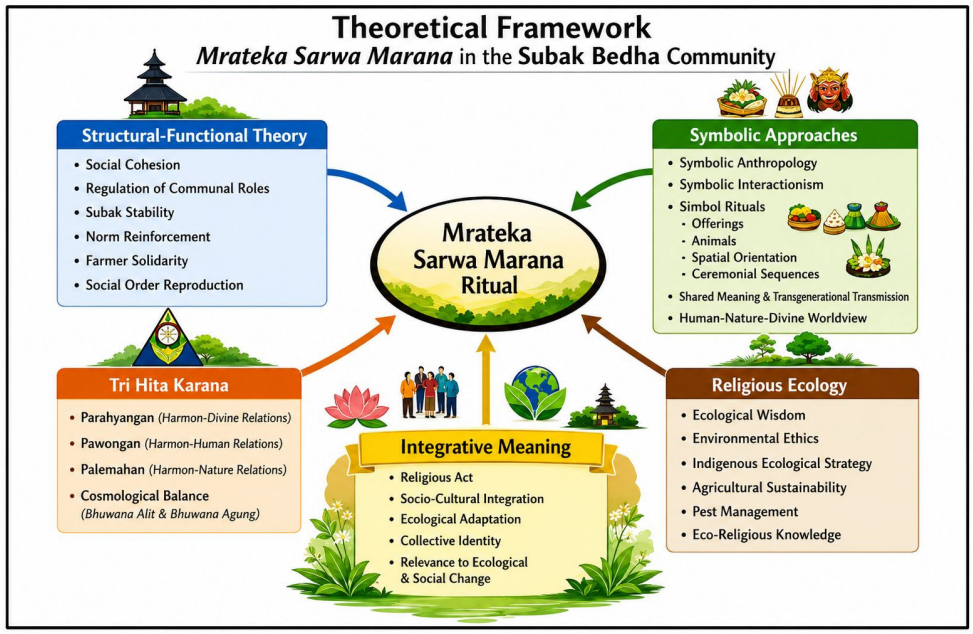

Figure 1. Theoretical Framework *Mrateka Sarwa Marana* in the *Subak* Bedha Community (Adapted by the authors from Berkes [2012], with AI assistance)

4. Results and Discussion

4.1 Field Observation Data

Bedha Traditional Village is a customary village with strong socio-cultural and religious traditions rooted in Balinese Hinduism. Beyond serving as a residential settlement, the village functions as a socio-cultural institution that preserves customary law, local wisdom, and religious practices. Community life reflects a close relationship among humans, nature, and the spiritual world through cultural activities, religious ceremonies, and community-based natural resource management. Agriculture and plantations form the village's main economic sectors, strengthening the integration of cultural values, environmental stewardship, and local livelihoods.

Historically, Bedha Traditional Village is believed to have existed since the pre-Bedahulu period, before the thirteenth century, based on local oral traditions. The village name is associated with "*Daha*" in East Java, indicating early cultural connections between Bali and Java. Local historical accounts also mention *Patih Kebo Iwa*, who is believed to have built a *Bale Agung* in the area. Over time, Bedha developed through the *Kaba-Kaba* kingdom, the Dutch colonial period, Indonesia's early independence, and the modern era, shaping its present customary governance and social institutions that continue to preserve cultural heritage and community cohesion.

During the preparatory stage, *pakaseh*, *subak* administrators, *pamangku*, *sulinggih*, and members of the farming community (*krama petani*) jointly prepared ritual offerings (*banten*), ceremonial equipment, and ritual sites, including temples, irrigation channels, and rice fields. These activities were carried out through *ngayah* (voluntary communal service), reflecting shared responsibility and mutual cooperation, although participation was dominated by older community members, with limited involvement from younger generations. The observations also showed that ritual symbols were treated as sacred. Rats, representing *marana* (agricultural pests), were purified, wrapped, and presented as ritual offerings rather than treated as objects of destruction. This practice reflects the belief that pests are part of the cosmic order and should be ritually reconciled to restore ecological balance.

4.2 Ritual Process of Mrateka Sarwa Marana

Field observations indicate that the *Mrateka Sarwa Marana* ritual is implemented through a structured sequence comprising ritual preparation, purification, symbolic cremation, and closing ceremonies, forming an integral component of the agricultural cycle within the *Subak* system of Bedha Village. The entire procession involves the active participation of the *pakaseh*, *pamangku*, *sulinggih*, *subak* administrators, and members of the farming community, each

performing specific responsibilities according to customary regulations, thereby demonstrating the close integration of agricultural management, religious obligations, and communal cooperation within the institutional structure of *Subak.*

This observation was consistently supported by interview findings. I Wayan Suriana, a customary priest (*pemangku adat*), explained that every stage of the ritual represents a sacred process intended to restore harmony between humans, nature, and the divine, while I Nyoman Swadra, a customary leader, emphasized that the ritual functions not merely as a response to agricultural pests but as a mechanism for maintaining the cosmological principles that sustain the *Subak* system. Likewise, I Gde Andika Yudha Pradana, I Ketut Merta Suteja, and I Ketut Mertayasa, a village official, highlighted that the ritual embodies educational and ecological values by strengthening collective responsibility, preserving indigenous knowledge, and encouraging younger generations to respect nature. This interpretation was further reinforced by I Nyoman Arnaya, who explained that the ritual should not be understood as an effort to eradicate pests but rather as a symbolic practice that teaches respect for all living beings and promotes ecological balance. These interview findings are consistent with documentary evidence from *Sri Purana Tattwa*, *Usada Sawah*, and *Kuttara Dewa Tattwa*, which collectively portray the ritual as a cosmological mechanism for restoring harmony before the implementation of *penangluk marana*.

Taken together, the convergence of observational evidence, interview data, and documentary sources demonstrates that the *Mrateka Sarwa Marana* ritual functions simultaneously as a religious practice, an ecological strategy, and an institutional mechanism through which the *Subak* community preserves environmental sustainability, reinforces social cohesion, and maintains harmonious relationships between humans, nature, and the divine.

Table 1 summarizes the main stages of the *Mrateka Sarwa Marana* ritual in Bedha Village. The table presents the sequence of ritual processions, key ritual actions, offerings, and their primary significance in a concise format, allowing readers to easily understand the overall structure of the ceremony. More detailed explanations of the theological, ethical, and ecological meanings of each stage are discussed in the subsequent analysis.

Table 1. The Procession of the *Mrateka Sarwa Marana* Tradition in Bedha Village

Stage	Name of Procession	Key Ritual Action	Offerings	Main Significance
1	*Mabanten Pakeling*	Ritual notification to temple deities	*Banten Pejati*, conch shell	Initiates sacred ritual sequence
2	Ethical Treatment of Rats	Shift from killing to ritual respect for rats	Prayers, symbolic rites	Ahimsa and ecological awareness
3	*Ngeringkes*	Purification and shrouding of rat bodies	*Eteh-eteh*, white cloth	Spiritual purification of beings
4	*Pabersihan lan Tarpana*	Prayers for the souls of rats	Tarpana offerings	Spiritual release of atma
5	*Banten Mamanah Toya*	Night ritual dedicated to Dewa Wisnu	Mamanah Toya offerings	Inner purification
6	*Nunas Toya Panembak*	Retrieval of holy water	Holy water *(tirta)*	Collective spiritual cleansing
7	*Nyukat Genah Ngeseng*	Preparing cremation site	Measuring tools, offerings	Ritual purification of space
8	*Melaspas Wadah lan Patulang*	Purification of cremation structures	*Banten Melaspas*	Sanctification of ritual media
9	*Mamargi Ka Segara*	Procession to the sea	Procession offerings	Journey toward cosmic realm
10	*Ngeseng lan Nganyut ka Segara*	Cremation and ash dispersal	Fire ritual, *jukung*, offerings	Return to cosmic elements
11	*Caru Panca Sanak*	Ritual to neutralize negative forces	*Caru* offerings	Cosmic balance restoration
12	*Mabumi Sudha* & *Masapuh Wighna*	Land purification rituals	*Pecaruan* offerings	Environmental and spiritual cleansing
13	*Penyejeg* and Closing Rituals	Final ritual consolidation	*Bade tumpang tujuh, sasari,* concluding offerings	Ritual closure and harmony

Source: Authors, 2025

The ritual stages presented in Table 1 indicate that *Mrateka Sarwa Marana* is not merely a ceremonial practice but an integrated system that connects religious beliefs, ethical values, and ecological awareness. The ritual sequence reflects a cosmological perspective in which humans, animals, and nature are understood as interconnected elements within a balanced cosmic order. A significant aspect of the ritual is the symbolic transformation of rats from agricultural pests into living beings recognized as possessing *atma* (souls). This interpretation reflects the ethical principle of *ahimsa*, which emphasizes respect for all forms of life. Therefore, *Mrateka Sarwa Marana* frames pest management not only as a practical activity but also as a moral and spiritual practice aimed at maintaining ecological harmony.

Figure 2. The *Mrateka Sarwa Marana* ritual, led by a Hindu priest and followed by communal prayers by the local community in Bedha Village, Tabanan, 2021. (Photo: Renawati, 2025)

4.3 Traditional Ecological Knowledge Embedded in the Mrateka Sarwa Marana Ritual

The findings indicate that the *Mrateka Sarwa Marana* ritual embodies a living system of Traditional Ecological Knowledge (TEK) that has been developed, practiced, and transmitted across generations within the *Subak* community of Bedha Village. Participatory observations revealed that ritual implementation is consistently integrated with ecological management activities, including cleaning irrigation canals, preparing rice-field environments, coordinating synchronized planting schedules, and organizing communal work (*ngayah*). These collective practices demonstrate that environmental management is inseparable from ritual performance and reflects the community's understanding that agricultural sustainability depends upon the harmonious relationship between humans, nature, and the divine. This interpretation was consistently supported by interview findings. I Nyoman Arnaya explained that the ritual should not be understood merely as a ceremonial response to agricultural pests but as a moral guide that teaches respect for nature and encourages the restoration of ecological balance rather than the eradication of pests.

Likewise, I Wayan Suriana, a customary priest, emphasized that ecological disturbances are interpreted not only as biological phenomena but also as indications that harmony between humans, the environment,

and spiritual obligations has been disrupted. He further explained that increasingly unpredictable seasonal patterns and more severe rat infestations are closely associated with the declining implementation of synchronized planting within the *Subak* system, noting that *"Seasonal changes are increasingly unpredictable, and rat infestations are becoming more difficult to control. In the past, rituals such as Mrateka Sarwa Marana were effective because farmers planted their rice simultaneously*". This perspective was reinforced by I Ketut Mertayasa and I Gde Andika Yudha Pradana, who explained that modern agricultural technologies, including tractors and environmentally friendly pesticides, complement rather than replace the ritual because technological innovation addresses practical farming needs, whereas ritual maintains cosmological harmony and collective responsibility toward nature.

Furthermore, I Gde Andika Yudha Pradana and I Ketut Merta Suteja highlighted that the continuity of this ecological knowledge depends on intergenerational transmission through ritual participation, temple ceremonies, and community-based environmental programs that encourage younger generations to remain engaged with *Subak* traditions. These interview findings are consistent with documentary evidence from *Sri Purana Tattwa* and *Usada Sawah*, which describe agricultural rituals as mechanisms for maintaining balance among humans, nature, and the cosmic order while positioning agricultural pests within a broader cosmological framework rather than solely as destructive organisms.

4.4 An Integrative Model of Mrateka Sarwa Marana: Linking Ritual, Cosmology, Traditional Ecological Knowledge, and the Subak System

The findings of this study demonstrate that the *Mrateka Sarwa Marana* tradition cannot be adequately understood as an isolated ritual practice or merely as a religious response to agricultural pest outbreaks. Participatory observations revealed that every stage of the ritual—from collective preparation (*ngayah*), ritual purification, symbolic cremation, and the procession to the sea—is closely integrated with agricultural management, environmental stewardship, and the institutional governance of the *Subak* system. Throughout the ritual process, the *pakaseh*, *pamangku*, *sulinggih*, *subak* administrators, and farming community perform complementary roles that collectively maintain both ecological and social balance.

This observation was consistently supported by interview findings. I Wayan Suriana, a customary priest (*pemangku adat*), explained that the ritual functions as a sacred process for restoring harmony between humans, nature, and the divine rather than merely controlling agricultural pests. Similarly, I Nyoman Swadra emphasized that ecological disturbances are interpreted

through Balinese cosmology as indications of disrupted harmony within the relationships among humans, the environment, and spiritual forces. This interpretation was reinforced by I Nyoman Arnaya, who explained that the ritual teaches respect for all living beings and encourages the restoration of ecological balance instead of emphasizing pest eradication. Furthermore, I Gde Andika Yudha Pradana, I Ketut Merta Suteja, and I Ketut Mertayasa highlighted that the continuity of the tradition depends upon the integration of ritual practice, environmental ethics, indigenous knowledge, and collective participation, including the transmission of ecological values to younger generations and the complementary use of modern agricultural technologies alongside customary practices.

These interview findings correspond with documentary evidence from *Sri Purana Tattwa*, *Usada Sawah*, and *Kuttara Dewa Tattwa*, which collectively describe agricultural rituals as mechanisms for restoring harmony between *bhuwana alit* (the microcosm) and *bhuwana agung* (the macrocosm), while emphasizing that environmental balance is achieved through the interaction of spiritual, ecological, and social responsibilities. The convergence of observational evidence, community narratives, and documentary sources therefore demonstrates that the *Mrateka Sarwa Marana* tradition operates through four interrelated dimensions.

Ritual functions as the operational mechanism through which collective actions are performed, Balinese cosmology provides the philosophical framework for interpreting ecological disturbances, Traditional Ecological Knowledge supplies adaptive environmental knowledge developed through generations of farming experience, and the *Subak* system serves as the institutional platform that integrates these components into a coherent system of agricultural governance. The continuous interaction among these four dimensions enables farming communities to respond adaptively to environmental change while simultaneously preserving cultural identity, strengthening social cohesion, and maintaining agricultural sustainability. Accordingly, this study proposes an integrative socio-ecological model in which ritual, cosmology, Traditional Ecological Knowledge, and the *Subak* system function as mutually reinforcing components rather than independent elements. This integrative relationship constitutes the principal novelty of the present study by demonstrating that the long-term resilience of the *Subak* system depends not on a single cultural or ecological factor but on the dynamic interaction among spiritual beliefs, indigenous knowledge, collective institutions, and adaptive environmental management.

Figure 3. Photographs of the *Mrateka Sarwa Marana* ritual in Bedha Village, Tabanan, Bali, 2021. Top left: rats placed in an iron cage awaiting the ritual and the ritual event banner. Bottom: the ritual procession. (Banner photograph reproduced from the Bedha Traditional Village Facebook page; all other photographs were taken with permission from the Instagram account @krisna_widarma.)

4.5 Discussion

This study demonstrates that the Mrateka Sarwa Marana tradition within the Subak of Bedha Village represents a socio-religious knowledge system that enables Balinese agrarian communities to adapt to ecological disturbances, climate change, and social transformation. The tradition functions not merely as a religious ritual or pest-control practice but as a cosmological framework that integrates relationships among humans, nature, and transcendental forces within a moral and spiritual order. These findings align with Danugroho et al., (2025) and Geria et al., (2023) perspective, which situates ritual as a symbolic system that imparts meaning to ecological and social realities while simultaneously shaping collective patterns of action within the community.

Participatory observations indicate that *Mrateka Sarwa Marana* is embedded within the *Subak* system as a socio-religious institution that integrates agricultural practices, ritual activities, and community organization. The involvement of *pakaseh* (*Subak* leaders), *Subak* administrators, *pamangku* (temple custodians), *sulinggih* (priests), and farming communities in all ritual stages demonstrates its role in strengthening social cohesion and spiritual integration. The practice

of *ngayah* (unpaid communal service) reflects values of cooperation, solidarity, and shared responsibility in responding to *marana* (agricultural disturbances). However, the study also identifies declining participation among younger generations, indicating challenges in the intergenerational transmission and sustainability of the tradition. This finding is consistent with Wijayanti et al., (2025) and Rusadi et al., (2024), who highlighted the impact of social change and modernization on the continuity of cultural practices within the *subak* system.

The *Subak* community of Bedha Village understands *marana* as an agrarian disturbance with both ecological and cosmological dimensions. Rather than viewing *marana* solely as a biological pest problem, the community interprets it as an indication of imbalance between microcosm (*bhuwana alit*) and macrocosm (*bhuwana agung*). Seasonal uncertainty, irrigation damage, rice-field conversion, and increasing ecological pressures are perceived as signs of disrupted harmony between humans and the environment. This perspective reflects local ecological awareness that corresponds with cultural ecology, which views ritual as a cultural adaptation strategy for responding to environmental change (Citra et al., 2025; Danugroho et al., 2025; Zhu, 2025; Zen et al., 2024).

The integration of empirical findings with classical *lontar* texts, including *Sri Purana Tattwa*, *Kuttara Dewa Tattwa*, and *Usada Sawah*, indicates that *Mrateka Sarwa Marana* is grounded in strong theological and cosmological principles. These texts describe *marana* within the concept of *Tri Grubug* as a manifestation of cosmic imbalance resulting from disrupted relationships among humans, nature, and the spiritual realm. Therefore, the ritual functions as an effort to restore cosmic harmony and support agricultural sustainability. The study also reveals that rats, as symbols of *marana*, are not perceived merely as pests but as beings with spiritual significance within the concept of *Catur Sanak* in *Usada Sawah.* This aligns with Gould et al., (2023) and Muller et al., (2019) concept of relational ontology, which emphasizes that human–nonhuman relations in indigenous societies are ethical and interconnected.

The ritual treatment of rats aims to neutralize destructive energies and restore cosmic balance rather than to eliminate living beings. Changes in ritual practices that prohibit direct killing reflect adaptations to ethical and ecological values, particularly the principle of *ahimsa* and growing awareness of ecosystem sustainability, which in the anthropology of religion are understood as symbolic adjustments that preserve the essence of the ritual (Arshiniwati & Peradantha, 2025; De Haas et al., 2011). Interviews with informants indicate that the *Subak* community of Bedha Village does not perceive ritual practices and modern agricultural technologies as mutually exclusive approaches. The use of tractors, natural pesticides, and modern farming techniques is understood as complementary, not as replacements for ritual functions. For farmers,

successful harvests are determined not only by technical factors but also by the spiritual harmony cultivated through collective ritual. These findings reinforce Ardana et al., (2024) argument that the effectiveness of the *Subak* system lies in the integration of technical management, social structure, and religious belief.

From a moral and ethical perspective, this study emphasizes that *marana* is understood because of human behavior that deviates from cosmological and social norms. Teachings in the *lontar* manuscripts *Sila Gama Catur Pataka* and *Purwana Yama Tattwa* portray *marana* as the consequence of violating *apah krama and papa krama* thus requiring a collective purification process (*prayascitta*) for resolution. Consequently, the *Mrateka Sarwa Marana* ritual functions as a pedagogical and reflective instrument, instilling human moral responsibility toward nature and fellow beings. This perspective aligns with Yulisinta et al., (2024) concept of sacred ecology, which emphasizes that environmental sustainability depends largely on the values and ethics embedded within communities.

The findings of this study also reveal that the sustainability of the *Mrateka Sarwa Marana* tradition cannot be separated from the dynamics of symbolic power and the legitimacy of knowledge within the *Subak* community of Bedha Village. The authority of *pemangku*, *sulinggih*, and *pakaseh* functions not only as technical executors of the ritual but also as custodians of collective memory and interpreters of the tradition's cosmological meaning. Through sacred narratives, mantras, and references to *lontar* manuscripts, they construct symbolic legitimacy that ensures the tradition remains recognized as relevant by the community. From Ardana et al., (2024) perspective, this practice can be understood as a form of symbolic capital that reinforces social cohesion while maintaining value systems within Balinese agrarian society. However, the study also identifies subtle negotiations of meaning at the community level. Some younger farmers interpret the ritual primarily as a customary obligation and a marker of cultural identity, rather than as a spiritual necessity with transcendental significance. This phenomenon indicates a shift toward cultural religiosity, where rituals are preserved as symbols of collective identity continuity, even if their metaphysical meanings are not fully internalized. This aligns with Suyitno et al., (2023) notion of reflexive modernity, in which individuals actively negotiate traditions within an increasingly rational and pragmatic modern context.

From a political ecology perspective, the *Mrateka Sarwa Marana* tradition functions as cultural resistance to the homogenization of modern agriculture. By framing marana as a cosmological and moral issue, the ritual affirms ethical limits in human–nature relations and symbolically challenges exploitative, industrial approaches to nature (Boelens et al., 2023). The *Mrateka Sarwa Marana* ritual has a latent pedagogical function by transmitting values of discipline,

communal responsibility, and ecological awareness through participation. As informal experiential learning, it enhances ecological and spiritual literacy, especially among younger generations. These findings resonate with Djufri (2025) perspective, which emphasizes that the most effective learning occurs through meaningful social experiencesFurthermore, this study reveals that symbolic practices in the *Krateka Sarwa Marana* ritual reflect environmental ethical principles that are both preventive and restorative. Efforts to neutralize *marana* through ritual are aimed not only at the physical restoration of rice fields but also at repairing social relations that may have been disrupted due to internal conflicts, inequitable water distribution, or violations of *Subak* agreements. In this sense, the ritual functions as a mechanism of symbolic conflict resolution that strengthens social solidarity. The findings indicate that the presence of this ritual also contributes to the social-ecological resilience of the *Subak* system. The ritual serves as a shared space for reflecting on human–nature relationships while reinforcing collective commitment to sustainable agriculture. This concept aligns with the resilience thinking framework developed by Mekonnen et al., (2021), which emphasizes the importance of local institutions and traditional knowledge in responding to environmental change.

This study shows that the aesthetic and performative elements of the *Krateka Sarwa Marana* procession, including offerings, ritual music, chants, and spatial arrangements, play an important role in strengthening emotional and spiritual engagement among participants. These ritual components function not only as symbolic expressions but also as affective media for internalizing spiritual and ecological values while reinforcing collective memory and shared cultural meaning. This finding is consistent with the study by Vipriyanti et al., (2025), who demonstrated that ritualized experiences in intangible cultural heritage create emotional attachment, strengthen collective identity, and facilitate the intergenerational transmission of cultural values through symbolic and performative practices.

Likewise, Xie et al. (2026) argued that collective ritual performances generate emotional synchrony among participants, thereby reinforcing shared memory, social cohesion, and the continuity of cultural traditions. These findings suggest that the performative dimensions of *Krateka Sarwa Marana* extend beyond ceremonial aesthetics, serving as mechanisms through which ecological ethics and spiritual values are collectively experienced and reproduced within the *Subak* community. However, this study also reveals that the continuity of the tradition is increasingly challenged by agricultural land conversion, tourism expansion, and socio-economic transformation.

This observation supports the findings of Jung (2025) who reported that land-use change and tourism development in Bali have reduced the ecological

integrity of *Subak* landscapes while simultaneously increasing the risk of ritual commodification. Similarly, Ghozi et al., (2025) emphasized that when sacred rituals are increasingly presented as tourism attractions, their spiritual meaning may gradually shift toward performative spectacle, potentially weakening their cultural authenticity. Therefore, adaptive conservation strategies integrating community participation, cultural governance, and sustainable environmental management are essential to ensure that *Mrateka Sarwa Marana* remains a living cultural tradition rather than becoming merely a commodified cultural performance.

The theoretical implications of this study reinforce perspectives within the anthropology of religion and ethno-ecology that conceptualize ritual as a form of adaptive knowledge rather than as an irrational or purely symbolic practice. The findings contribute to scholarly discussions on the *Subak* system by foregrounding its moral, spiritual, and cosmological dimensions of agricultural management—dimensions that are frequently overlooked in technocratic and policy-driven approaches. From a practical standpoint, this study demonstrates that the preservation of the *Mrateka Sarwa Marana* education, particularly in fostering values of environmental stewardship and ecological responsibility among younger generations. The integration of ritual practices with conservation initiatives, irrigation management, and environmental education programs may enhance the long-term sustainability of the *Subak* system in the face of ongoing modernization pressures. Furthermore, the policy implications of this study underscore the need for institutional recognition and support for *Subak* traditions as living cultural heritage. Village governments and customary institutions are encouraged to regard rituals such as *Mrateka Sarwa Marana* not merely as ceremonial events, but as integral components of local environmental governance and food security strategies. The incorporation of local wisdom into cultural, educational, and environmental policy frameworks can further strengthen the Subak system's role as a globally recognised model of sustainable agriculture, contributing to the achievement of the SDGs, particularly SDG 1 (No Poverty) and SDG 2 (Zero Hunger) through resilient rural livelihoods and enhanced food security.

5. Conclusion

This study demonstrates that *Mrateka Sarwa Marana* is not merely a religious ceremony for addressing agricultural pests but an integrated socio-ecological system that supports the sustainability of the *Subak* system. The findings show that the ritual connects spiritual beliefs, ecological knowledge, and collective action to maintain harmony among humans, nature, and the divine. The first finding indicates that the ritual process functions beyond ceremonial practice.

Through stages of preparation, purification, symbolic cremation of rats, and ritual procession, *Mrateka Sarwa Marana* strengthens social solidarity, reinforces environmental ethics, and promotes collective responsibility in managing agricultural disturbances. The second finding reveals that the ritual is rooted in the Balinese cosmological worldview, where *marana* is interpreted not only as a biological problem but also as a sign of disrupted harmony between *bhuwana alit* (microcosm), *bhuwana agung* (macrocosm), and the divine. Accordingly, the ritual represents an effort to restore ecological and spiritual balance while reflecting respect for all forms of life. The third finding demonstrates that *Mrateka Sarwa Marana* represents a living system of Traditional Ecological Knowledge (TEK). This knowledge is transmitted through ritual participation, collective farming practices, irrigation management, and environmental stewardship. The coexistence of traditional practices and modern agricultural technologies further indicates that indigenous knowledge and scientific approaches can complement each other in supporting sustainable agriculture.

The main contribution of this study is the development of an integrative model linking ritual, TEK, and the *Subak* system. In this model, ritual serves as a practical mechanism, cosmology provides the philosophical foundation, TEK contributes adaptive ecological knowledge, and *Subak* functions as the institutional framework that integrates these elements. This model extends previous studies by demonstrating that socio-ecological resilience emerges from the continuous interaction among cultural values, ecological knowledge, and community institutions.

Comparable agricultural rituals are practiced in several *Subak* communities across Bali, including *Nangluk Merana*, *Ngusaba Nini*, and *Mapag Toya*. These rituals share the same philosophical foundation, namely *Tri Hita Karana*, which emphasizes harmony among humans, nature, and the divine. They also involve collective participation, ritual offerings (*banten*), and prayers to protect agricultural ecosystems, maintain crop fertility, and support the sustainability of the *Subak* system. However, *Mrateka Sarwa Marana* differs from these rituals in its symbolic cremation of rats as representations of *marana* (agricultural pests) and in its explicit integration of ritual practices with Traditional Ecological Knowledge (TEK) for community-based pest management. These similarities indicate that agricultural rituals across Bali perform a common socio-ecological function. At the same time, these differences reflect the diversity of local cultural expressions that strengthen environmental stewardship, collective responsibility, and the resilience of the Subak system.

This study was conducted in a single *Subak* community and focused primarily on cultural and ecological dimensions. Future research should examine the applicability of this model across different *Subak* communities and other

indigenous agricultural systems through comparative and interdisciplinary approaches involving ecological, agricultural, and social perspectives. Such studies may provide further insights into the role of Traditional Ecological Knowledge in climate adaptation, intergenerational knowledge transmission, and sustainable environmental governance.

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