

## Interreligious Views on the Integration of Artificial Intelligence and Indigenous Knowledge for Environmental Preservation

Jeramie N. Molino<sup>1</sup>

### ABSTRACT

*This paper employs a qualitative narrative analysis to explore interreligious perspectives on integrating Artificial Intelligence (AI) and Indigenous Knowledge (IK) to address environmental challenges. It delves into the viewpoints of three major world religions – Christianity, Islam, and Buddhism – highlighting their distinct yet complementary stances. Christianity, grounded in the principle of stewardship, emphasizes humanity's divine-given duty to care for the Earth. Within this framework, AI is seen as a promising tool to enhance environmental knowledge, sustainable practices, and conservation. Pope Francis' Laudato Si' lays down principles, stressing the interconnectedness of creation, that can guide AI integration. In Islam, the concept of "Khalifa" signifies human stewardship of the Earth. Though opinions on AI vary, there are those who view it as a means to improve environmental knowledge and resource management. Islamic teachings encourage seeking wisdom from diverse sources, including indigenous knowledge. While recognizing AI's potential for ecological understanding, Buddhism raises concerns about excessive reliance on AI-generated information. Emphasizing interconnectedness, compassion, and mindfulness, it encourages a balanced approach where AI complements personal connections and mindfulness in experiencing nature. In summary, these religions appear to recognize AI's potential while emphasizing ethical, cultural,*

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<sup>1</sup> **Jeramie Molino** is a professor at Saint Louis University, Baguio City, Philippines. She holds Bachelor Degree in Education, MA in Religious Studies, PhD in Educational Management, and PhD in Applied Theology at De La Salle University, Manila. Her research interests are on Christian Environmentalism, Ecofeminism, Eco-theology, Environmental Communication, Women Studies, Youth Studies, and Empirical Studies.

*and spiritual aspects. This interplay fosters holistic and sustainable environmental preservation, where technology and Indigenous Knowledge coexist. It invites further collaboration to ensure that technological advancements align with ethical and environmental values, promoting a just, equitable, and harmonious coexistence with our planet.*

**Keywords:** interreligious perspectives, artificial intelligence (AI), indigenous knowledge (IK), environmental challenges

## 1. Introduction

The environment is the very foundation of human existence, providing us with essential resources such as clean air, water, and food (Cosgrove and Loucks 2015). It sustains all life on earth and plays a pivotal role in maintaining ecological balance (Assessment 2005). However, in recent decades, the environment has faced unprecedented challenges (Siddique et al. 2021). Rapid industrialization, deforestation, pollution, climate change, and habitat destruction have led to a multitude of environmental crises (Izah et al. 2018). These crises, ranging from loss of biodiversity to extreme weather events, threaten not only the planet's ecosystems but also the well-being of present and future generations.

In an era marked by astonishing technological advancements (Prisecaru 2016; Acemoglu 2016; Genesereth and Nilson 2012; Knell and R  ther 2023; Castells 2014; Hanson 2016; Tiwari 2022) and an increasingly pressing global concern for the environmental crisis as emphasized by *Laudato Si'* (LS) and UN Sustainable Development Goal (SDG) 15, the urgency of pioneering and collaborative conservation approaches is undeniable.

Throughout history, humanity's relationship with the environment has been a subject of deep contemplation and reverence across various religious and spiritual traditions. In his encyclical, *Laudato Si'* (LS, nos. 1, 2, 3, 4), Pope Francis passionately underscores the call for ethical responsibility in the face of a global environmental crisis. Drawing inspiration from the wisdom of Saint Francis of Assisi (LS, no. 1), he accentuates the profound interconnectedness between humanity and

the environment. Thus, Pope Francis vividly illustrates the ecological harm caused by irresponsible resource exploitation (LS, nos. 5, 6) and emphasizes that environmental stewardship transcends religious boundaries, representing a moral and spiritual duty embraced by all individuals. Furthermore, he highlights the intricate interconnections between ecological issues and broader moral and social concerns, calling for a transformative shift in human behavior rooted in values such as generosity and sacrifice. Amid heightened global environmental awareness, Pope Francis calls for a collective response across all segments of society to address this pressing issue.

Similarly, UN Sustainable Development Goal (SDG 15) posits that Earth's ecosystems, including forests, plant life, and biodiversity, are essential for human survival and well-being. These ecosystems provide crucial resources such as food, clean air, and water, while also playing a pivotal role in mitigating climate change. However, a significant threat looms over these ecosystems, with deforestation and the degradation of drylands emerging as major concerns. Additionally, the illegal trafficking of wildlife poses a significant risk to biodiversity, with broader negative repercussions spanning security and corruption. This argument underscores the urgency of safeguarding natural habitats and biodiversity as a means to ensure global food and water security, mitigate climate change, and promote peace and security.

Inspired by the principles articulated in *Laudato Si'* and UN SDG, adherents of various religious traditions often instill ethical and moral imperatives to care for the natural world, forming an enduring foundation for ecological stewardship. At the same time, indigenous communities have always nurtured invaluable ecological knowledge and practices that have safeguarded their environments for generations.

This research embarks on a multifaceted exploration to examine how various religious and spiritual traditions perceive AI's role in environmental stewardship and how these perspectives align or diverge from indigenous worldviews. Furthermore, it delves into the practical applications of AI-driven solutions within diverse cultural contexts, underscoring the necessity for responsible and culturally sensitive approaches to conservation. This research synthesizes insights from

theology, environmental science, AI ethics, and indigenous studies, seeking to bridge disciplinary divides and foster dialogue among diverse stakeholders. By doing so, we aspire to uncover synergies that can inform holistic and sustainable approaches to environmental preservation.

## **2. Indigenous Knowledge and AI in Environmental Stewardship**

Indigenous Knowledge (IK) comprises location-specific knowledge systems that are progressively gaining recognition within Western scientific circles (Jessen et al. 2022). Drawing from scientific literature, Jessen et al. illustrate how IK has significantly enriched our comprehension of fields like ecology, evolution, physiology, and applied ecology. While IK often diverges from Western science in its motivations and methodologies, there exist common underlying principles that can foster constructive and mutually advantageous partnerships. Scientists should engage in a considerate social agreement with IK custodians, with a primary focus on collaborative research endeavors that yield benefits for Indigenous communities, governments, and nations (Jessen et al. 2022).

Indigenous Knowledge is defined as the unique, traditional, local knowledge existing within, and developed around the specific conditions of women and men indigenous to a geographic area (Greiner 1998; Esiobu 2021). In the context of environmental care, it refers to the traditional knowledge systems, practices, and wisdom held by indigenous communities regarding the natural world and its sustainable management. It encompasses a deep understanding of local ecosystems, biodiversity, weather patterns, and the intricate relationships between humans and the environment.

Neube (2022) explains that IK often involves holistic and harmonious approaches to environmental stewardship, emphasizing the interconnectedness of all living beings and the need for sustainable resource use. This knowledge is typically passed down through generations and reflects the accumulated wisdom of indigenous peoples who have lived in close connection with their environments for centuries. In the context of environmental care, IK offers valuable insights into conservation, resource management, and ecological sustainability, making it a critical

resource for addressing contemporary environmental challenges (Ncube 2022).

More recently, AI technologies are beginning to play an increasingly pivotal role in the realm of environmental conservation and management (Goralski and Tan 2020). They facilitate wildlife protection by autonomously tracking and identifying animals, aid in assessing biodiversity through image and audio analysis, and optimize habitat restoration efforts (Wägele et al. 2022). Furthermore, AI's predictive modeling capabilities empower researchers and policymakers to proactively address climate change and deforestation (Clutton-Brock et al. 2021).

These technologies continuously monitor environmental variables, including air and water quality, enabling the early detection of issues. Integrating various technologies expands the scope of ecological research and conservation, allowing for the identification and mitigation of threats to protected ecosystems on larger spatial and temporal scales (Marvin et al. 2016). AI can offer multiple technology options, including remote sensing and ground-based methods, highlighting their potential for data collection in ecological studies (Marvin et al. 2016). The integration of these technologies, often low-cost or open-source, can lead to more cost-effective large-scale, long-term data collection efforts that enhance our understanding of threats to natural ecosystems and endangered species, ultimately improving conservation strategies (Marvin et al. 2016).

AI helps design protected areas and corridors (Silvestro et al. 2022), while also detecting patterns associated with illegal activities like poaching or logging. Moreover, AI-driven educational tools engage the public in environmental awareness (Monroe et al. 2008). In agriculture, precision farming powered by AI optimizes resource usage and minimizes environmental impact. This multifaceted integration of AI significantly enhances our ability to tackle the complex challenges of environmental care and conservation effectively through the use of this emerging technology.

One of the first AI-based Indigenous conservation projects, undertaken by Cornell University, was co-developed with the Coral

Gardeners (2023), from Mo'orea, French Polynesia. Founded in 2017, this Indigenous group cultivates heat-resistant super corals and transplants them onto damaged parts of the reef. Cornell provides the software to track the sounds of the many organisms making their home here and, working also with the University of Hawaii, integrates them into a recording platform, ReefOS (Coral Gardeners 2023), a network of sensors and cameras collecting visual and acoustic data 24 hours a day. The AI-mediated soundscape tells the on-site respondents whether the reefs are starting to sound like healthy and stable reef systems, or whether additional restoration efforts are needed (Eaton 2022).

Such Indigenous-AI conservation works just as well with other ecosystems. In March 2014, the Temb  tribe in Northern Brazil reached out to the San Francisco nonprofit Rainforest Connection (2023) to build a low-cost alert system to monitor deforestation. Rainforest Connection uses recycled cell phones and an open-source AI software called TensorFlow (2023) to single out the sounds of chainsaws and logging trucks amid the cacophony of the Amazon. Text alerts go out instantly to Temb  patrols when Google's cloud computing detects the rev of a chainsaw.

Artificial intelligence is an integral part of this partnership. Especially telling was the presence of the Allen Institute for AI (Artificial Intelligence for Ocean Action 2022) at this year's Our Ocean Conference, co-hosted by the U.S. and the Republic of Palau, bringing Indigenous-AI conservation to a whole new level. The conference showed that AI can perform specific tasks beneficial to island nations, like tracking illegal fishing that depletes fish stocks and threatens local livelihood. More generally, AI, if carefully designed and rigorously tested before being deployed in the field, can be a useful tool for analyzing ocean data, from the songs of humpback whales to the properties of microplastics (AI is Learning to Predict Ocean Surprises 2023).

On the international level, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body established to assess the state of the world's biodiversity, ecosystems, and the contributions that they make to human well-being. IPBES operates similarly to the Intergovernmental

Panel on Climate Change (IPCC) but focuses on biodiversity and ecosystem services. IPBES (2022) biodiversity report warns of the impending extinction of one million species, including vital mammals and sharks. This loss poses severe human consequences, as one in five people relies on these species for their well-being. To combat this, the UN urges governments and NGOs to secure land rights for Indigenous groups actively protecting wildlife (Dimock 2022). Of particular interest is the role of technology, particularly deep-learning neural networks, in conserving biodiversity and safeguarding Indigenous land rights. These AI systems, which analyze sound data from threatened ecosystems, offer a cutting-edge conservation tool. However, equitable access remains a challenge. These AI systems complement human vigilance by swiftly identifying threats like illegal logging and mining, offering a crucial lifeline to Indigenous communities (IPBES 2022).

### **3. Significance of Integrating AI and IK**

Due to their enormity and complexity, addressing the current environmental challenges requires innovative and holistic approaches that draw from diverse sources of knowledge and technology (Geesteranus 2014). Two such sources are AI, with its capacity for data-driven analysis and prediction, and IK, rooted in centuries of sustainable practices and profound connections to the natural world. The significance of integrating AI and IK lies in their complementary strengths: AI offers the power to process vast amounts of environmental data and model complex systems (Rayhan 2023), while IK provides insights into harmonious human coexistence with nature (Melaku 2016). Together, these two distinct but complementary knowledge systems hold the potential to revolutionize our approach to environmental conservation and restoration.

This integration represents a bridge between tradition and technology, offering the promise of more effective, culturally sensitive, and sustainable environmental care. It acknowledges that solutions to today's environmental crises cannot be one-size-fits-all and must encompass a deep understanding of the ecosystems, cultures, and communities they affect. Furthermore, it recognizes the importance of

respecting and valuing Indigenous perspectives and knowledge systems, which have sustained diverse ecosystems for generations.

Now, in the face of unprecedented environmental challenges, the integration of AI technology into these age-old wisdoms presents both opportunities and dilemmas. This dynamic convergence of ancient wisdom and cutting-edge technology sets the stage for our exploration of innovative and collaborative approaches to environmental conservation, where interreligious perspectives, AI integration, and IK intersect to address the urgent global environmental crisis. This introduction lays the essential groundwork for a comprehensive examination of this vital intersection and clarifies the rationale behind our interdisciplinary inquiry.

At present, AI continues to emerge as a transformative force with the potential to revolutionize environmental conservation efforts. AI-powered tools and systems possess the capacity to analyze extensive datasets, model intricate ecological systems, and facilitate real-time monitoring of ecosystems. Nevertheless, this remarkable potential is accompanied by ethical dilemmas, as the deployment of AI technologies raises questions concerning privacy, data ownership, and the cultural sensitivity of IK systems.

#### **4. Integration of AI and Indigenous Knowledge**

IK encompasses unique perspectives on the relationship between humans, nature, and the spiritual realm, emphasizing the interconnectedness of all living beings and the sacredness of the natural world (Pierotti & Wildcat 2000). These IK systems provide holistic approaches to environmental conservation, and the integration of AI into IK systems holds the potential to enhance traditional practices such as ecological monitoring, land stewardship, and resource management (Younging 2018). However, it is essential to consider concerns regarding the preservation of cultural authenticity and integrity when collaborating with AI technologies (Abram 1997).

The works of Ellen (2000) shed light on the advancement of IK in



Asia, exploring its applications and complexities. Gaspar's (1990) book provides a detailed account of a grassroots Church community engaged in a struggle for justice and environmental protection in the Philippines. Gedicks (1993) discusses native-environmental resistance against multinational corporations, emphasizing the need for alliances between Indigenous communities and environmentalists. Sitarz (1993) examines the involvement of the United States with Agenda 21, a comprehensive blueprint for global sustainability. While these works contribute to our understanding of IK and environmental concerns, the specific integration of AI within the context of Indigenous Knowledge requires further exploration (Ellen 2000; Gaspar 1990; Gedicks 1993; Sitarz 1993).

IK offers valuable perspectives on the relationship between humans and the environment, highlighting the importance of interconnectedness and sustainable practices. The potential integration of AI into IK systems presents opportunities to enhance traditional ecological practices. However, it is crucial to approach this integration with sensitivity and respect for cultural authenticity. Further research and exploration are needed to understand the implications, challenges, and ethical considerations involved in integrating AI within IK systems. By fostering dialogue and collaboration, we can develop inclusive and equitable approaches that honor Indigenous perspectives and promote environmental conservation. Here are some ways in which AI can be integrated with IK systems for the benefit of both and in the interest of environmental preservation:

#### **4.1. Data Preservation and Digitization**

Many IK systems are oral traditions passed down through generations. As an example, Ossai (2010) in his study on the African IK systems, their characteristics, sources, and functions in the context of the digital age and ICT technologies argues that these knowledge systems, while rooted in tradition, possess adaptability and relevance in the modern era, making them valuable assets that can complement and interact with other forms of knowledge in the age of information and technology. AI can assist in digitizing (Malik et al. 2020) and preserving this IK (Frąckiewicz 2023) through audio and video recordings, transcription, and translation services. This ensures that traditional wisdom is documented and can be

shared with future generations.

AI can digitize and catalog IK, translate endangered languages, monitor and protect indigenous lands, and preserve traditional art and music (Frąckiewicz 2023). While AI offers promising solutions, ethical considerations and the need to empower Indigenous communities remain critical. Frąckiewicz (2023) emphasizes that AI can be a powerful tool in safeguarding these valuable traditions but must be used responsibly and in collaboration with efforts to support and empower indigenous communities to ensure the preservation of their cultural heritage.

#### **4.2. Environmental Monitoring, Cultural Mapping, and Storytelling**

Indigenous communities have deep ecological knowledge and practices (Jessen 2022). AI can enhance their ability to monitor and manage their environments. For example, AI-powered sensors and drones can be used to monitor changes in local ecosystems, track wildlife, or assess the health of forests and water bodies.

Thumbadoo et al. (2022) explain that Indigenous mapping, facilitated by digital technology, is transforming traditional cartography by empowering Indigenous communities to map their own stories, histories, cultural heritage, and priorities. IK is increasingly being acknowledged as a legitimate and equal knowledge system, challenging conventional mapping concepts. Thumbadoo et al. explain further that multimodal and multisensory online maps are playing a pivotal role in this transformation, enabling the presentation and preservation of a wide range of spatial and temporal information. AI can aid in creating interactive digital maps that incorporate indigenous place names, stories, and cultural heritage. This helps in preserving and sharing the cultural significance of specific landscapes.

#### **4.3. Collaborative Research**

Collaborative research with AI refers to the potential synergy between IK and scientific research, particularly in the realms of disaster risk reduction and climate change adaptation. The article emphasizes the importance of integrating local and IK with scientific data to enhance disaster preparedness and resilience in coastal and small island communities. Collaborative research suggests that AI can play a crucial role in facilitating

this integration. IK holders, who possess invaluable insights about local environmental patterns and hazards, can collaborate with researchers from various fields, including climatology, meteorology, and environmental science.

AI technologies can assist in this collaboration by aiding in the analysis and integration of IK with scientific datasets. For example, AI can help identify commonalities or patterns between IK about natural phenomena (e.g., changes in weather patterns or signs of impending disasters) and scientific data (e.g., meteorological measurements or climate models).

By bridging these two knowledge systems, AI enables a more comprehensive understanding of environmental and societal challenges, such as the impact of climate change or the likelihood of natural disasters. Overall, the collaborative research highlighted in the passage underscores the potential of AI to serve as a bridge between IK and scientific expertise, ultimately leading to more effective strategies for disaster risk reduction and climate change adaptation in these vulnerable communities.

#### **4.4. Weather and Climate Prediction**

Balehegn et al. (2019) argue that Indigenous weather and climate forecasting, practiced by Afar pastoralist communities in Africa, is a highly valuable and dynamic knowledge system that plays a crucial role in helping these communities cope with climate change-induced extreme weather variations. They explain that traditional weather forecasting is not only the most accessible and affordable source of weather and climate information for these communities but is also intricately connected with their decision-making processes.

The researchers also highlight the intricate process through which the Afar pastoralists predict weather and climate variations by observing various bio-physical entities, emphasizing that no single indicator is taken at face value. Instead, weather forecasting involves a dynamic process of triangulating information from multiple sources, including modern weather forecasts, and it undergoes rigorous evaluation through traditional institutions before being used for livelihood decisions. The systematic documentation of this IK underscores its significance in contemporary pastoral communities

and emphasizes the potential for synergies between Indigenous and modern weather and climate knowledge systems, ultimately serving the adaptation needs of local people (Balehegn et al. 2019).

#### **4.5. Community Decision-Making**

AI tools can support community-led decision-making processes by providing data-driven insights based on both IK and scientific data. This helps communities make informed choices about land use, resource management, and development. In the study by Linaza et al. (2021) they explored potential transformative impact of smart agriculture, particularly precision agriculture (PA) technologies utilizing AI and advanced robotics, on the agricultural sector. It emphasizes that these technologies have the capacity to revolutionize agriculture even more significantly than mass farming methods of the 20th century. Linaza et al. also provide a summary of recent research projects conducted in European countries, aiming to showcase achieved results, ongoing investigations, and technical challenges in the implementation of AI-driven smart agriculture, with a focus on data availability and the integration of advanced AI methodologies.

The work of Correani et al. (2020) underscores the fact that digitization extends far beyond mere automation. It facilitates the development of manufacturing processes that are highly adaptable and flexible. This perspective is further corroborated by Lasi et al. (2014) and Oztemel and Gursev (2020), who champion the principles of Industry 4.0. According to these authors, Industry 4.0 places a premium on standardization, rapid development, personalization, and decentralization within manufacturing processes, ultimately leading to increased mechanization, automation, connectivity, and the full digitization of operational settings.

### **5. Interreligious Perspectives on AI and IK Integration**

#### **5.1. Christianity**

Exploring how Christianity views the convergence of AI and IK to address environmental issues reveals a harmonious coexistence. In particular, Catholicism emphasizes stewardship, recognizing humanity's

divine duty to care for the Earth, aligning neatly with the imperative to address environmental challenges holistically, with consideration for all life forms (Nishant 2020; Alshahrani et al. 2021). Simultaneously, AI offers substantial potential to mitigate environmental issues by processing extensive data, facilitating precise climate forecasts, enhancing energy efficiency, refining conservation techniques, and promoting sustainable practices (Nishant 2020; Alshahrani et al. 2021).

Pope Francis' support for ethical AI, highlighting its consistency with Christian principles, is further strengthened by his emphasis on its harmony with the well-being of society and ecological preservation (Von Braun 2021). His encyclical, *Laudato Si'*, delves deeper into the Christian perspective on environmental challenges and the role of technology. It underscores the interconnectedness of all creation, calling for ecological conversion and sustainable development while cautioning against profit-driven environmental degradation.

Pope Francis, as indicated in *Laudato Si'*, prioritizes the harmonious integration of technological progress, with a special emphasis on the welfare of both humanity and the environment, to foster a more equitable, sustainable, and interconnected future (Pope Francis 2015). Furthermore, faith-based organizations, including the Catholic Church, can collaborate with Indigenous communities to enhance traditional ecological knowledge in addressing environmental challenges, recognizing, respecting, and preserving their wisdom through education and partnership (United Nations 2019). These combined efforts contribute to holistic and sustainable approaches to environmental conservation, rooted in Indigenous wisdom and practices passed down through generations (Hitzhusen 2013; United Nations 2019).Top of Form

In various articles and addresses, Pope Francis consistently underscores the ethical and moral dimensions of technological advancements, particularly AI and digital technologies, emphasizing their potential benefits while stressing the critical importance of ensuring their use for the common good and human dignity (Francis, 2023a; 2023b; 2020; 2019a). He calls for interdisciplinary dialogue among experts from technology, ethics, economics, and theology to address

the ethical challenges posed by technology and uphold the dignity of every individual. The Pope commends efforts such as the “Rome Call” and “Minerva Dialogues,” promoting “algor-ethics” and responsible AI development while preventing discrimination against marginalized groups. Pope Francis highlights the transformative nature of technology in shaping human perceptions and decisions, urging against the unchecked pursuit of a “technocratic paradigm” that could exacerbate inequalities (Francis, 2023a; 2023b; 2020; 2019a). He advocates for an ethical framework rooted in freedom, responsibility, and fraternity, ensuring that true progress aligns with human dignity.

In summary, Pope Francis advocates for a responsible and ethical approach to technological advancements, urging experts and society at large to consider the implications of technology on human well-being and the common good. He calls for a balance between technological progress and moral values to ensure that technology serves humanity rather than harms it.

## **5.2. Islam**

Islam emphasizes the concept of “*Khalifa*,” meaning the role of humans as stewards and caretakers of the Earth (Abdullah et al. 2020). Islamic teachings encourage the protection and conservation of the environment, as it is seen as a trust from God (Deen 1996). Regarding AI, there may be varying opinions within the Islamic community. Some Muslims may view AI as a means to improve environmental knowledge, monitoring, and resource management (Ali et al. 2021). Others may express concerns about the potential ethical implications, including data privacy, cultural sensitivity, and the potential for AI to replace human responsibility in environmental stewardship.

The Natural Language Processing research group at Leeds University’s Institute for Artificial Intelligence and Biological Systems (I-AIBS) has conducted extensive research on Arabic natural language processing and corpus linguistics (Atwel et al. 2011). Initially focusing on Modern Standard Arabic, their recent research has shifted towards Quranic Arabic. While the Quran does not explicitly address IK as a concept (Aikenhead and Ogawa 2007), Islam emphasizes the pursuit of knowledge,

wisdom, and understanding of the natural world (Burdbar et al. 2012; Kamla et al. 2006).

Islamic teachings encourage Muslims to observe and reflect upon the signs of God's creation, seek knowledge from diverse sources, and respect different forms of knowledge, including indigenous knowledge rooted in local cultures and traditions (Halstead 2004; Kamali 2003). Islam also emphasizes stewardship of the Earth, balance and moderation, environmental conservation, sustainability, and social justice (Abdullah and Keshminder 2020; Bsoul et al. 2022; Koehrsen 2021; Wals and Benavot, 2017; Sachedina 2009).

The Quran serves as the primary source for these principles (Quran 2:30, 6:165, 7:56, 10:61). While Muslims' attitudes and actions towards environmental challenges may vary, many Muslims view AI as a tool for societal benefit, including environmental conservation (Kadi 2022). Muslims can leverage AI applications to enhance IK in addressing environmental challenges through data collection and analysis, knowledge preservation, ecological modeling and prediction, decision support systems, awareness and education, collaborative platforms, and early warning systems (Ghorbani et al. 2021; Barlow et al. 2020; Reshma et al. 2023; Nabavi-Pelesaraei et al. 2018; Shrestha et al. 2019; Kankanhall et al. 2019; Islam 2011; Perera et al. 2020). It is essential to implement AI in a culturally sensitive manner, respecting the rights and sovereignty of indigenous communities and adopting inclusive approaches (Carrillo 2020).

Islam's emphasis on humans as stewards and caretakers of the Earth, referred to as "*Khalifa*," underscores the significance of environmental protection and conservation as a trust from God. While there exist varying perspectives within the Islamic community regarding AI's role in addressing environmental challenges, a common thread emerges – AI is seen as a potential tool for enhancing environmental knowledge, monitoring, and resource management, aligning with Islamic values of wisdom and understanding of the natural world. This convergence of technology and faith is supported by Islamic teachings, which encourage Muslims to seek knowledge from diverse sources and respect different forms of knowledge, including indigenous knowledge rooted in local cultures and traditions.

The Quran, as the primary source for these principles, underpins the Islamic commitment to stewardship, balance, moderation, environmental conservation, sustainability, and social justice. As Muslims navigate environmental challenges, many perceive AI as a means to achieve societal benefits, including environmental conservation, by leveraging its capabilities for data analysis, knowledge preservation, ecological modeling, awareness, and education. To ensure a culturally sensitive and inclusive implementation of AI, it is essential to respect the rights and sovereignty of Indigenous communities while adopting these transformative technologies to promote the well-being of both humanity and the environment.

### **5.3. Buddhism**

Buddhism emphasizes interconnectedness, compassion, and the impermanence of all phenomena, providing a unique perspective on the integration of AI into IK systems for addressing environmental challenges (Wiseman 2021; Xu et al. 2021; Sillitoe 2002; Kuma 2020). This integration can deepen the understanding of interdependence and promote effective environmental practices. However, Buddhism also highlights the significance of mindfulness, awareness, and direct experience of nature (McWilliams 2012). The potential reliance on AI-generated information raises concerns about the loss of personal connection and embodied understanding of ecological interdependence (Roncoli et al. 2002; Giddens and Sutton 2021). Excessive reliance on AI may detach individuals from nature and devalue its intrinsic worth (Moorkens and Lewis 2019). Thus, a balanced approach is necessary, where AI complements personal connection, mindfulness, and direct experience with nature.

It is crucial to engage in interreligious dialogue and collaborations to develop nuanced approaches that respect IK systems and the potential of AI in addressing environmental challenges. For example, Studley's (2005) research on Tibetan ethnoforestry paradigms contributes to understanding sustainable knowledge systems and resource stewardship in the context of Indigenous communities in eastern Kham. Furthermore, the integration of AI into IK systems within a Buddhist context should take into account the ethical and spiritual dimensions of Buddhist teachings. Buddhism teaches the importance of compassion, non-harming, and the interdependence of



all beings. Therefore, any use of AI should align with these principles and contribute to the well-being of both humans and the environment.

One way to ensure the responsible integration of AI is to prioritize mindfulness and direct experience of nature alongside technological advancements. This can be achieved by incorporating practices such as meditation, contemplation, and ecological engagement into the use of AI. By doing so, individuals can maintain a deep connection with the environment and cultivate a sense of reverence and care for all living beings.

Buddhism offers valuable insights into the integration of AI into IK systems for addressing environmental challenges. It emphasizes interconnectedness, compassion, and impermanence, providing a foundation for understanding the interdependence between humans and nature. While AI can enhance the understanding and application of IK, it is important to maintain mindfulness, awareness, and direct experience of the environment. Balancing technological advancements with personal connection and ethical considerations is crucial to ensure the responsible use of AI within a Buddhist framework. By engaging in interreligious dialogue and collaborations, we can develop holistic approaches that respect IK systems, religious values, and the potential of AI to contribute to sustainable and compassionate environmental practices.

## **6. Concluding Remarks: Spectrum of Perspectives and Approaches**

In comparing the reactions of different religions to the integration of AI and IK in addressing environmental challenges, we find a spectrum of perspectives and approaches. Within Christianity, particularly Catholicism, there is a harmonious coexistence with the convergence of AI and IK. The emphasis on stewardship aligns seamlessly with addressing environmental challenges holistically. AI is seen as a valuable tool to process data, enhance energy efficiency, and promote sustainable practices. Pope Francis' *Laudato Si'* reinforces these principles, guiding the integration of AI while emphasizing the interconnectedness of all creation and the need for ecological conversion. Collaboration with Indigenous communities further enhances traditional ecological knowledge for sustainable practices.

Islam emphasizes humans as stewards of the Earth, and the protection of the environment is viewed as a trust from God. There are varying opinions within the Islamic community regarding AI's role in addressing environmental challenges, with some seeing it as a means to improve environmental knowledge and others expressing ethical concerns. Islam encourages the pursuit of knowledge and wisdom from diverse sources, including IK. The Quran serves as a primary source for principles emphasizing stewardship, balance, moderation, environmental conservation, sustainability, and social justice. Many Muslims perceive AI as a tool for societal benefit, including environmental conservation, when implemented in a culturally sensitive manner.

Buddhism brings a unique perspective, emphasizing interconnectedness, compassion, and mindfulness. While AI can enhance understanding and ecological practices, Buddhism highlights the importance of maintaining personal connection and direct experience with nature. Excessive reliance on AI-generated information is cautioned against, as it may detach individuals from nature. To ensure a responsible integration of AI, Buddhism encourages alignment with ethical and spiritual dimensions of teachings, emphasizing compassion, non-harming, and the well-being of both humans and the environment. Mindfulness practices are promoted to complement AI and maintain a deep connection with nature.

In conclusion, these religions offer diverse yet complementary perspectives on the integration of AI and IK to address environmental challenges. While they recognize the potential benefits of AI, they also emphasize the importance of ethical considerations, cultural sensitivity, and the preservation of traditional knowledge. These religious perspectives, guided by principles of stewardship, interconnectedness, and compassion, contribute to a more holistic and sustainable approach to environmental conservation, where technology and faith coexist in harmony for the greater good of both humanity and the natural world.

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