

# Integrative Environmental Worldview: A Holistic Conceptual Framework to Advance Environmental Education for Sustainability

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## Abstract

Studying worldviews is critical to understanding the root of environmental issues and finding solutions for sustainability. However, the best way to operationalize the theoretical framework of various worldviews for sustainable development is still unclear, especially in Thailand where different traditional, scientific, and ecological factors are at play. To best address these conundrums, this study employed mixed methodology to establish a conceptual framework of integrative environmental worldviews [IEW] based on 1) integral theory and 2) diverse worldviews of stakeholders in Thailand. First, we conducted structured interviews of 63 environmental agencies to analyze their worldviews in ontological, epistemological, and axiological terms. Next, a 27-item survey was collected from 449 environmental agents. We then conducted a principal component analysis to define five components of an IEW conceptual framework, (i.e. aesthetic, dharmic, systemic, sacred and materialistic). This framework provides a shift from a dualistic, egocentric view of environmental studies to a more holistic one. Moreover, it also links fundamental patterns of knowing from cross-cultural perspectives and a more sustainable pathway in the development of human-natural connection to advance environmental education for local and global sustainability.

**Keywords:** integrative environmental worldview, environmental education, sustainability, holistic environmental study, human-nature connection

## Introduction

For decades, scholars have argued that the dualistic, materialistic, and reductionistic Western worldview is the root cause of environmental issues. Importantly, they have asserted that a radical shift away from this is necessary if we are to achieve sustainability (Canty, 2014; Witt, 2013; Capra, 1996; Wilber, 1995). Others have asserted that the global environmental crisis is associated with anthropocentrism, which sees individual humans and the human species as more valuable than all other organisms. To remedy this, some have introduced ecocentrism, which recognizes intrinsic value in all life forms and ecosystems (including their abiotic components), to reshape the human-nature relationship and their understanding of humanity's place on the earth (Washington et al., 2017; Schein, 2015; Naess, 2001). Thus, different worldviews are both the origin of the environmental crisis, as well as the solution. However, the concept of worldview is still unclear, especially when applied to environmental education [EE] and management in diverse and multicultural societies. For example, to design an EE curriculum for local communities, one must recognize the nuances of indigenous and Western worldviews in terms of meaning making, knowledge, and values regarding the natural world (Kapyrka and Dockstator, 2012). In Thailand, the ongoing conflict between the government and local communities in natural resource management stems from the same incongruencies in their worldviews (Laungaramsri, 2005). In the scope of this conflict, scientific and community knowledge are pitted against one another as a political tool. Thus, the need for a holistic framework that integrates a variety of environmental perceptions in designing environmental education or managing resources becomes apparent.

Environmental education was initiated based on a Western worldview that separates humans from nature and emphasizes empirical science and ecology to tackle environmental realities and problems in order to better understand their cause-and-effect relationship. For example, in the international environmental education framework

(1975-1995; implemented in various countries, including Thailand) the environment has been considered a set of problems, the object of study, a field of values, or a system. Therefore, the EE's goal is to inform people and learn about environmental issues and develop competence for solving them (McBride et al., 2013; Hungerford and Volk, 1990; UNEP, 1978). In the last two decades, the concept of the environment has evolved to include aspects such as being shared resources for sustainable living and economic development, place of belonging, place of emancipation, place of identity, Gaia, culture, aesthetics, and spirituality. These have all been included in the EE conceptual framework (Hart et al., 1999; Sauve, 2005; Palmer and Birch, 2005). While this demonstrates the richness of the EE field, a holistic EE framework based on integrating all aspects of the environment cannot be found.

Recently, UNESCO (2017) has also proposed that the scientific community's contributions are not enough to fix complicated environmental issues, and suggested that academic knowledge should be combined with indigenous worldviews to develop appropriate education for sustainable development. In addition, some authors have initiated the integral or integrative worldview to complement rational thought and science with a sense of awe for the natural world (Witt, 2014; Esbjorn-Hargens and Zimmerman 2009; Esbjorn-Hargens, 2009; Chaitieng, 2017). Thus, development in the field's definition of worldview is needed if we are to find solutions and make the transition to better ecological and social sustainability. To develop the integrative worldview, researchers should first understand and integrate the various conceptions of environment, knowledge, and values from multiple worldviews. Moreover, in the face of such multiplicity and tension, we should be more consistent within the socio-cultural contexts as dictated by stakeholders' perspectives. The present study presents a framework of the integrative environmental worldview, developed from stakeholders' worldviews together with integral theory in Thailand. This IEW framework provides a holistic understanding of the environment and core knowledge for the sustainable pathway of a human-natural relationship to develop and advance environmental

education. It would be helpful for educators, practitioners, and researchers to use this in any initiatives in studies of nature and environmental education for sustainability.

## Literature Review

### The Components of Worldview

Conceptually, worldview relates to philosophy, social sciences, and the humanities. From a philosophical view, a worldview concerns metaphysics, ontology, epistemology, and axiology (Witt, 2013; Rousseau and Billingham, 2018). In the social sciences, worldview is a set of beliefs and values about physical and social reality which affects cognition and behavior (Koltko-Rivera, 2004). However, in this study, we explored worldviews through three philosophical lenses: (1) ontology (what is the nature and human position in the natural world?), (2) epistemology (patterns of knowing and how to gain additional knowledge about nature), and (3) axiology (values and norms of decision-making and action toward nature). The history of the Thai environmental worldview has been influenced by various sources of knowledge that include scientific, ecological, economic, social, cultural, animistic, aesthetic, and dharmic aspects (Chatthip, 2014; Eoseewong, 2012; Morrow, 2011; Sattayanurak, 2002). Thus, in this study, we draw on structured interview questions exploring these eight aspects via ontological, epistemological, and axiological lenses.

In order to understand the environmental worldview in all of its complexity, one must consider the human-nature connection, society-nature relationships, issues and goals of sustainability, as well as understand the history of theories of environmental worldviews. In 1989 and 1990, Timothy O’Riordan looked to draw environmental ideas based on an analysis of ideology, political structures, social movements, along with environmental management strategies to investigate the tension between two significant worldviews: technocentrism (a manipulative view) and ecocentrism (a conservative view) (Gough et al., 2000). In 1992, Merchant applied Western concepts

such as religion and ethics to move the environmental worldview from the realm of nature to partnership ethics, which can be classified into three groups: egocentric (self), homocentric (society), and ecocentric (cosmos). In the same period, Robyn Eckersley used the history of the environmental movement to classify environmental ideas and fill a gap between technocentrism and ecocentrism. Thus, the categorization of the environmental worldview consists of five groups: resource conservation, human welfare ecology, preservationism, animal liberation, and ecocentrism (Ganjanapan, 2011). These attempts to include various aspects such as scientific, economic, ecological, sociocultural, political, and aesthetic aspects further refined the environmental worldview to develop human-nature connections, society-nature relationships, problem-solving, and sustainability goals.

In Thailand, the history of the concept of the environment has been influenced by both traditional and Western worldviews (Eoseewong, 2012; Sattayanurak, 2002). The traditional worldview has historically been intertwined with supernatural beliefs called “spirit worship” or “animism,” which comes from combining the belief systems of indigenous communities with Hindu-Buddhist cosmology (Morrow, 2011). In the twentieth century, the more empirically-based Western worldview, which views nature as an object of study and resources, influenced and devalued the traditional worldview of local animist worship. Concurrently, because of heightening environmental issues and cultural modernization in Thai society, new ecological concepts such as local wisdom, sustainable development, deep ecology, social ecology, and the Buddhist ecology movement were founded to engage issues and sustainability goals (Chatthip, 2014; Sangkpanthanon, 2013; Darlington, 1998).

The richness in the environmental worldview literature shows that, despite their shared concern for the environment and issues, various scholars adopt widely differing environmental ideas and propose diverse ways of engaging with nature. However, a holistic framework based on integrating all aspects of the conceptions of the environment cannot be found, especially in the Thai sociocultural context, which has been

critical throughout history to study the environmental worldview in a holistic way. Specifically, this can be broken down into eight critical aspects: scientific, ecological, economic, social, cultural, aesthetic, animistic, and dharmic. Thus, in this study, we drew on structured interview questions exploring these eight aspects via ontological, epistemological, and axiological lenses.

### **Integral Theory**

Ken Wilber's integral theory was used to classify qualitative data. According to this theory, at least four irreducible perspectives (subjective, intersubjective, objective, and interobjective) must be considered when attempting to fully understand any issue and reality (Esbörn-Hargens, 2009). First, subjective realities are a result of individual experiences known only through first-person perspectives, such as feeling, sensing, or intuition. Next, intersubjective realities refer to cultural domains such as group values, norms, and ethics which come from the second-person perspective. Third, objective realities refer to individual behaviors which are known through empirical observation. Finally, interobjective realities refer to the system, such as eco, social or economic systems which are known through system analysis. Knowledge of the last two aspects comes from the third-person perspective. Thus, we parsed interview results of individual worldviews into the integral framework.

### **Methods**

In this study, an exploratory sequential mixed methods research design was used to explore and establish the framework of stakeholders' environmental worldviews. The qualitative data was first collected and analyzed, then the findings were used to build a survey instrument for subsequent quantitative data collection (Doyle et al., 2016; Guetterman et al., 2015; Fetters et al., 2013; Creswell, 2012). As a result, there are three stages of analysis: the post-primary qualitative phase, the post-secondary quantitative phase, and the integrative phase which connects these two categories of findings (Greene et al., 1989). In this

study, the first phase used structured interviews to explore various aspects of the environmental worldview. Next, we applied a survey to gather data and did a principal component analysis [PCA] to define the worldview components. Finally, we integrated qualitative and quantitative results to draw the integrative environmental worldview.

### **Participants**

In Phase 1, we conducted structured interviews with informants selected through purposeful sampling, drawing from their participation in pro-environmental behavior throughout Thailand. In addition, the selected eco-communities had continuously shown their performance in environmental protection and conservation. We conducted a total of 63 interviews: scholars (n=10) and university students (n=7), EE high school educators (n=14), leaders of environmental clubs (n=9), leaders of environmental NGOs (n=8), leaders of eco-communities (n=6) with continuous performances, environmental activists (n=4) and environmental monks (n=4). In Phase 2, to verify the worldview components in the larger sample via PCA analysis, we used multi-stage cluster sampling techniques (Teddlie and Yu, 2007) to define the sample size. In addition, the sample size was calculated by Roscoe's formula at the 95 percent confidence level. In this study, we used surveys to gather data from an additional 449 citizens who exhibited both environmentally responsible behavior and leadership in sustainable development in Thailand. Finally, the qualitative and quantitative data were combined based on integral theory.

### **Tools and Data Collection**

In Phase 1 we used structured interviews involving ontological, epistemological, and axiological questions to explore an individual's worldview through eight different aspects: scientific (X1), ecological (X2), economic (X3), social (X4), cultural (X5), animistic (X6), aesthetic (X7), and dharmic (X8). For instance, from an ontological perspective, we asked, "What is nature, and what is the position of humans in the natural world from the scientific (X1) aspect?" From an epistemological

perspective, we asked, “How do we gain an understanding of nature from the scientific (X1) aspect?” From an axiological perspective, we asked, “How should we behave toward nature, and what are the decision norms from the scientific (X1) aspect?” To triangulate the structured interview data, documents and non-participant observation were collected and analyzed in specific contexts (Creswell, 2012; Heale and Forbes, 2013).

Data from the qualitative phase were used to develop a survey instrument for the second quantitative phase. It consisted of 27 items that emerged during phase one interviews. Respondents were asked to report their “Agreement level” of their perception of nature on a 5-point Likert scale from 1 to 5, from 1 = Strongly Disagree to 5 = Strongly Agree. This instrument was also tested for reliability (Cronbach’s Alpha = 0.79). In addition, this survey instrument was examined for validity by testing the index of item-objective congruence: IOC (Pasunon, 2015) by five experts, one in each of the following fields: philosophy, social environment, cultural studies, and environmental education. Our metric had an IOC value of 0.98. We employed a hybrid data collection method involving both personal contact and surveys distributed via mail.

### Data Analysis

In Phase 1, we did a content analysis to outline the themes of environmental worldviews (Table 1). In Phase 2, we used PCA to define the components, choosing an oblique rotation (Promax). Prior to this, we did a Bartlett Sphericity test (chi-square = 4630.06 and  $Q < 0.001$ ) and obtained a measure of sampling adequacy via Kaiser-Myer-Olkin (KMO = 0.921), which implied that there was a strong relationship among the variables. PCA generated five significant components (Table 2). Phase 3, the integrative phase, happened at multiple levels of the study (Berman, 2017; Guetterman et al., 2015; Fetters et al., 2013). Integration occurred, first, while linking data at the design level when using a sequential design, where the results from the first phase were used to build the second stage of the research design. Finally, we integrated the qualitative and quantitative data based on integral theory to draw out new insights about the environmental worldview (Figure 1).

## Results and Discussion

### The List of Environmental Worldview Variables from the Structured Interviews

In the study of phase one, the content analysis revealed a list of variables to describe environmental worldviews, separated into five different themes, as seen in Table 1.

In Table 1, we defined variables of environmental worldviews into five different themes: scientific-economic, ecological-social, cultural-animistic, aesthetic, and dharmic. First, the scientific-economic theme reveals variables in which interviewees described the reality of nature in physiological components such as biotic, abiotic, materials, and resources. Therefore, these become the object of investigation and management via empirical science and scientific approaches (e.g. observation, experiment, and analysis). Human positionality is superior to other organisms, has the right to efficiently utilize natural resources, and should be responsible for conservation, protection, and problem-solving.

Next, the ecological-social theme reveals variables where interviewees described nature in terms of a system (e.g. food chain, earth system). For example, “the earth system” was described as:

The interaction of the soil system, water system, and human system, and the system is manipulated by the human system for sustainability (Scholar, 2016).

**Table 1** The list of environmental worldview variables from structured interviews

|  |
|--|
| <p><b>Scientific-economic themes: SE</b></p> <p>SE1 - Nature consists of biotic and abiotic. (O)</p> <p>SE2 - Nature provides materials and resources to support humans needs. (O)</p> <p>SE3 - Empirical knowledge comes from observation, analysis, and the scientific method for discovering facts. (E)</p> <p>SE4 - Humans should manage and utilize natural resources at <i>maximum efficiency</i> for benefit. (A)</p> |
|--|

**Table 1** The list of environmental worldview variables from structured interviews (cont.)

|   |
|---|
| <p><b>Ecological-social themes: ES</b></p> <p>ES1 - <i>Nature is an ecosystem</i> which consists of a food chain, a food web, and an ecosystem. (O)</p> <p>ES2 - <i>Nature is an earth system</i> that consists of humans, society, and the ecosystem. (O)</p> <p>ES3 - <i>Natural is a life-supported system</i> for human wellbeing and cultural community. (O)</p> <p>ES4 - <i>Systemic knowledge</i> comes from systemic thinking, critical thinking, and problem-based learning, and is essential to understand the environmental issues within a social context. (E)</p> <p>ES5 - We should be <i>aware of the consequences</i> of our behaviors or activities that might have an impact on the ecosystem. (A)</p> <p>ES6 - Environmental activities should come from <i>participatory management</i> which includes all stakeholders. (A)</p>  |
| <p><b>Aesthetic themes: Ae</b></p> <p>Ae1 - The beauty of nature is <i>the inherent property</i> of natural things known by seeing things as they are. (O)</p> <p>Ae2 - The beauty of nature is <i>an integral ecosystem</i> that reflects diversity, complexity, and integrity. (O)</p> <p>Ae3 - The beauty of nature is in <i>the natural patterns</i> comprised of lines, grains, colors, textures, and dots. (O)</p> <p>Ae4 - The beauty of nature is in <i>the healing energy</i> which leaves people feeling joyful, relaxed, and happy. (O)</p> <p>Ae5 - <i>Aesthetic knowledge comes from aesthetic experience</i>, imagination, and art and is a way to appreciate the beauty of nature. (E)</p> <p>Ae6 - Humans should <i>live in harmony with nature</i> and nourish the beauty of nature. (A)</p>   |
| <p><b>Cultural-animistic themes: CA</b></p> <p>CA1 - Nature is a sacred place that has <i>a mysterious power</i> to judge humans who violate it. (O)</p> <p>CA2 - Everything of the natural world is created by <i>the power of God</i>. (From Christian and Islamic perspective) (O)</p> <p>CA3 - Nature is a sacred place with <i>a natural force</i> to protect and balance the natural world. (O)</p> <p>CA4 - Natural places have <i>a spirit of the place</i>: (1) <i>the ancestral spirit</i>, which is called “<i>Don Pu Ta</i>” (the eastern region), or “<i>Tod</i>” (the southern region), (2) the natural spirits such as “<i>Mae Thorani</i>” (mother earth). (O)</p> <p>CA5 - <i>Local/Indigenous knowledge</i> is homegrown knowledge transferred via community rituals and traditions, and it provides a path to connect with the sacred aspect of the natural world. (E)</p> <p>CA6 - <i>Personal knowledge from deep experience</i> is a pathway to insight into the sacred earth. (E)</p> <p>CA7 - Humans should <i>respect nature</i>, which is sacred. (A)</p> |

**Table 1** The list of environmental worldview variables from structured interviews (cont.)

|   |
|---|
| <p><b>Dharmic themes: Dh</b></p> <p>Dh1 - Nature is a place to reveal “<i>the law of reality</i>” or dharma from the Buddhist perspective. (O)</p> <p>Dh2 - Natural things and human beings are connected in oneness, called ‘<i>Interbeing</i>’ in the Buddhist perspective. (O)</p> <p>Dh3 - <i>Personal knowledge comes from spiritual practices</i> such as meditation, mindfulness training, and <i>dharma-yatra - a walking meditative “pilgrimage” through the beautiful countryside</i>, which is part of Buddhist discipline to seek insight into “the law of reality and “interbeing.” (E)</p> <p>Dh4 - Humans should be <i>compassionate to all beings</i> and live in harmonious simplicity with the laws of reality. (A)</p> |
|---|

O = Ontology; E= Epistemology; A = Axiology

Systemic realities, systemic thinking, critical thinking, problem-based learning, and community-based learning are ways by which to gain knowledge and insight. From the systemic point of view, humans become a part of nature and respond to keep ecosystems in balance. Humans, animals, plants, and natural things have intrinsic values that contribute to an ecosystem’s balance. Therefore, humans should be aware of our behaviors or activities that may affect this complex ecosystem.

The third is the aesthetic theme, in which interviewees commonly defined the reality of nature in terms of experiential reality toward the beauty of nature in four different terms: an inherent property, ecological beauty, healing energy, and natural patterns. For instance, an interviewee reflected on the idea of *the beauty of nature as an integrated ecosystem* in the following way:

The beauty of nature is a green forest, a pure river, and fresh air, which are associated with diversity, complexity, and natural balance (Leader of eco-community, 2016).

One can access the beauty of nature from experiential realities through personal experiences, such as aesthetic experiences (e.g. seeing the sunrise, bird watching, and forest bathing), imagination,

contemplation, art, crafts, and appreciation of traditions. From personal experience, human-nature connection is manifested via sensations, emotions, or psychological connections. Thus, humans should behave in a way that promotes culture in harmony with the beauty of nature.

Fourth, the cultural-animistic theme shows that interviewees described the reality of nature as a sacred phenomenon in two aspects. First, nature is a place of kinship or ancestral spirits that are described in three forms: mysterious power, natural force, and the spirit of a place. For instance, interviewees commonly called nature “*Mae*,” which means mother or goddess (i.e. “*Mae Thorani*” (mother earth) or “*Mae Kong Ka*” (goddess of the river). Second, Christian and Muslim interviewees viewed the natural world as the place of creation by God. Thus, everything comes from “*the power of God*,” as described below:

God is the creator and sacredness is the power of God. The miracles of the natural world, such as rivers, forests, oceans, stones, animals, etc., come from God, and humans have the stewardship to protect God’s creations (University student, 2016).

From these sacred points of view, humans are less powerful than the natural world, and they should respect and be grateful to nature. This includes establishing traditional rules for resource management. Moreover, one can gain insight into these sacred aspects through community rituals and personal experience (e.g. joining eco-quest activities or praying to God).

Finally, the dharmic theme includes what interviewees described as nature being a place for enlightenment and the discovery of the true meaning of life based on the discipline of the Buddhist community in Thailand. Nature has been called “*Dharma*,” which refers to the law of reality and interbeing. The term, “*Interbeing*,” was described in the following way:

Humans cannot be separate from nature, soil, water, air, forests, animals, and all things that are related to our living and become part of our body, mind, and spiritual being via seeing, listening,

smelling, sensing, feeling, touching, and tasting (Environmental monk, 2016).

From the dharmic view, the human-nature relationship becomes oneness - there is no separation between humans and nature. Therefore, human wellness is associated with the wellness of others, including one’s ecosystem. In terms of the epistemological aspect, individuals gain insight into “*interbeing*” through spiritual practices such as meditation, mindfulness training, and *dharmayatra*. Through these practices, they develop awareness and compassion toward themselves and nonhuman beings and live simply, harmoniously, and fairly.

### **Finding the Dimensionality of Environmental Worldview from PCA**

Phase 1 analyzed qualitative interview data to describe the variables of the environmental worldview in five themes with 27 items. Phase 2 explored these components and their correlation through principal component analysis. PCA generated five different components with eigenvalues greater than one. The eigenvalues before rotation ranged from 8.45 to 1.06, and were labeled as *aesthetic*, *dharmic*, *systemic*, *sacred* and *materialistic*. The five components explain 55.03 percent of the total variance, almost one third of which (31.28 percent) is explained by the first factor, as shown in Table 2.

**Table 2** The five different factors of the dimensionality of the environmental worldview from PCA

| Components of the environmental worldview | 1            | 2      | 3      | 4      | 5      |
|---|--------------|--------|--------|--------|--------|
| <b>1. Aesthetic</b>                       |              |        |        |        |        |
| Ae3 – natural patterns (O)                | <b>0.803</b> | -0.145 | 0.046  | 0.046  | -0.095 |
| Ae4 – healing energy (O)                  | <b>0.808</b> | -0.038 | 0.022  | 0.127  | -0.067 |
| ES3 – a life-supported system (O)         | <b>0.491</b> | 0.153  | 0.170  | -0.062 | 0.018  |
| CA5 – local/indigenous knowledge (E)      | <b>0.580</b> | 0.043  | 0.221  | 0.087  | 0.018  |
| ES2 – the earth system (O)                | <b>0.580</b> | -0.016 | 0.165  | 0.003  | 0.074  |
| Ae5 – aesthetic knowledge (E)             | <b>0.877</b> | -0.028 | -0.121 | -0.053 | 0.029  |
| ES4 – systemic knowledge (E)              | <b>0.403</b> | 0.257  | 0.085  | -0.195 | 0.148  |
| Ae6 – living in harmony with nature (A)   | <b>0.619</b> | 0.160  | -0.055 | -0.04  | 0.139  |

**Table 2** The five different factors of the dimensionality of the environmental worldview from PCA (cont.)

| Components of the environmental worldview                           | 1      | 2            | 3            | 4            | 5            |
|---|--------|--------------|--------------|--------------|--------------|
| <b>2. Dharmic</b>   |        |              |              |              |              |
| Dh1 – the laws of reality (O)                                       | 0.117  | <b>0.795</b> | -0.248       | 0.066        | -0.057       |
| Dh2 – interbeing (O)  | -0.078 | <b>0.630</b> | 0.213        | -0.122       | -0.15        |
| Dh3 – personal knowledge from spiritual practices (E)               | 0.267  | <b>0.551</b> | -0.145       | 0.167        | -0.079       |
| CA6 – personal knowledge from deep experience (E)                   | -0.073 | <b>0.595</b> | 0.245        | 0.069        | 0.012        |
| Dh4 – compassion for all beings (A)                                 | -0.095 | <b>0.530</b> | 0.135        | 0.097        | 0.181        |
| CA7 – respect for nature (A)  | 0.020  | <b>0.772</b> | -0.089       | -0.018       | 0.079        |
| <b>3. Systemic</b>  |        |              |              |              |              |
| Ae1 – inherent properties (O)                                       | -0.116 | 0.242        | <b>0.696</b> | 0.139        | -0.043       |
| Ae2 – an integrity ecosystem (O)                                    | -0.004 | 0.116        | <b>0.743</b> | 0.052        | -0.088       |
| ES1 – ecological system (O)   | 0.199  | -0.076       | <b>0.767</b> | 0.030        | 0.072        |
| ES6 – participatory management (A)                                  | 0.216  | -0.145       | <b>0.679</b> | -0.030       | -0.053       |
| <b>4. Sacred</b>  |        |              |              |              |              |
| CA1 – a mysterious power (O)  | 0.037  | -0.030       | 0.179        | <b>0.793</b> | -0.087       |
| CA2 – the power of God (O)  | -0.068 | -0.169       | -0.055       | <b>0.688</b> | 0.252        |
| CA3 – a natural force (O)   | 0.059  | 0.118        | 0.089        | <b>0.880</b> | -0.103       |
| CA4 – spirits of a place: Ancestral spirits and natural spirits (O) | 0.005  | 0.190        | -0.006       | <b>0.696</b> | -0.053       |
| <b>5. Materialistic</b>   |        |              |              |              |              |
| SE1 – biotic and abiotic (O)  | -0.024 | -0.196       | <b>0.684</b> | 0.071        | <b>0.329</b> |
| SE2 – materials and resources (O)                                   | -0.011 | -0.036       | -0.291       | -0.291       | <b>0.629</b> |
| SE3 – empirical knowledge (E)                                       | -0.028 | 0.225        | 0.236        | 0.236        | <b>0.483</b> |
| ES5 – awareness of the consequences (A)                             | 0.020  | <b>0.423</b> | 0.095        | -0.115       | <b>0.367</b> |
| SE4 – maximum efficiency (A)  | 0.063  | -0.051       | 0.118        | 0.118        | <b>0.715</b> |

Note: Extraction method: principal component analysis. Rotation Method: Promax with Kaiser Normalization.

O = Ontology, E = Epistemology, A = Axiology

In addition, the component correlation matrix (Table 3) shows that most factors tended to correlate with one another, showing positive correlations, except for the third and the fourth factors ( $r = -0.117$ ,  $p < 0.05$ ). This finding may be due to the contradiction between the sacred aspect (the traditional worldview of Thai people) and the systemic aspect (rooted in the ecology of the Western worldview).

**Table 3** Component correlation matrix

| Components              | 1     | 2      | 3      | 4        | 5      |
|-------------------------|-------|--------|--------|----------|--------|
| <b>1. Aesthetic</b>     | 1.000 | 0.611* | 0.580* | 0.117*   | 0.141* |
| <b>2. Dharmic</b>       |       | 1.000  | 0.524* | 0.211*   | 0.219* |
| <b>3. Systemic</b>      |       |        | 1.000  | -0.117** | 0.217* |
| <b>4. Sacred</b>        |       |        |        | 1.00     | 0.141* |
| <b>5. Materialistic</b> |       |        |        |          | 1.000  |

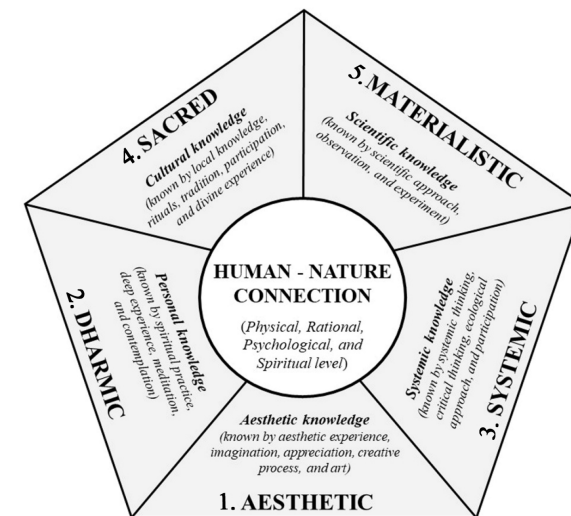
Extraction method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.

\* significant at the 0.01 level (2-tailed)

\*\* significant at the 0.05 level (2-tailed)

### A Conceptual Framework for the Integrative Environmental Worldview [IEW]

An IEW framework was established in the integration phase based on combining our qualitative and quantitative results with integral theory. Overall, the IEW model (as shown in Figure 1) consists of five core components that reveal holistic perceptions of nature and five foundational links between patterns of knowing and the pathway of human-nature connection development in environmental education.



**Figure 1** Conceptual framework of the integrative environmental worldview [IEW]



The first component, the aesthetic aspect, describes the beauty of nature as both an experiential reality and a cultural and ecological appreciation. Aesthetic knowledge is about acknowledging and appreciating the beauty of the natural world through an aesthetic experience, creative process, one's imagination, or the appreciation or production of art. Therefore, it plays a critical role in shifting ecological thinking from an empirical to a more subjective understanding, including human-nature connection development through physical sensations. As a result, from this aesthetic point of view, the human-nature connection is a psychological process that is helpful in developing human-nature intimacy and environmental norms born from love and respect for nature. Second, the dharmic aspect views nature as a place which inspires reflection on the law of reality and interbeing via personal experience of reality. Therefore, personal knowledge is self-realization and insight into the true meaning of life in which personal well-being is not separated from the nonhuman or an ecosystem's well-being. Self-realization comes from spiritual practice, meditation, and contemplation of the Buddhist discipline. From this point of view, the human-nature connection is developed at a spiritual level that is extremely intimate. This also implies that environmental awareness encompasses living in simplicity, fairness, and harmony with all beings. Third, the systemic aspect refers to views that describe the natural world in systems (e.g. ecosystem, earth system). This view is associated with systemic knowledge that comes from systemic thinking, critical thinking, and participatory approaches. From ecological understanding, the human-nature connection is logically sound, and the human position is a part of the ecosystem; thus, their duties are to keep the ecosystem in balance and be aware of the consequences of impacts on an ecosystem. Fourth, the sacred aspect views the reality of nature in two different schemes: kinship relationships from local knowledge and creation by God (from Christian and Islamic perspectives). From a kinship perspective, the natural world becomes a place of ancestral spirits, defined as the mysterious power, natural force, or spirit of a place. These characteristics are found both in cultural knowledge and the belief

systems of indigenous and local communities of Thailand. Crucially, from a theocentric perspective, the natural world viewed as a physical representation of the power of God which comes from Christian or Muslim people in Thailand. From this point of view, human-nature connections on both psychological and spiritual levels are products of intense personal experience. Finally, the materialistic aspect views the natural world in physiological realities such as biotic and abiotic, materials and resources derived by empirical knowledge (i.e. environmental science). From the materialistic point of view, a human-nature connection bonds at a physical level; therefore, natural resources must be effectively utilized and conserved for human utility.

## Discussion

Our findings show that the IEW conceptual framework provides several significant contributions to environmental education. Such contributions include a holistic conception of the environment, linking patterns of knowing from cross-perspectives, and a sustainable pathway for human-nature relationship development. Finally, we will discuss applying the integrative environmental worldview to environmental education design.

To understand the environment in a holistic way, integral ecology has developed the framework that includes a variety of schools of ecology within the four major terrains of the integral theory of Ken Wilber (Esbjorn-Hargens and Zimmerman, 2009). However, integral ecology does not look for a new definition of ecology, but instead tries to find an integral interpretation of the common definition of ecology (Markus, 2019). In this study, the IEW framework has expanded and emphasized the definition of nature based on five different ontological perspectives. While it was developed based on individuals' worldviews within the sociocultural context of Thailand, it provides a general holistic view for the study of nature and environmental education. The framework, therefore, not only provides insight into the reality of nature as defined in first-, second-, and third-person perspectives, but also

makes a critical link between traditional, scientific, and ecological worldviews. Moreover, this framework is consistent with idea that considering the spiritual (Thathong, 2012; Baker and Morrison, 2008), aesthetic (Wang and Yu, 2018), and sacred aspects (Kouy, 2013; Hitzhusen, 2006; Cairns, 2002) of the environment is essential for ecological and social sustainability.

In the past, researchers who studied local Thai knowledge often exclusively considered promoting local knowledge. They failed to mention the inequality that exists between scientific and local knowledge (Ganjanapan, 2012; Koanuntakul, 2005). In this study, the IEW framework provides five fundamental patterns of knowing in which all knowledge from cross-cultural perspectives can be used to align, exchange, and debate equally in the discipline of environmental education. This finding is not only consistent with the concept proposed by Chaitieng (2017) and Barnhardt (2005), who suggested that sustainability requires integrating both scientific and local wisdom; it also extends the concept of the environment into the aesthetic, sacred, and dharmic aspects in education for sustainability. Furthermore, Palmer (1998) has proposed that the EE framework for the 21st century addresses three elements (empirical, aesthetic, and ethical). This framework places the spiritual aspect as a subset of the aesthetic element. However, in our study, we found that the spiritual element is different from the aesthetic, and that the spiritual element should be learning about the dharma and the sacred aspect of the natural world. Moreover, we also discovered that there are differences between the aesthetic and spiritual elements in describing both the reality of nature and the ways of obtaining knowledge. Thus, our findings have revealed the aesthetic and spiritual aspects to be separate entities that must be considered in any analysis of a natural site.

Currently, numerous environmental issues force us to reexamine how the current human-nature connection has developed. The human-nature connection has historically been explained exclusively through natural science or ecology. In the present study, the IEW framework provides a format for ecological thinking that is

not only based on empirical knowledge, but also includes cultural, aesthetic, and personal knowledge to uncover the human-nature relationship. This holistic understanding provides a sustainable pathway for human-nature connection development to promote awareness and attitudes toward sustainable lifestyles (Witt et al., 2014). Moreover, developing human-nature connection at the spiritual level is associated with expanding individual perception and self-identity beyond an egocentric view. This finding is consistent with the concept of an ecological self (Naess, 2001) and the greening of the self (Macy, 1990), which are about personal change in the discipline of deep ecology. Hence, it will be the critical pathway to advance environmental education for sustainability both locally and globally.

Finally, it is critical to apply the IEW framework to environmental education. As noted above, the IEW framework provides five critical perspectives to acquire a holistic environmental understanding, knowledge, and the pathway to human-nature relationship development. Using this logic, we can choose any exemplar and examine it from five different perspectives. For instance, we can apply the IEW framework to Chana city in Songkhla province (the site of a planned industrial park project), where there are many conflicts between the government and the local community. First, we could provide students an understanding of Chana city in terms of empirical knowledge, or the scientific and sociocultural research done on topics such as biodiversity and cultural diversity to ultimately understand the environmental impact of the industrial park project. Next, we could guide students in investigating the project to understand the big picture in the ecological and social structure context. Third, we could focus on students' personal experience of touching, feeling, and enjoying the Chana landscape and beach. This aesthetic experience would allow them to develop a human-nature relationship and develop an attachment with Chana. Fourth, in terms of the sacred aspect, most Chana people are Muslim, and they believe in God's creation; therefore, we could ask students to explore how Chana's community conserves and protects nature and how they conduct their environmental decision-making.

Finally, in terms of the dharmic perspective, which opens for deep personal experience, we could allow students to reside for one or two days in the area where the government plans to build the industrial park. Then, we could ask them to individually contemplate and explore how they feel connected to the place, what environmental awareness and attitudes this experience teaches, and what their decision-making process regarding the Chana project would look like from this personal realization. Through these practical applications of the IEW framework, students can have a more holistic insight and understand systemically Chana and the issues of the industrial park project from scientific, ecological, social, cultural, and personal perspectives. Thus, the IEW framework provides a systemic and holistic platform for environmental education and management for sustainability.

## Conclusion

In summary, the IEW framework provides the five aspects of perception to reveal a more holistic understanding of nature and includes five fundamental patterns of knowing for debate in environmental education. Moreover, it also highlights a sustainable pathway to shift the human-nature relationship from a dualistic to an ecocentric and nondualistic one. Further, this framework allows the designation of the EE curriculum, which includes self-realization for the sake of environmental literacy and environmental problem-solving in accordance with unique sociocultural contexts of each region. Environmental issues are incredibly complex and require a framework that includes and acknowledges diverse insights from various cultural perspectives. Critically, the IEW framework establishes a critical link between traditional, scientific, and ecological worldviews that includes patterns of knowing from various sources in environmental education. Moreover, it also provides a sustainable pathway to human-nature connection which shifts the focus from reductionistic, dualistic, and egocentric views to a more holistic one, which is fundamental to addressing the world's complex environmental crises and environmental education, both locally and globally.

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