



Environmental Ethics: Modelling for Values and Choices

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Ecocentrism goes beyond biocentrism with its fixation on organisms, for in the ecocentric view people are inseparable from the inorganic/organic nature that encapsulates them. They are particles and waves, body and spirit, in the context of Earth's ambient energy.

J. Stan Rowe, Ecocentrism, 1994.

Abstract

The framework of environmental ethics is built, challenging the way we view or interpret environmental education through the eyes of different stakeholders. In this chapter we consider aspects of land and ecological ethics as well as pedagogy as they relate to environmental ethics to form modelling. We classify that environmental ethics are “anthropocentrism,” or the human-centered approach; “biocentrism,” or the life-centered approach; and “ecocentrism,” or the ecosystem-centered approach. Environmental paradigms are explored, which include the theories and practices regarding to environmental ethics, new environmental, ecological and behavioral paradigms, and paradigm shifts. Regarding to our choices from environmental values and concerns, we may use a model to detect our problem-solving approach to identify environmental problems we face and, find our practical needs and implement solutions toward sustainability.

6.1 What is Environmental Ethics?

Environmental ethics is an epistemological doctrine that is philosophically grounded that explores the relationship between humans and the environment. Many philosophical hypotheses relative to environmental ethics has established such as: *All things have intrinsic value* (Mazzucato 2020; Carney 2021). The social and natural sciences clearly have an influence on ethics (Bellah 1983; Schwartz 1987). Where is the ethics coming from, and when? Following birth of the life myth, we become detached from the warmth of motherhood, resulting in alienation and anxiety. We are born, grow, age, and before we die, we all look for ways to find connections between humans. Finding connections gives us status, identity, and value in the world that is closely related to Mother earth.

6.1.1 Beliefs of Land Ethics

Land ethics is a theory of environmental philosophy and considers how humans view and/or use

the land in a moral sense (Callicott 1989, 2010). The term was coined by Aldo Leopold in *A Sand County Almanac* (1949) and in the middle twentieth century, it was considered a classic text of the environmental movement (Callicott 2005; Callicott et al. 2011). Leopold believed humans urgently needed a new ethic that dealt with the relationship between humans and land. He wrote (1949):

The first ethics dealt with the relation between individuals; the Mosaic Decalogue is an example. Later accretions dealt with the relation between the individual and society. The Golden Rule tries to integrate the individual to society; democracy to integrate social organization to the individual.... There is as yet no ethic dealing with man's relation to land and to the animals and plants which grow upon it. The land-relation is still strictly economic, entailing privileges but not obligations....

This narrative provided an ecology-based land ethic that protected nature, developed the idea of a self-renewing ecosystem, and rejected the human-centered view of the environment. *A Sand County Almanac* is the first systematic introduction of an ecologically-centric method of environmental protection. While Leopold is credited with coining the term land ethics, numerous philosophical theories that explain how humans should treat the land followed (Callicott 1989). Economically-based utilitarianism, libertarianism, egalitarianism, and ecological land ethics were all considered (Callicott 1989; Noll 2017). Despite the plethora of definitions for the same concept, the UNEP in 1972 adopted Leopold's definition for designing the curriculum content for environmental education in different countries (Gruenewald 2004; Tete and Ariche 2021).

6.1.2 Beliefs of Anthropocentric Value System

The shift in emphasis from humans to nature is important. Theists believe that human beings exist on the earth and that they are superior to other forms of life and occupy a superior position. Therefore, all other forms of life are present

to serve humanity's needs because human beings are superior and created in the image of God (Burdett 2015; Kilner 2015). But this doctrine is challenged by biblical commentators who believe that God wants human beings to be stewards or protectors of life on earth, thereby highlighting the plasticity of biblical interpretations.

Aristotle and Kant believed that only humans are moral creatures, because only humans have the ability to think rationally (Hurka 1996; Taylor 2010). This point of view is now referred to as anthropocentrism.

However, compared with the arbitrariness of western culture, oriental culture has its modesty. As Mencius (孟子)(Meng Tzu, 372–289 BC), one of the Chinese Confucian philosophers, believed that humans and animals are very different from each other and only humans have a moral nature. Most people do not know the value of kindness. So, Mencius in the book of *Mencius* said (Lau 2004; Huang 2010): "Slight is the difference between man and beasts." Therefore, "They often abandon benevolence and morality, and only gentlemen know morality valuable." He tried to defend his claim of the innate goodness of human beings and claimed the human heart contains the sprouts of the four central Confucian virtues: benevolence (*ren*), righteousness (*yi*), propriety (*li*), and wisdom (*zhi*). Mencius believed that these sprouts needed to be nourished. The Taoist Zhuangzi (莊子)(Zhuang Tzu, 369–286 BC) also often used animals to metaphorically view the world in his dreams. For example, he used the image of butterfly in his dream and when he woke (Möller 1999; Lee 2007), he thought about his lucid self and said: "Is myself coexisted in a butterfly's dream?" Zhuangzi argued that he'd rather to be a turtle playing in the mud. He talked to the vice-chancellor:

I am told there is a sacred tortoise offered and canonized three thousand years ago, venerated by the prince, wrapped in silk, in a precious shrine on an altar in the temple. What do you think? Is it better to give up one's life, and leave a sacred shell, as an object of cult in a cloud of incense for three thousand years, or to live as a plain turtle dragging its tail in the mud?

“For the turtle,” said the vice-chancellor, “better to live and drag its tail in the mud!” “Go home!” said Zhuangzi. “Leave me here to drag my tail in the mud.”

Willing to be an official is equated with being a companion with a tiger, because being an official is a loss of human freedom. Literally it means staying close to the emperor and serving him is as risky as living with a tiger, for he may be killed by the emperor anytime. It carries a sense of worry and concern. Therefore, neither traditional Chinese Confucianism nor Taoism is the anthropocentric theorist in their human-centered theory. Even Zhuangzi’s ideal is to learn swamp pheasants. “Pheasants in swamps have stepped ten steps, with one peck; one hundred steps, with one drink, and the muddy pheasants do not care about living in a fed cage associated with animal husbandry.” This is a thought that pursues the freedom of humans and species (Wenzel 2003), rather than the only thought that respects humans. However, Zhuangzi is also similar in his anthropocentric theory on a dualism from this “radical critique of power and ultimate spiritual life” defined through human criteria from his theory (Kim 2009) since some other scholars regarding Zhuangzi as anti-anthropocentric thinker (Parkes 2013; D’Ambrosio 2022). This is quite controversial for an ancient Chinese scholar from his paradoxes of comments on radical critique of power and ultimate spiritual life in Western philosophy (Barrett 2011; Moeller 2015).

6.1.3 Beliefs of Biocentric Ethic Value System

In the past, this discourse on anthropocentrism had not been challenged until modern times. However, because of Darwin’s theory of the evolution, the position of humans as a “superior” species has changed. Biocentrism is a moral point of view that extends the intrinsic value of life to all living things. The center of life is to explain how the earth works, especially what is related to biodiversity. Biocentrism encompasses all living things, extending the status of moral

objects from humans to all living things in nature. As such biocentric ethics requires rethinking the relationships between humans and nature because nature no longer exists exclusively for the use or consumption by humans. Biocentrists believe that all species have intrinsic value and that humans are not morally or better than other species. The four pillars of biocentrism are:

- (1) Humans and all other species are members of the earth;
- (2) All species are part of an interdependent system;
- (3) All creatures pursue their own advantages (good) in their own way; and
- (4) Human beings are not better than other creatures.

Biocentrism does not imply an idea of equality between animals, as this phenomenon has not been observed in nature due to differences in their capacities (Singer 1997). Biocentrism is based on natural observations, not biased in favor of the human (Sterba 1998). Biocentrism should not treat humans as superior species (Sterba 1995). Proponents of biocentrism often promote biodiversity conservation, animal rights, and environmental protection. Biocentrism combines deep ecology with opposition to industrialism and capitalism (Johns 1992; Orton 1996; Barnhill and Gottlieb 2010; Farida et al. 2019) (Fig. 6.1).

6.1.4 Beliefs of Ecological Ethic Value System

Biocentrism contrasts strongly with anthropocentrism (Flores and Clark 2001). Anthropocentrism is centered on human values; however, biocentrism extends intrinsic value to the entire natural world (Bennett 2004). Because humans are one of many species in the world’s ecosystems, any behaviors that negatively affect these ecosystems then negatively impact humans. Therefore, do we maintain a biocentric world-view or expand the moral category in the world? It depends how to extend all things to have



Fig. 6.1 Proponents of biocentrism often promote biodiversity conservation, animal rights, and environmental protection (Photo by Max Horng)

intrinsic value to strengthen the concept of ecological ethics (Sandler 2012).

The debate on environmental ethics with respect to *an Interconnected World* has become increasingly acute because of its interconnect- edness and vulnerability to the ecosystem (Droz 2021). We previously intimated humans are part of nature and now we are intimating there is a *human ecosystem*. The *human ecosystem* should be regarded as *an organizing concept in ecosystem management* (Machlis et al. 1997).

What is Ecocentrism? Do we need to concern humans? Ecocentrism is the broadest term for worldviews that also recognize intrinsic value (Bennett 2004) in all lifeforms and ecosystems themselves, including their abiotic components (Washington et al. 2017). Proposed by 1990s (de Figueiredo et al. 2022), Rowe (1994b) declared ecocentrism puts a new interpretation on community from traditional ecological knowledge. The ideas of ecocentrism are focused on the entire biological community and committed to

maintaining the composition and ecological processes of the ecosystem (Shrivastava 2008; Fios 2019). Therefore, ecocentric approach to environmental ethics uses an *eco-holistic* perspective with the widest visions (Steverson 1991).

However, how is it different from biocentrism? Ecocentrism goes beyond biocentrism since ecocentrism having the widest vision. Biocentrism is implicitly establishing an equality among life-forms that favors or values all animals. Ecocentrism has been concerned about taking a broader view of our common home— planet Earth. Why eco-centrism is the key pathway to sustainability (Washington et al. 2017)? In a sense, Washington et al. (2017) declared eco-centrism has been with humanity since it underpins what can be called the ‘*old sustainability*’. Why we need to examine Leopold’s principle of eco-centrism? Is this an ‘old’ sustainability to be detected from conservation biology? To answer this question, we may read

one of the papers: *Making the law more eco-centric: Responding to Leopold and conservation biology* (Kuhlmann 1996).

Leopold (1949), recognized that all species, including humans, were the products of long-term evolutionary processes that interrelated in their life processes. His views on land ethics and environmental management are the key elements of ecological ethics. Rolston (1975) considered the responsibilities of the biota in their ecosystems, illustrating the philosophy of nature, and suggested nature needed to be protected according to ethical decisions and processes.

Ecocentrism is not an argument that all living things are of equal value (Washington et al. 2017). It does not deny the existence of countless important core issues, such as Nature Needs Half movement (Kopnina et al. 2018). Unlike many species, human beings are a resilient species in a rigid situation of under a climate-mediated mechanical change (Madin et al. 2008). However, human beings need to learn how to survive from their social networks and their living environment. Therefore, an ecocentric epistemology for ecosocialism can be reproduced social relations, sustaining habitat for sustainability (Salleh 2022). We may consider that Disinger (1990) described environmental world views as placed on an “ecocentric-anthropocentric continuum.” While the dominant social paradigm follows the anthropocentric view. In addition, ecocentric practices also offer an alternative episteme for building a life-affirming civilization from resilience ethics (Bravo-Osorio 2022). This is one of the sound-science roots to support of a growing number of conservationists for ecocentric-based approaches addressing human concerns and directing human action regarding to the environment by the concepts of social-ecological resilience (Piccolo et al. 2018).

6.1.5 From Deep Ecology to Animal Rights

Deep ecology is opposed to the worldviews that emerged in the eighteenth century and proponents believe that the world is not a freely

exploitable resource for humans (Gladwin et al. 1995). Therefore, the ethics of deep ecology holds that the survival of any ecosystem depends on this struggle for their lives for its overall well-being (Næss 1973; Bradford 1989). Deep ecology states (Næss 1973, 1985a, b, 1986, 1987, 1989):

- (1) The life of human beings or other living things on the earth itself have “value.” This life value is not determined by the contribution of the non-human world to the human world;
- (2) Life forms have value in themselves; moreover, the richness and diversity of life forms contribute to the “realization” of these life values in themselves (Næss 1986, 2011);
- (3) Human beings have no right to reduce richness and diversity, except for the essential basic needs for sustaining life;
- (4) The prosperity of human life and culture is compatible with the small human population. To maintain the abundance of other organisms, a small population needs to be maintained;
- (5) At present, human beings’ excessive interference with other living things is rapidly deteriorating;
- (6) Humans must change policies that affect basic economic, technological, and ideological structures. As a result, the situation will be very different from what it is now;
- (7) Based on the natural value of life, the change in ideology is mainly due to the appreciation of “life quality” (Næss 1986, 2011), not the pursuit of a higher standard of living. We will be profoundly aware that there is a difference between “big ness” and “greatness.” (McElroy 2002; Næss 2011); and
- (8) Anyone who agrees with the above viewpoints has the obligation to participate directly or indirectly in the necessary reforms (Næss 1986, 2011).

Deep ecologists have written an ambitious statement to change the current political and economic system (Devall 1980; Næss 1986; McLaughlin 1993; Pepper 2002; Zimmerman 2020). Næss (1984, 1986) emphasized the

intrinsic value based on the relations to individual living being with its sense in a holistic system (Katz 1987). He believed that the connection of ecological phenomena affects the whole body in a Gaia sense (Næss 1995). Therefore, he believed that human beings should adjust their attitudes towards nature and use ecological worldviews for macro-control, otherwise the global environment will suffer.

Bill Devall (1938–2009) and George Sessions (1938–2016) cite *New Physics* in their book entitled *Deep Ecology*, said *the ultimate norms of deep ecology suggest a view of the nature of reality* in 1985 (Devall and Sessions 1985), described the new physics as the *view of reality* (Sessions 1987) as smashing Cartesian (René Descartes, 1596–1650) and Newton’s (Sir Isaac Newton, 1643–1727) cosmic vision.

Devall and Sessions (1984) agreed to deny the empty image of nature as created by the human, and the *New physics* created by them denies that nature is a simple linear causal machine. Devall and Sessions (1985) argued that nature was in a state of constant change and rejected the notion that the observer was independent of the environment. They referred to the new physics presented in *The Tao of Physics* and the impact of new physics on the interconnectedness of metaphysics and ecology (Capra 1975). According to Capra, this should make deep ecology the framework of future human society. Devall and Sessions (1985) talked about ecological science itself and emphasized the links between ecosystems where is thus closely related to a rigorous determinism (Capra and Luisi 2014). They point out that in addition to scientific viewpoints, ecologists and natural historians have developed a profound ecological consciousness, including political and spiritual consciousness (Devall and Sessions 1985). They criticize anthropocentrism because ecocentrism is a discourse beyond human perspective.

Capra believed that this kind of complex network organization model will lead to a novel and systemic way of thinking. The ecosystem will be a form of autopoiesis and the structure and function of all ecosystems are complementary so they are indispensable (Fig. 6.2).

Ecosystems are unbalanced dynamic structures, but at the same time they can maintain dynamic stable structures. At a time when the ecosystem is constantly seeking to improve itself, continuously absorbing energy and matter from the environment, and releasing “entropy” to the environment. The ecosystem can even adopt a model of environmental destruction that exchanges “entropy” with the external environment to maintain its own stable. This presumes that the biotic elements of an ecosystem have the ability to adapt (Mersereau 2016; Feliciotti et al. 2018). Finally, the ecosystem uses social networks for system information exchange and repairs between systems (Capra and Luisi 2014).

Deep ecology affects the *Animal Liberation* movement (Flükiger 2009). Experts on animal liberation, such as Tom Regan (1938–2017) and Peter Singer (1946–), put forward the theory of animal protection. Regan inferred from the theory of benefit that human beings are not morally unique and equal judgments based on theory (Singer 1975). Regan wrote *The Case for Animal Rights*, which argues that humans cannot use rationalism as the principle of supremacy and only grant rights to those who have reason. In fact, these rights should be given to infants, vegetative, and non-human. These rights are intrinsic values, and humans should put the case of animals in moral considerations (Regan 1983).

Peter Singer’s 1975 book, *Animal Liberation*, severely criticized anthropocentrism, and Singer disagreed with deep ecology’s belief in the “inner value” of nature (Vilkka 2021). Singer took a more practical stand, called “effective altruism,” meaning that protecting animals can bring greater benefits from utilitarian basis (Regan 1980).

Deep ecology and animal rights are in relation to environmental education (Kopnina and Gjerris 2015). However, animal welfare (AW), animal rights (AR), and deep ecology (DE) have often been absent within environmental education and education for sustainable development (Kopnina and Cherniak 2015). Therefore, we may try to realize the concept from “biocentric equality,” according to Devall and Sessions, entails that *all organisms and entities in the ecosphere, as parts of the interrelated whole, are equal in intrinsic*



Fig. 6.2 The ecosystem will be a form of autopoiesis, and the structure and function of all ecosystems are complementary, so they are indispensable. The ecosystem uses social networks for information exchange with species like humans and animals. (*Bambusicola*

sonorivox, as the common name Taiwan bamboo partridge, is a subspecies bird endemic to Taiwan (Hong et al. 2014) occurs at Qixingshan Trail, Yangmingshan National Park, Taipei, Taiwan) (Photo by Max Horng)

worth (Devall and Sessions 1985) and the *nature of reality*, ultimately, “intimately connected” with the environment (Borgmann 1995). Environmental education, therefore, is intimately related and their connection with nature should be intimately involved in the learning process from animal welfare (AW), animal rights (AR), and deep ecology (DE).

6.2 Environmental Paradigm

We talked about the philosophical basis of environmental ethics in the aforementioned section, mainly to provide philosophical concepts for environmental education. In addition, this section discloses a new environmental paradigm in

modelling, utilizing as a measuring scale of the measurement for an evaluation approach on the environmental education research.

Do we need environmental paradigm? How do we need, and why? What is the relationship from environmental ethics to environmental paradigm? It should be noted, however, that a few studies have examined the relationship between environmental ethics and environmental paradigm (Dunlap and Liere 1984), but it does not seem obvious that we, humans, may not clearly understand our relationships with the biosphere where we depend on, and we also do not find out the fate and all well-beings on earth in the future.

Are we smart? May be not. Or we are only just a bug living on earth?

From the previous discussion, environmental ethics is a basic model of human morality; it belongs to a kind of “self-respect” and “external respect” for things that are deep inside and exposed.

In this section we will talk about “paradigm.” What is paradigm? The term of paradigm in *the American Heritage Dictionary of the English Language* is defined as *A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline.* A paradigm for model could be fitting with applications to a real world. Therefore, in social science we do not replace necessarily an old one; various paradigms could be existing side-by-side (Kornai 2002). We try to extend the models for our multidimensional paradigm in many refining works on our studies. We tried to study conceptual model for environmental ethics to be constructed in several years.

However, what is a “model”?

Examples of a **model** include all concepts, assumptions, values, approaches, and benchmarks used to test truth in human activities. The word paradigm is derived from the Greek *paradeigma* and has the meaning of pattern, model, or plan, and refers to all applicable experimental situations or procedures. Therefore, a **paradigm** could be a significant scientific view of how to look at the world, which should be recognized by a community that provides a model. Plato (429–347 BC) coined the word paradigm, hoping to use it in the idea of its ideas or forms to resolve the way in which disputes over truth are discussed. The German philosopher Georg Lichtenberg (1742–1799) believes that the “paradigm” is an exemplary achievement. We can use this achievement as a model and use an analogous process to answer questions. Later, Ludwig Wittgenstein (1889–1951) talked about “paradigms” in the concept of language games, hoping to follow the process of analogy, let the questions be answered, and seek the truth in this world. This truth-based paradigm has allowed Riley E. Dunlap, a professor of sociology at Oklahoma State University, to study the nature and origin of environmental problems for 40 years.

6.2.1 Traditional Beliefs and Values

Dunlap and Liere (1984) emphasized the links between environmental issues, public opinion, and environmental decision-making. When he developed the New Environmental Paradigm Scale, he called the opposing paradigm the Dominant Social Paradigm.

What is **Dominant Social Paradigm**?

Dominant Social Paradigm (Pirages and Ehrlich 1974) was coined as one of the world views in human society, representing that *humans are superior to other all other species, the Earth provides unlimited resources for humans, and that progress is an inherent part of human history.* This term was developed by Pirages and Ehrlich (1974) and has been elaborated further by Dunlap and Liere (1984). In their studies, Dominant Social Paradigm of western industrial society could be containing political, economic, and technological institutions from a capital domain. It is these institutions that determine both the quality of life and environmental constructs within any society (Kilbourne 2006).

Dunlap examined the associations between traditional American beliefs and values (e.g., individualism, laissez-faire, and progressivism), environmental attitudes and behaviors (Dunlap 2022). Concerned about the beliefs and values of the Dominant Social Paradigm and his concern for environmental quality, Dunlap and his colleagues developed core elements for measuring environmental models and worldviews, and has applied his work in many countries (Dunlap et al. 1983; Dunlap and Liere 1984; Dunlap 2022).

6.2.2 New Environmental Paradigm

Dunlap’s idea of a New Ecological Paradigm was developed in the 1980s, after he developed a New Environmental Paradigm Scale during 1976 and later published in 1978 (Dunlap and Van Liere 1978); and later published the New Ecological Paradigm Scale in 2000 (Dunlap et al. 2000; Dunlap 2008). His work is currently focused on an analysis of public opinion on climate change, the polarization of climate science

and policy, and the analysis of negative sources and nature of climate change (Dunlap and McCright 2015).

We tried to introduce the **New Environmental Paradigm** (NEP) scale. The earliest model of environmental norms was proposed by environmental sociologist Riley Dunlap and his colleague (Dunlap and Van Liere 1978), and it's currently the most widely used environmental attitude assessment tool (Lalonde and Jackson 2002). Lalonde and Jackson (2002) argued that the NEP scale is limited *with respect both to the anachronistic wording of items and its inability to capture people's increasingly thorough understanding of the nature, severity, and scope of environmental problems* over the last four decade from now. The new environmental paradigm model is centered on human development and emphasizes the interaction between humans and nature. After presenting the first version of the scale, Dunlap merged it into a streamlined version of a set of six items by modifying the vocabulary, and a simplified version was used by John Pierce, who shared the information.

New Environmental Paradigm is related to the responses to individual environmental attitude questions (Pienaar et al. 2013). Environmental attitudes in our studies are measured by one-order constituents such as caring or not caring in a moral root. Later, environmental attitudes adopted a multi-component concept and were adopted in many studies (Cherdymova et al. 2018; Sorokoumova et al. 2021). Therefore, we may propose this New Environmental Paradigm model to be refined through history lesson that has some relevance on their multi-component concept to the topic from an idea of the paradigm shift in the theories of behaviors.

6.3 Paradigm of the Theory of Behaviors

We learned from Riley Dunlap's concepts of "The creation of paradigm" and "searching to the truth" that we need to rely on environmental psychologists to adopt human attitudes and

methods that are different from normal science to conduct experiments on human behavior. British scholar Edmund Burke (1729–1797) said (Burke 1790):

The world would then have the means of knowing how many they are; who they are; and of what value their opinions may be, from their personal abilities, from their knowledge, their experience, or their lead and authority in this state.

Because, traditionally, we have thought that as long as humans have knowledge, their attitudes and values, will change their behaviors (Fig. 6.3). However, this argument is not absolute (Dunlap 1975). To explore the relationship between knowledge, attitude, and behavior is to find out whether the relationship has been wrong. That is, verifying that having environmental knowledge does not necessarily affect environmental attitudes, and that having attitudes does not necessarily affect pro-environmental behaviors. The relationship among them is very complicated.

The impact of environmental knowledge and environmental attitudes on people's indirect actions may be greater than that of people's direct pro-environmental behaviors (Kollmuss and Agyeman 2002). Economic factors, social norms, emotions, and internal logic have a great impact on people's decision on pro-environmental behavior. We conduct a review of human environmental behavior, including good behavior and bad behavior. We answer the question: "Why do we do what we should do?"

First, the moment a behavior occurs is a neurobiological explanation. That is, what kind of vision, sound, or scent, when a behavior occurs, causes the nervous system to produce this behavior? Then, what hormones respond to the stimulation of the nervous system in human individuals? In these sensory worlds of neurobiology and environmental endocrinology, we can try to explain what thoughts, attitudes, and behaviors will take place in the next moment (Sapolsky 2017) (see Fig. 6.4).

Of course, all behaviors can be traced back to the effects of structural changes in the nervous system, including adolescence, childhood, fetal

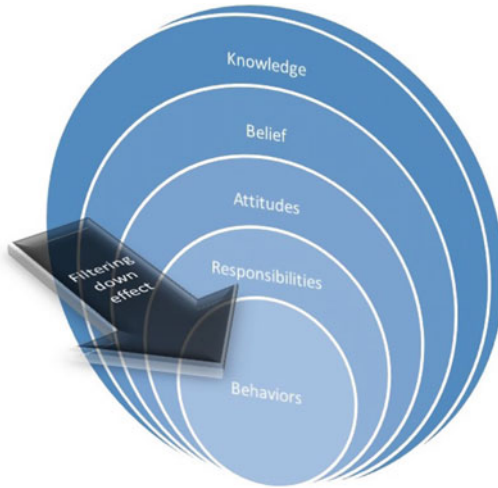


Fig. 6.3 Environmental efficacy by measured the function of behavioral change could be detected a lower level until the effect has reached the bottom from the educational and/or learning market in a civic society and/or at schools. We argued that in this complex area by presenting the conventional models of the linkages between knowledge and behaviors (Kerkhoff and Lebel 2006). The filtering down effect warned that the transfer function of the output, i.e., pro-environmental behaviors, less the scaling gain from the input of environmental knowledge investment enforced in a civic society and/or at schools. Marcinkowski and Reid (2019) argued that many attitude-behavior (A-B) relationships with substantial evidence were determined to be regarding as a relatively moderate strength (Illustrated by Wei-Ta Fang)

life, and genetic makeup. Finally, we should extend the perspective of environmental protection to social and cultural factors. Because, how does environmental protection culture shape personal environmental perceptions, and what ecological factors have formed this kind of environmental protection culture? From the perspective of environmental protection, pro-environmental behavior is one of the dazzling human behavior sciences. These issues involve the biophilia hypothesis, social norms, moral obligations, altruism, free will, and human values (Dunlap et al. 1983). All the achievements of environmental protection are human performances. We emphasize that practice itself is a symbol of an unknown hero because environmental protection is a nameless and lonely job. The following is explanation of the paradigm of

behavioral theories, including theoretical models such as the Theory of Planned Behavior (TPB).

6.3.1 Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is a behavioral decision model that was used to predict and understand human behavior (Ajzen 1985, 1991). The model is mainly composed of environmental attitudes, subjective norms, perceived behavior control, behavioral intentions, and behaviors theory (Fig. 6.5). It specifies the nature of the relationship between belief and attitude. According to the model, human evaluation or attitude to behavior depends on their belief in behavior, where belief is defined as the subjective probability that the behavior produces some result. Specifically, the evaluation of each outcome helps shape the behavior. In other words, a positive environmental attitude strengthens the pro-environmental intention.

- (1) Subjective norm: An individual's perception of a particular behavior is influenced by the judgment of important others (such as parents, spouses, friends, teachers).
- (2) Perceived behavioral control: The degree to which an individual perceives the difficulty of performing a particular behavior. Here we assume that perceived behavioral control is determined by the total set of accessible control beliefs.

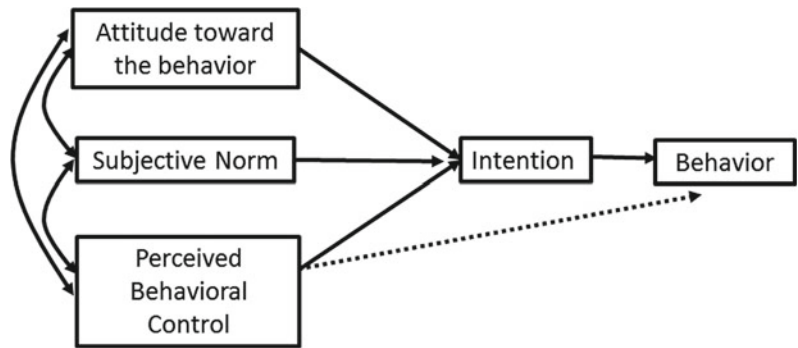
In assessing important factors such as normative beliefs, social norms, attitudes, and perceived behavioral control, we may complete the development of the scale under social and cultural causes. While we clarify the causal relationship between important factors, we will understand the importance of social influence.

The concept of social impact is assessed through the social norms and beliefs. Humans' detailed thinking on subjective norms is based on whether their friends, family members, and society expect them to perform specific behaviors. Social influence is measured by assessing various social groups. For example, we provide in the



Fig. 6.4 In these sensory worlds of neurobiology and environmental endocrinology, we can try to explain what gestures and postures will take place in moments beyond planned behaviors (Merlion, as an official mascot of Singapore, named and designed by Fraser Brunner) (Elegant look by model by Chiao-Yen Chang; Photo by Max Horn)

Fig. 6.5 The theory of planned behavior (Modified after Ajzen, 1991; Illustrated by Wei-Ta Fang)



case of smoking (Ajzen and Manstead 2007). Subjective norms from peer groups, including ideas such as: “Most of my friends smoke,” or “I feel ashamed to smoke in front of a group of non-smoking friends,” and subjective norms of the

family, such as: “The idea that family members smoke and it seems natural to start smoking; or “My parents were really mad at me when I started smoking”; and subjective norms from society or culture, including things like:

“Everyone is against smoking,” and ideas like “we just assume everyone is a non-smoker.”

Although most models are conceptualized in the individual’s cognitive space, planned behavior theory is based on collectivistic culture-related variables to consider social influences, such as social norms and normative beliefs. Whereas, individual behaviors (including health-related decisions such as diet, condom use, smoking cessation, and alcohol consumption), may be built on social networks and organizational knowledge (for example, peer groups, family members, school faculties, and the workplace colleagues). Social influence has a great influence on the Theory of Planned Behavior. Therefore, in the social norms that affect environmental behavior, in addition to subjective norms, describing norms may also be one of the important variables.

At present, the Theory of Planned Behavior has been applied in research fields related to environmental protection and public health (Fang et al. 2017; Liu et al. 2018; Woo et al. 2022) as well as the similar research modelling studies, such as Fang et al. (2021a, b). The research found that the most important psychological variables that affect behavioral intentions are different in various groups and regions. Respondents have different conditions, such as those with a high degree of environmental care. Perceived behavioral control is an important variable, while those with a low degree of attitude are important variables that affect environmental behavioral intentions. In addition, different regions and interviewees have different conditions and the important intermediary variables that directly affect behavior are also different (Bamberg 2003). For example, when buying environmentally friendly products. At the national level, attitudes are the most important variable in Spain (Nyrud et al. 2008). Take the example of switching to public transportation without a car. In Frankfurt, Germany, perceived behavioral control is the most obvious, and in Bochum, Germany, attitude is the most important variable (Bamberg et al. 2007).

The Theory of Planned Behavior holds that subjective norms can directly influence

behavioral intentions (Ajzen 1991), but does not discuss whether descriptive norms affect behavioral intentions. In terms of environmentally friendly behavior, in recent years, researchers have tended to include description norms and subjective norms (such as the expectations and support of important people around them) as social norms. Social norms affect individual psychological variables, such as social norms affecting attitudes, and attitudes in turn affect environmentally friendly behavioral intentions. A little different from the Theory of Planned Behavior, social norms influence environmentally friendly behaviors in an indirect way (Thøgersen 2006; Bamberg and Möser 2007; Hernández et al. 2010; McKenzie-Mohr 2011).

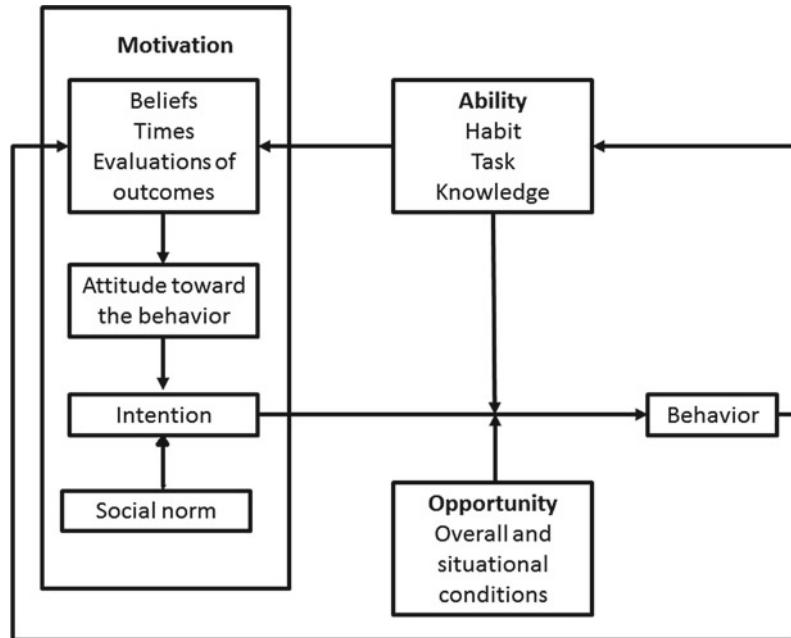
6.3.2 The Motivation-Opportunity-Abilities Model

The Theory of Planned Behavior emphasizes environmental attitudes, subjective norms, and perceived behavioral control. Another type of integration model is the “Motivation-Opportunity-Abilities” (MOA) model proposed by Ölander and Thøgersen (1995). The important structural feature of the MOA model is to integrate motivation, habits, and background factors into a single model of pro-environmental behavior. Because environmental protection behaviors are mainly habitual behaviors, they are not necessarily conscious behaviors based on conscious decisions.

Ölander and Thøgersen (1995) point out that the improvement of behavioral ability can be predicted by combining the concept of capability to strengthen conditions and transforming behavior into a model through opportunity (Fig. 6.6). In the model, in addition to the behavioral environmental attitude, subjective norms, and perceived behavioral control are the contents of the original model of planned behavior theory, the MOA model adds the following:

- (1) **Motivation:** As each person’s value system is different, personal needs and desires may

Fig. 6.6 Motivation-opportunity-ability theory (Modified after Ölander and Thøgersen 1995; Thøgersen 2009; Illustrated by Wei-Ta Fang)



affect their behavior in some way. The so-called motivation is the motivation of behavior. Motivation is a prerequisite for generating incentives and rewards through behavior types and behavior outcomes that are beneficial to the environment. Because of praise or other encouragement, human beings can encourage pro-environmental behaviors based on rewards. For example, motivational rewards can be as simple as volunteers' efforts to promote environmental education and gain recognition from the general public.

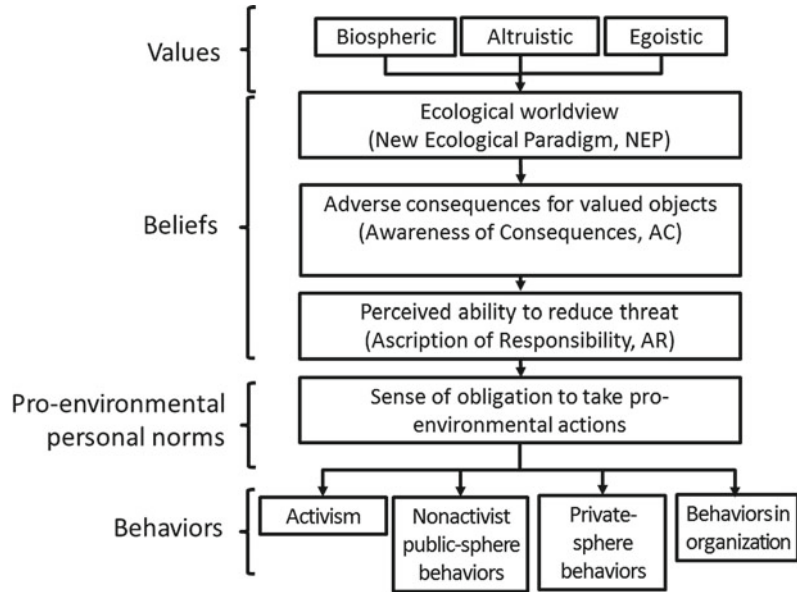
- (2) **Opportunity:** Opportunity is a limitation of the availability of time and resources. The opportunity composition of the MOA model belongs to the "objective prerequisites for environmental behavior." This model also has some similarities with the concept of perception in planned behavior theory. Often, we look for opportunities to accomplish a task that will benefit us or others.
- (3) **Ability:** Ability is a strength of a person's cognitive, emotional, technical, or social resources that can be used to perform specific actions. The concept of competence

regarding to ability should include knowledge, habits, and tasks. Among them, habit is an independent behavior, and it is also one of the main items that determine the intention of the environment.

6.3.3 The Value-Belief-Norm Theory

The Value-Belief-Norm theory (VBN) is the development of decision theory by Stern et al. (1999, 2000) improved communication between stakeholder groups by establishing consensus on important behaviors affecting the environment (Stern et al. 1999; Stern 2000). The main structure is through the individual variables linked by the causal chain, he developed the VBN theory (Fig. 6.7), which is connected by the causal chain of five variables: values, ecological world view, awareness of consequences, ascription of responsibility, pro-environmental personal norms, and pro-environmental behaviors. Each chain directly affects the next variable, and each variable may also indirectly affect the next variable. Values affect beliefs, beliefs affect personal norms, and personal norms affect pro-

Fig. 6.7 Value-Belief-normative theory (Modified after Stern 2000: 412; Illustrated by Wei-Ta Fang)



environmental behaviors. Values are divided into ecological values, altruistic values, and biosphere values; beliefs are derived from the ecological world view, human's awareness of the consequences of the adverse environment, and the ascription of responsibilities, so that people believe that their actions can slow the negative factors of the environment; the previous factors affect personal norms. Personal norms are the only variables that affect environmental behavior. Environmental behaviors include activism, non-activist public-sphere behaviors in the public domain, behavior in the private sphere, and behavior within the organization, as described below (Fig. 6.7):

(1) **Ecological Worldview:** This is a world view of sustainable development. Its purpose is not to maintain the status quo, but to strengthen the health, adaptability, and evolution potential of a fully integrated global social ecosystem. The ecological worldview is a kind of self-regeneration, thus creating conditions for the prosperity and rich future of the ecological environment, including the integrity of the ecological environment, social relations, and the

transformative nature of the economy. These models can strengthen the ecological environment of regeneration and sustainability.

- (2) **Awareness of Consequences (AC):** awareness of the impact of environmental issues (Hansla et al. 2008; Fang et al. 2019).
- (3) **Ascription of Responsibility (AR):** The attribution of responsibility is the reason for the occurrence of environmental problems, summarize their causes, and bear the negative facts that need to be assumed, attributed, dealt with, or controlled by the environment. This is the environmental importance influence factors in behavior (Hines et al. 1986/1987; Kaiser et al. 1999; Fang et al. 2019; Chao et al. 2021).
- (4) **Pro-environmental Personal Norms:** Personal norms are often discussed with morality (De Groot and Steg 2009; Fang et al. 2019; 2021a), and are also regarded as a concept of self-value extension. Personal norms are simply the recognition of obligations and morals, and are considered to be a self-disciplined consciousness that may be related to the generation of environmental behavior.

- (5) **Activism:** committed environmental activities and actively participate in environmental organizations.
- (6) **Non-activist Public-sphere Behaviors:** Support or accept public policies is like the willingness to pay higher environmental protection tax. Non-aggressive behavior in the public domain affects public policy and may have a significant impact on the environment, as it can immediately change the behavior of many people or organizations,
- (7) **Private-sphere Behaviors:** The purchase, use, and disposal of personal and household products that have an impact on the environment will have direct environmental consequences, but the effects will be small.
- (8) **Behaviors in Organizational:** Individuals may significantly influence the goodness of the environment by, for example, affecting the behavior of their affiliated organizations. For example, developers may use or ignore environmental standards in their development decision-making process, and may do so because of right or wrong things. Make decisions to reduce or increase pollution from commercial buildings. Organizational behavior is the largest direct source of many environmental problems.

The Value-Belief-Normative theory uses intent-oriented definitions that focus on human beliefs and motivations in order to understand and change target behaviors. Value-Belief-Normative theory provides a description of the reasons for the general tendency to environmental behavior. Environmental behavior depends on a wide range of contingencies; therefore, Stern (2000) argued that the general theory of environmentalism may not be very useful for changing specific behaviors. Because different kinds of environmental behaviors have different reasons, and their causal factors for causality may be very different between behaviors and individuals, each target behavior should be theoretically separated. If the above causality affects each other, attitude reasons have the greatest predictive value for individual behaviors from different backgrounds. However, for more

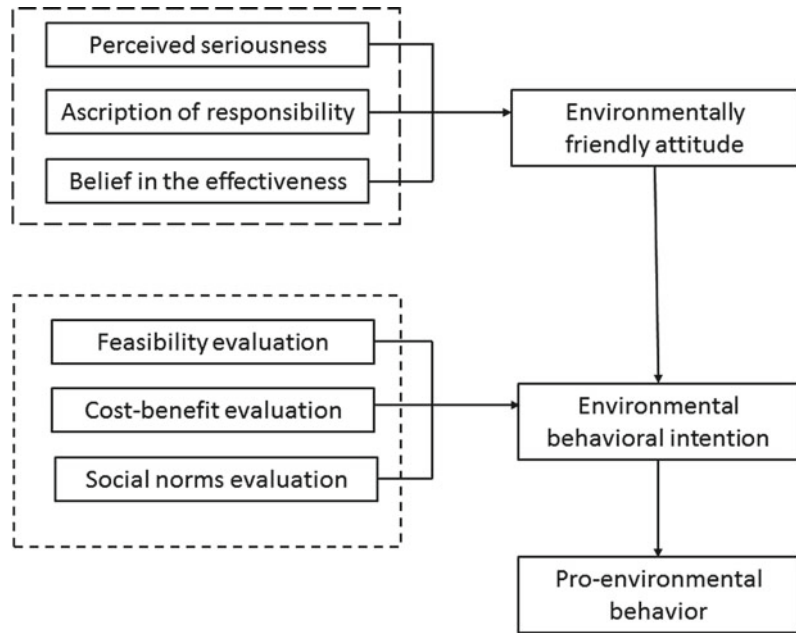
difficult environmental protection behaviors, environmental factors and personal capabilities may cause more variation. Although VBN theory is concerned with explaining the reasons for environmental behaviors, VBN theory cannot explain all behaviors. He also suggests that future research can identify important behaviors and discuss the factors that affect them (Stern 2000).

6.3.4 Two-Phase Decision-Making Model

Hirose (1994) considered the process of forming behaviors and proposed that pro-environmental behavior can be explained by a two-phase decision-making model (Fig. 6.8). The first phase involves the formation of environmentally friendly attitudes and the second involves various behavioral assessments to determine environmental behavioral intention that will directly or indirectly influence the pro-environmental behaviors. An environmentally friendly attitude refers to “the intent to solve an environmental problem or make a contribution” that supports ecofriendly behavior that is accompanied by a degree of respect for the environment and express concern for ecological issues. It involves three factors:

- (1) **Perceived Seriousness:** This represents the perception of the consequences of environmental problems (Chao et al. 2021). The perceived seriousness emphasizes the perception of environmental risk, the severity of environmental pollution, the likelihood of occurrence, and the perceptions and expectations of the likelihood of occurrence of the environmental problem and the severity of the problem. However, individuals may feel that their power is insignificant despite the impact they have on larger-scale problems.
- (2) **Ascription of Responsibility:** Ascription of responsibility refers to the recognition of the cause of responsibility (Fang et al. 2019, 2021b; Chao et al. 2021), that is, the perception of responsibility. Specifically, who or what causes environmental pollution and damage.

Fig. 6.8 The two-phase decision-making model (Modified after Hirose 1994; Illustrated by Wei-Ta Fang)



Although it is easy to attribute the cause of complex environmental issues to natural phenomena, residents often place the blame on themselves and therefore different actions can be taken to solve environmental problems depending on the responsibility involved.

- (3) **Belief in the Effectiveness:** This is the recognition of validity of a counter measurement to solve the environmental problem. For instance, a sense of effectiveness can arise if one considers the environmental problem to be solvable by an individual and/or collective efforts of other people. In contrast, if one feels that there will be limited or no effect on addressing the environmental problem regardless of the commitments and efforts put in, then a sense of effectiveness will not substantiate.
- (4) **Feasibility Evaluation:** The non-economic factors that are considered when determining if it is practicable to adopt a pro-environmental action. It also helps to assess whether individuals can engage in pro-environmental behaviors when opportunities arise externally and internally.
- (5) **Cost-Benefit Evaluation:** This type of evaluation assesses the benefits of adopting pro-environmental actions and the costs involved. The main evaluation criteria for comparing the two are the personal benefit and cost evaluation, such as convenience and comfort. If the reduction in personal benefits and the increase in costs of taking pro-environmental actions are significant, then no action is taken and vice versa.
- (6) **Social Norm Evaluation:** The assessment of whether an individual's behavior conforms to the norms and expectations of an organization or society. In the theory of planned behavior, social norm evaluation corresponds to the subjective norm, so the two-phase decision-making model derived from the theory of planned behavior also uses the subjective norm as an assessment item.
- (7) **Environmental Behavioral Intention:** This refers to the extent to which individuals are willing to consider taking appropriate actions to protect the environment, and this is directly linked to the formation of the target "pro-environmental behavior."

Chao et al. (2021) revised the application of the two-phase decision-making model to include the variables of social needs to explain citizen

science engagement behaviors. The three influencing variables of social needs were social networks, learning and growth, and belonging and contribution. The results indicated that both the development of an environmentally friendly attitude in the first phase and the series of behavioral assessments generated in the second phase were influenced by the social needs. Therefore, a two-phase decision-making model was developed to incorporate the variables of social needs was proposed (Fig. 6.9). There was evidence from Chao et al. (2021) to indicate the occurrence and effects of social networks and needs in the two-phase decision-making model. Thus, the two-phase decision-making model that incorporated the key variables (i.e., social networks, learning and growth, and belonging and contribution) of social needs had provided a more comprehensive understanding about the citizen science participation behaviors.

warming are based on symbols of this era. Some people insist on an early worldview and refuse to deal with the reality that our environment is changing. However, whether this an issue of young people that are environmentally conscious of a younger generation versus that of an older generation needs to be further assessed.

6.4 Paradigm Shift

Environmental protection has been underway for over 60 years and although we’ve made great strides on environmental issues, environmental pollution, reduced biodiversity, and global

6.4.1 Dominant Social Paradigm

Dominant Social Paradigms advocate economic growth, but its popularity in the policy world is relatively short lived (Fang 2020: 12). In 1940, Western governments used gross domestic production to measure economic growth and to support employment goals. In 1950, economic growth became the focus of government policy. This “growth” is currently a goal supported by the Organization for Economic Cooperation and Development. The Dominant Social Paradigm (DSP), however, is too optimistic about social development regarding to concern for environmental quality (Dunlap and Liere 1984). In order to solve environmental pollution, a mainstream person proposes to improve the efficiency of resource utilization through technological improvement and sustainable communication

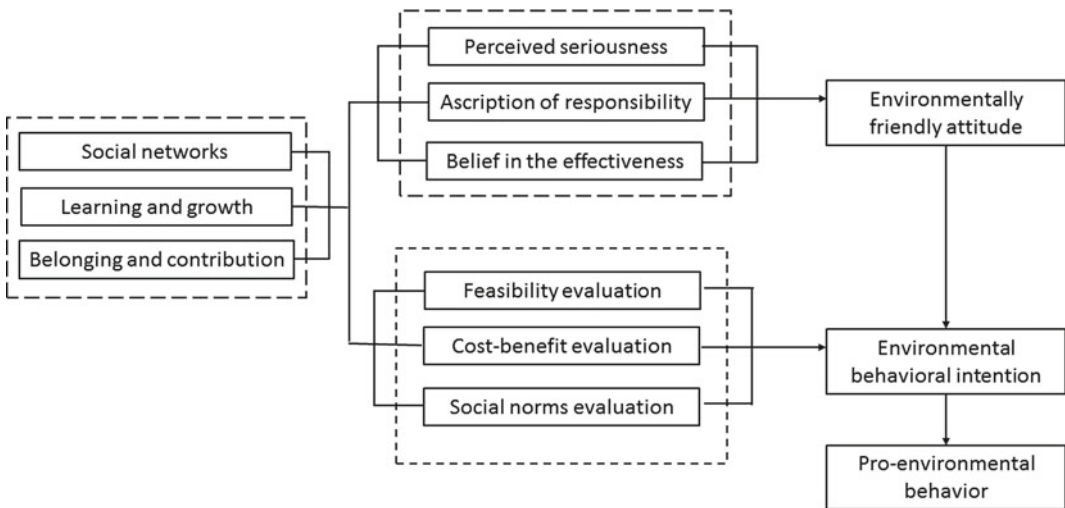


Fig. 6.9 Extended two-phase decision-making model with social needs (Modified after Chao et al. 2021; Illustrated by Wei-Ta Fang)

(Kilbourne 2004), but the consumption of unit resources will produce more products. Therefore, most people believe that the mass production of goods will reduce energy consumption and achieve energy saving and reduction of unit goods. DSP defines the basic belief structures and practices of marketplace actors and is manifested in existing exchange structures (Gollhofer and Schouten 2017). Now, of course, it is also possible to reduce the waste discharge per unit resource and increase the recycling rate, which can also have a slowing effect. The paradigm of mainstream society emphasizes the following characteristics:

- (1) Human beings are different from the creatures they control.
- (2) Human beings are the masters of their own destiny; they can choose their goals and learn to achieve them.
- (3) The world is vast and offers unlimited opportunities for humankind.
- (4) Human history is progressive, and every problem can be solved, so progresses endless.

Due to the instruction of DSP, technologies developed in many fields have harmed the environment. For example, the large-scale promotion of fuel-efficient cars has actually increased the total mileage of human beings, but has caused the total amount of fuel consumption to rise, resulting in more carbon emissions. However, more and more people are beginning to realize that economic growth cannot solve all problems in society. The idea of the DSP formed the Jevons paradox (Ruzzenenti et al. 2019). This is because the mainstream person's dependence on science and technology has led to the misconception that science can solve all problems. However, the new ecological paradigm is to solve environmental problems and consider what actions to take effectively. However, it still has its limitations, and we must continue to transfer paradigms.

6.4.2 New Ecological Paradigm

When people raise their living standards, population growth will slow down and fertility will decline (Day and Dowrick 2004). The current global economic challenge is how to use the earth's resources economically. With rates of fertility declining in every region of the world (Connelly 2003), it is now possible to begin to see the end of the *limit population growth by order*. For example, adopting the one-child policy in mainland China from historical judge (Feng et al. 2013), does not play a sustainable role from social consequences (Cai and Feng 2021). The increasing proportion of elderly in China is producing social pressures (Zhang and Goza 2006). Who will care for the elderly in China?

Of course, the idea of the Garden of Eden is a myth (Delumeau 2000); mankind will never return to the original state of nature. When we are getting old, we may not remember same enchanting natural world where it was, but located this time on our side of death, is described as the kingdom of heaven, does urge the age in our turns while we should be getting old.

We need to explain the issues and take action to protect high-quality air, water, soil, sunlight, and biodiversity from all generations. We believed that the elderly people will manifest a higher level of endorsement of the New Ecological Paradigm (NEP) (Costache and Sencovici 2019). However, the NEP scale could be limited with respect to the anachronistic wording of items (Lalonde and Jackson 2002). Some questions of the New Ecological Paradigm (NEP) could be starting to get into some very complicated, ethical issues that readers will believe we may support or refute. Some wording of items could be hard to capture people's increasingly thorough understanding of the nature, severity, and scope of environmental problems (Lalonde and Jackson 2002). Hawcroft and Milfont (2010: 143) have documented this kind of abuse among previous studies using the NEP

scale (Dunlap et al. 2000; Cruz and Manata 2020). We may also claim to explain this relatively new focus with a meaningful construct toward **sustainability paradigm**, including increasingly more pervasive and global environmental issues, changing societal expectations, and educational reform (Hart 2013).

6.4.3 Sustainability Paradigm

Fifty years after the birth of neoliberal economic policies, the debate over how to properly address global environmental issues continues. It is worth noting that, as of now, the proponents of the Dominant Social Paradigm (DSP) and the New Ecological Paradigm (NEP) have each held their own words. Our goal is to guide on dialogue and action on environmental issues. We try to achieve sustainable development through environmental education, communication, and advocacy as a **Sustainability Paradigm** (see Fig. 6.10).

6.5 Summary

Global climate change (GCC) represents a world-historical opportunity for the emergence of a common global society (Broadbent et al. 2016), with failure to do so likely to bring intensifying calamities for all economic developed and/or emerging economics. This is the time represented a global field to discuss our modelling for some choices in certain ways of media discourse

(Broadbent et al. 2016). To prevent a global extinction crisis and achieve a sustainable society requires rethinking our social values. Environmental education can help learners understand the connections of living environments during a pandemic, become creative problem solvers and active environmental citizens associated with climate governance (Chen and Lee 2020) to participate in shaping a common future (Fig. 6.11). Therefore, experiential learning and critical pedagogy will provide learners with opportunities for transformative and sustainable development. While we create a worldwide community of critical thinking, we may try to remember how relative to other forms of teaching, generated by critical educational research. We will engage in critical pedagogy in diverse and creative ways and in different settings (Kincheloe 2008). Environmental education is a modern education paradigm that inspires civic responsibility, constructs a positive social status, and promotes a healthy lifestyle. Therefore, we are not convincing all environmental ethics from rigid lessons, but we tried to apply modelling from ethical theories to behave humans' capacities to follow pedagogy's notion of praxis—informed action from practical knowledge. This required to be gained through learning anything adopting by day-to-day hands-on experiences from personal theories. We may encourage that you may learn skills of “knowing-how” in all empirical condition from your effective motivation. In this praxis-based context, we gain the ability to change ourselves relative to other forms of teaching and learning.

Fig. 6.10 A paradigm returning from functional paradigm toward interpretive paradigm (Illustrated by Wei-Ta Fang)

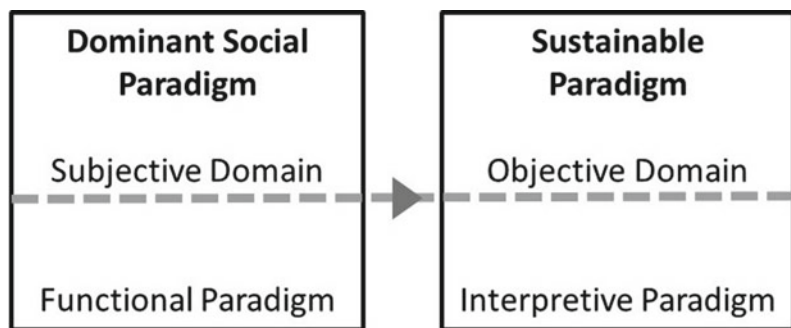




Fig. 6.11 Environmental education can help learners understand the connections of living environments (Qixingtan Beach, Hualien, Taiwan, 2019) (Photo by Dennis Woo)

References

- Ajzen I (1985) From intentions to actions: a theory of planned behavior. In: Kuhl J, Beckmann J (eds) *Action control: from cognition to behavior*. Springer, Berlin Heidelberg, pp 11–39
- Ajzen I (1991) The theory of planned behavior. *Organ Behav Hum Decis Proc* 50(2):179–211
- Ajzen I, Manstead AS (2007) Changing health-related behaviours: an approach based on the theory of planned behaviour. In: *The scope of social psychology*. Psychology Press, pp 55–76
- Bamberg S (2003) How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. *J Environ Psychol* 23(1):21–32
- Bamberg S, Möser G (2007) Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour. *J Environ Psychol* 27(1):14–25
- Bamberg S, Hunecke M, Blöbaum A (2007) Social context, personal norms and the use of public transportation: Two field studies. *J Environ Psychol* 27(3):190–203
- Barnhill DL, Gottlieb RS (eds) (2010) *Deep ecology and world religions: new essays on sacred ground*. SUNY Press, New York
- Barrett NF (2011) Wuwei and flow: comparative reflections on spirituality, transcendence, and skill in the Zhuangzi. *Philosophy East and West* 61(4):679–706
- Bellah RN (1983) The ethical aims of social inquiry. In: Haan N, Bellah RN, Rabinow P, Sullivan WM (eds) *Social science as moral inquiry*. Columbia University Press, New York, pp 360–382
- Bennett M (2004) Different shades of green. *Coll Lit* 31(3):207–212
- Borgmann A (1995) The nature of reality and the reality of nature. In: Soulé ME, Lease G (eds) *Reinventing nature*. Island, Washington DC
- Bradford G (1989) How Deep is Deep Ecology. *Times Change*, Ojai
- Bravo-Osorio (2022) Towards an ethic of ecological resilience. *Ethics, Policy Environ* <https://doi.org/10.1080/21550085.2022.2054648>
- Broadbent J, Sonnett J, Botetzagias I, Carson M, Carvalho A, Chien Y et al (2016) Conflicting climate change frames in a global field of media discourse. *Socius* 2:2378023116670660
- Burdett MS (2015) The image of God and human uniqueness: challenges from the biological and information sciences. *Exposit times* 127(1):3–10
- Burke E (1790) Reflections on the revolution in France and on the proceedings in certain societies in London relative to that event in a letter intended to have been sent to a gentleman in Paris. <https://socialsciences.mcmaster.ca/econ/ugcm/3113/burke/revfrance.pdf>
- Cai Y, Feng W (2021) The social and sociological consequences of China's one-child policy. *Ann Rev Sociol* 47:587–606
- Callicott JB (1989) *In defense of the land ethic: essays in environmental philosophy*. Suny Press, New York

- Callicott JB, Parker J, Batson J, Bell N, Brown K, Moss S (2011) The other in a sand county almanac: Aldo Leopold's animals and his wild-animal ethic. *Environ Ethics* 33(2):115–146
- Callicott JB (2005) Turning the whole soul: the educational dialectic of a sand county almanac. *Glob Relig Cult Ecol Worldv* 9(3):365–384
- Callicott JB (2010) The conceptual foundations of the land ethic. *Technol and Values: Essent Read* 438–453
- Capra F, Luisi PL (2014) *The systems view of life: a unifying vision*. Cambridge University Press, Cambridge
- Capra F (1975) *The Tao of Phys*. Shambhala, Boulder
- Carney M (2021) *Value(s): building a better world for all*. Public Affairs, New York
- Chao S-H, Jiang J, Wei K-C, Ng E, Hsu C-H, Chiang Y-T, Fang W-T (2021) Understanding pro-environmental behavior of citizen science: an exploratory study of the bird survey in Taoyuan's farm ponds project. *Sustainability* 13(9):5126. <https://doi.org/10.3390/su13095126>
- Chen RS, Lee HC (2020) Assessing climate governance of Tainan City through stakeholder networks and text mining. In: Chou K-T, Hasegawa K, Ku D, Kao S-F (eds) *Climate change governance in Asia*. Routledge, Oxfordshire, pp 256–281
- Cherdymova EI, Ukolova LI, Gribkova OV, Kabkova EP, Tararina LI, Kurbanov RA, Belyalova AM, Kudrinskaya IV (2018) Projective techniques for student environmental attitudes study. *Ekoloji* 27(106):541–546
- Connelly M (2003) Population control is history: New perspectives on the international campaign to limit population growth. *Comp Stud Soc Hist* 45(1):122–147
- Costache A, Sencovici M (2019) Age, gender and endorsement of the New Ecological Paradigm. *Int Multi Sci GeoConf: SGEM* 19(5.1):11–22
- Cruz SM, Manata B (2020) Measurement of environmental concern: a review and analysis. *Front Psychol* 11:363. <https://doi.org/10.3389/fpsyg.2020.00363>
- D'Ambrosio PJ (2022) Non-humans in the Zhuangzi: animism and anti-anthropocentrism. *Asian Philos* 32(1):1–18
- Day C, Dowrick S (2004) Ageing economics: human capital, productivity and fertility. *Agenda: J Pol Anal Reform* 11(1):3–20
- Delumeau J (2000) *History of paradise: the Garden of Eden in myth and tradition*. University of Illinois Press
- Devall B (1980) The deep ecology movement. *Nat Resour J* 20:299
- Devall B, Sessions G (1984) The development of nature resources and the integrity of nature. *Environ Eth* 6(4):293–322
- Devall B, Sessions G (1985) *Deep ecology: living as if nature mattered*. Gibbs Smith
- Disinger JF (1990) Environmental education for sustainable development? *J Environ Educ* 21:3–6
- Droz L (2021) *The concept of milieu in environmental ethics: individual responsibility within an interconnected world*. Routledge, Oxfordshire
- Dunlap RE (1975) The impact of political orientation on environmental attitude and action. *Environ Behav* 7(4):428–454
- Dunlap RE (2008) The new environmental paradigm scale: from marginality to worldwide use. *J Environ Educ* 40(1):3–18
- Dunlap RE (2022) Understanding opposition to the environmental movement: the importance of dominant American values. Edward Elgar Publishing, In *Handbook of Anti-Environmentalism*
- Dunlap RE, Van Liere KD (1978) The new environmental paradigm. *J Environ Educ* 9(4):10–19
- Dunlap RE, Van Liere KD (1984) Commitment to the dominant social paradigm and concern for environmental quality. *Soc Sci Q* 65:1013–1028
- Dunlap RE, Grieneeks JK, Rokeach M (1983) Human values and pro-environmental behavior. In: Conn WD (ed) *Energy and material resources: attitudes, values, and public policy*. Boulder, pp 145–168
- Dunlap RE, Van Liere KD, Mertig AG, Jones RE (2000) Measuring endorsement of the new ecological paradigm: a revised NEP Scale. *J Soc Issues* 56(3):425–442
- Dunlap RE, McCright AM (2015). Challenging climate change. In RE Dunlap and RJ Brulle (eds) *Climate change and society: sociological perspectives*. Oxford, Cambridge
- de Figueiredo MD, Marquesan FFS (2022) Back to the future: ecocentrism, organization studies, and the Anthropocene. *Scand J Manag* 38(2):101197
- Fang W-T, Ng E, Wang C-M, Hsu M-L (2017) Normative beliefs, attitudes, and social norms: People reduce waste as an index of social relationships when spending leisure time. *Sustainability* 9(10):1696
- Fang W-T, Chiang Y-T, Ng E, Lo J-C (2019) Using the norm activation model to predict the pro-environmental behaviors of public servants at the central and local governments in Taiwan. *Sustainability* 11(13):3712
- Fang W-T, Huang M-H, Cheng B-Y, Chiu R-J, Chiang Y-T, Hsu C-W, Ng E (2021a) Applying a comprehensive action determination model to examine the recycling behavior of Taipei city residents. *Sustainability* 13(2):490
- Fang W-T, Ng E, Liu S-M, Chiang Y-T, Chang M-C (2021b) Determinants of pro-environmental behavior among excessive smartphone usage children and moderate smartphone usage children in Taiwan. *PeerJ* 9:e11635. <https://doi.org/10.7717/peerj.11635>
- Fang W-T (2020) *Envisioning environmental literacy*. Springer Singapore, p 12
- Farida I, Permadi Y, Adelia T, Liviani N (2019) Considering all (Non) living things: a biocentric orientation in Blair Richmond's the lithia trilogy. *Lingua Cultura* 13(2):87–92
- Feliciotti A, Romice O, Porta S (2018) From system ecology to urban morphology: towards a theory of urban form resilience. In: *International Forum on Urbanism*. 2018-12-10–2018-12-12, UIC School of Architecture, Chicago

- Feng W, Cai Y, Gu B (2013) Population, policy, and politics: how will history judge China's one-child policy? *Popul Dev Rev* 38:115–129
- Fios F (2019). Building awareness of eco-centrism to protect the environment. *J Phys Conf Ser* 1402 (2):022095 (IOP Publishing, Bristol)
- Flores A, Clark TW (2001) Finding common ground in biological conservation: beyond the anthropocentric vs. biocentric controversy. *Yale Sch for Environ Stud Bull Ser* 105:241–252
- Flükiger JM (2009) The radical animal liberation movement: some reflections on its future. *J Stud Radicalism* 2(2):111–132
- De Groot JIM, Steg L (2009) Morality and prosocial behavior: the role of awareness, responsibility and norms in the norm activation model. *J Soc Psychol* 149:425–449
- Gladwin TN, Kennelly JJ, Krause TS (1995) Shifting paradigms for sustainable development: implications for management theory and research. *Acad Manag Rev* 20(4):874–907
- Gollnhofer JF, Schouten JW (2017) Complementing the dominant social paradigm with sustainability. *J Macromark* 37(2):143–152
- Gruenewald DA (2004) A foucauldian analysis of environmental education: toward the socioecological challenge of the earth charter. *Curric Inq* 34(1):71–107
- Hansla A, Gamble A, Juliusson A, Gärling T (2008) The relationships between awareness of consequences, environmental concern, and value orientations. *J Environ Psychol* 28(1):1–9
- Hart P (2013) Environmental education. In: *Handbook of research on science education*. Routledge, pp 703–740
- Hawcroft LJ, Milfont TL (2010) The use (and abuse) of the new environmental paradigm scale over the last 30 years: a meta-analysis. *J Environ Psychol* 30:143–158
- Hernández B, Martín AM, Ruiz C, Hidalgo MdC (2010) The role of place identity and place attachment in breaking environmental protection laws. *J Environ Psychol* 30(3):281–288
- Hines JM, Hungerford HR, Tomera AN (1986/87) Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *J Environ Educ* 18(2):1–8
- Hirose Y (1994) Determinants of environmental conscious behavior. *Jap J Soc Psychol* 10(1):44–55
- Huang Y (2010) Confucius and Mencius on the motivation to be moral. *Philos East and West* 65–87
- Hung C-M, Hung H-Y, Yeh C-F, Fu Y-Q, Chen D, Lei F et al (2014) Species delimitation in the Chinese bamboo partridge *Bambusicola thoracica* (Phasianidae; Aves). *Zoolog Scr* 43(6):562–575
- Hurka T (1996) *Perfectionism*. Oxford University Press, Oxford
- Johns D (1992) The practical relevance of deep ecology. *Wild Earth* 2:62–68
- Kaiser FG, Wolfing S, Fuhrer U (1999) Environmental attitude and ecological behaviour. *J Environ Psychol* 19:1–19
- Katz E (1987) Searching for intrinsic value: pragmatism and despair in environmental ethics. *Environ Ethics* 9 (3):231–241
- Kerckhoff LV, Lebel L (2006) Linking knowledge and action for sustainable development. *Annu Rev Environ Resour* 31:445–477
- Kilbourne WE (2004) Sustainable communication and the dominant social paradigm: can they be integrated? *Mark Theory* 4(3):187–208
- Kilbourne WE (2006) The role of the dominant social paradigm in the quality of life/environmental interface. *Appl Res Qual Life* 1(1):39–61
- Kilner JF (2015) *Dignity and destiny: Humanity in the image of God*. Eerdmans Publishing, Grand Rapids, Wm. B
- Kim T (2009) Reading Zhuangzi eco-philosophically. *J Daoist Stud* 2(2):1–31
- Kincheloe JL (2008) *Critical pedagogy primer*, vol 1. Peter Lang
- Kollmuss A, Agyeman J (2002) Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ Educ Res* 8 (3):239–260
- Kopnina H, Cherniak B (2015) Cultivating a value for non-human interests through the convergence of animal welfare, animal rights, and deep ecology in environmental education. *Educ Sci* 5(4):363–379
- Kopnina H, Gjerris M (2015) Are some animals more equal than others? Animal rights and deep ecology in environmental education. *Can J Environ Educ* 20:108–122
- Kopnina H, Washington H, Gray J, Taylor B (2018) The 'future of conservation' debate: defending ecocentrism and the nature needs half movement. *Biol Cons* 217:140–148
- Kornai J (2002) The system paradigm. *Voprosy Ekonomiki* 4. <https://ideas.repec.org/a/nos/voprec/2002-4-1.html>
- Kuhlmann W (1996) Making the law more ecocentric: responding to leopard and conservation biology. *Duke Envtl Pol'y f* 7:133
- Lalonde R, Jackson EL (2002) The new environmental paradigm scale: has it outlived its usefulness? *J Environ Educ* 33(4):28–36
- Lau DC (2004) *Mencius*. Penguin UK, London
- Lee JH (2007) What is it like to be a butterfly? A philosophical interpretation of Zhuangzi's butterfly dream. *Asian Phil* 17(2):185–202
- Leopold A (1949) *A sand county almanac*. Oxford University Press, Oxford
- Liu S, Chiang Y-T, Tseng C-C, Ng E, Yeh G-L, Fang W-T (2018) The theory of planned behavior to predict protective behavioral intentions against PM2.5 in parents of young children from urban and rural Beijing, China. *Int J Environ Res Publ Health* 15 (10):2215
- Machlis GE, Force JE, Burch WR Jr (1997) The human ecosystem part I: the human ecosystem as an organizing concept in ecosystem management. *Soc Nat Resour* 10(4):347–367

- Madin JS, O'Donnell MJ, Connolly SR (2008) Climate-mediated mechanical changes to post-disturbance coral assemblages. *Biol Lett* 4(5):490–493
- Marcinkowski T, Reid A (2019) Reviews of research on the attitude–behavior relationship and their implications for future environmental education research. *Environ Educ Res* 25(4):459–471
- Mazzucato M (2020) *The value of everything*. Public Affairs, New York
- McElroy M (2002) *Deep knowledge management and sustainability*. Centre for Sustainable Innovation. Retrieved on April 30, 2022. Center for Sustainable Innovation (www.sustainableinnovation.org)
- McKenzie-Mohr D (2011) *Fostering Sustainable Behavior: an introduction to community-based social marketing*. New Society Publishers
- McLaughlin A (1993) *Regarding nature: industrialism and deep ecology*. Suny Press, New York
- Mersereau MR (2016) *The abiotic Internet: internet mediation through organizational practice at Na-Me-Res*. University of Toronto, Toronto
- Moeller HG (2015) Paradoxes of health and power in the Zhuangzi. *New Vis Zhuangzi* 70–81
- Möller HG (1999). Zhuangzi's "Dream of the Butterfly": a daoist interpretation. *Phil East and West* 439–450
- Næss A (1973) The shallow and the deep, long-range ecology movement: a summary. *Inquiry* 16(1–4):95–100
- Næss A (1984) A defence of the deep ecology movement. *Environ Ethics* 6(3):265–270
- Næss A (1986) The deep ecological movement: some philosophical aspect. *Philos Inq* 8:10–31
- Næss A (1987) Self-realization: an ecological approach to being in the world. *Trumpeter* 4(3):35–42
- Næss A (1989) *Ecology, community, and lifestyle*. Cambridge University Press, Cambridge
- Næss A (1985a) Identification as a source of deep ecological attitudes. In: *Deep ecology*. In: Tobias M (ed) *Avant books*, San Diego, pp 256–270
- Næss A (1985b) *Ecosophy T: deep versus shallow ecology*. In: Pojman (ed) *Environ Ethics*, pp 151–153
- Næss A (1995) Self-realization. An ecological approach to being in the world. In: Sessions G (ed) *Deep ecology for the twenty-first century Shambhala*, Boston, pp 225–239
- Næss A (2011) The deep ecological movement: Some philosophical aspects. In: Bhaskar R, Næss P, KG Høyer (eds) *Ecophilosophy in a world of crisis; critical realism and the Nordic Contributions*. Routledge, Oxfordshire, pp 96–110
- Noll S (2017) Climate induced migration: a pragmatic strategy for wildlife conservation on farmland. *Pragmatism Today* 8(2):24–40
- Nyrud AQ, Roos A, Sande JB (2008) Residential bioenergy heating: a study of consumer perceptions of improved woodstoves. *Energy Policy* 36(8):3169–3176
- Ölander F, Thøgersen J (1995) Understanding of consumer behavior as a prerequisite for environmental protection. *J Consum Policy* 18(4):345–385
- Orton D (1996) Left biocentrism. *Green Web* 49:1–10
- Parkes G (2013) Zhuangzi and Nietzsche on the human and nature. *Environ Philos* 10(1):1–24
- Pepper D (2002) *Eco-socialism: from deep ecology to social justice*. Routledge, Oxfordshire
- Piccolo J, Washington H, Kopnina H, Taylor B (2018) Why conservation scientists should re-embrace their ecocentric roots. *Conserv Biol* 32(4):959–961
- Pienaar EF, Lew DK, Wallmo K (2013) Are environmental attitudes influenced by survey context? An investigation of the context dependency of the New Ecological Paradigm (NEP) Scale. *Soc Sci Res* 42(6):1542–1554
- Pirages DC, Ehrlich PR (1974) *Ark II: social response to environmental imperatives*. Freeman, San Francisco
- Regan T (1980) Utilitarianism, vegetarianism, and animal rights. *Philos Public Aff* 9(4):305–324
- Regan T (1983) *The case for animal rights*. University of California Press
- Rolston H III (1975) Is there an ecological ethic? *Ethics* 85(2):93–109
- Rowe JS (1994b) *Ecocentrism and traditional ecological knowledge*. http://www.ecospherics.net/pages/Ro993tek_1.html
- Ruzzenenti F, Font Vivanco D, Galvin R, Sorrell S, Wagner A, Walnum HJ (2019) The rebound effect and the Jevons' paradox: beyond the conventional wisdom. *Front Energy Res* 90 <https://doi.org/10.3389/fenrg.2019.00090>
- Salleh A (2022) *An ecocentric epistemology for ecosocialism*. the routledge handbook on ecosocialism. Routledge, Oxfordshire, pp 57–66
- Sandler R (2012) *Intrinsic value. Ecology, and conservation*. *Nat Educ Knowl* 3(10):4
- Sapolsky RM (2017) *Behave: the biology of humans at our best and worst*. Penguin
- Schwartz B (1987) *The battle for human nature: science, Morality and Modern Life*. WW Norton & Company, New York
- Sessions G (1987) The deep ecology movement: a review. *Environ Rev* 11(2):105–125
- Shrivastava P (2008) Corporate citizenship and the environment. *Handb Res Glob Corp Citizensh*, 166–184
- Singer P (1975) *Animal Liberation*. HarperCollins
- Singer P (1997) Neither human nor natural: ethics and feral animals. *Reprod Fertil Dev* 9(1):157–162
- Sorokoumova EA, Cherdymova EI (2021) Developing structural components of ecological consciousness to promote civic identity formation. *Psychol Sci Educ* 26(1):102–112
- Sterba JP (1995) From biocentric individualism to biocentric pluralism. *Environ Ethics* 17(2):191–207
- Sterba JP (1998) A biocentrist strikes back. *Environ Ethics* 20(4):361–376
- Stern P (2000) Toward a coherent theory of environmentally significant behavior. *J Soc Issues* 56(3):407–424
- Stern PC, Dietz T, Abel TD, Guagnano GA, Kalof L (1999) A value-belief-norm theory of support for social movements: the case of environmentalism. *Hum Ecol Rev* 6(2):81–97

- Steverson BK (1991) A critique of ecocentric environmental ethics, Doctoral dissertation, Tulane University
- Taylor C (2010) Aristotle. In: Skorupski J (ed) *The routledge companion to ethics*. Routledge, Oxfordshire, pp 67–77
- Tete F, Ariche CK (2021) Virtue ethics as philosophical foundation for environmental education. *GNOSI: An Interdisc J Human Theo Praxis* 4(1(May)):83–90
- Thøgersen J (2006) Norms for environmentally responsible behaviour: an extended taxonomy. *J Environ Psychol* 26(4):247–261
- Thøgersen J (2009) Promoting public transport as a subscription service: effects of a free month travel card. *Transp Policy* 16(6):335–343
- Vilka L (2021) *The intrinsic value of nature*. Brill, Leiden
- Washington W, Taylor B, Kopnina HN, Cryer P, Piccolo JJ (2017) Why ecocentrism is the key pathway to sustainability. *Ecolog Citizen* 1(1):35–41
- Washington H, Chapron G, Kopnina H, Curry P, Gray J, Piccolo JJ (2018) Foregrounding ecojustice in conservation. *Biol Cons* 228:367–374
- Wenzel CH (2003) Ethics and zhuangzi: awareness, freedom, and autonomy. *J Chin Philos* 30(1):115–126
- Woo S-K, LePage B, Chiang Y-T, Fang W-T (2022). Predicting the protective behavioral intentions for parents with young children that possess different levels of education in Hong Kong using the theory of planned behavior for air polluted with PM2.5. *BMC Public Health* 22(1):1–11
- Zhang Y, Goza FW (2006) Who will care for the elderly in China? A review of the problems caused by China's one-child policy and their potential solutions. *J Aging Stud* 20(2):151–164
- Zimmerman ME (2020) *Contesting earth's future*. University of California Press, Oakland, *Contesting Earth's Future*

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