

# A Model Of Asian Elephant Conservation Based On Environmental Education In Thailand

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## Abstract

The aim of this research is to initiate a model of Asian elephant conservation through environmental education in Thailand. Combined qualitative and quantitative research methods including research surveys, in-depth interviews, and small group discussions were used to analyze the current situation regarding environmental perception, knowledge, knowledge management, expectation, and included SWOT analysis of Asian elephant conservation in Thailand. Research and Development (R&D) was later used to synthesize the model of Asian elephant conservation based on environmental education in Thailand, together with Action Research (AR) used to assess the research innovation efficiency by means of operational training for 50 participants at the Thai Elephant Conservation Centre, (TECC), Pak Chong District in Nakhon Ratchasima Province, Thailand. The research findings resulted in a model of Asian elephant conservation based on environmental education in Thailand. This model is comprised of 7 factors including (1) Systematic knowledge about Asian elephants; (2) Environmental literacy; (3) Individual behavior; (4) Participation in action; (5) Public interpretation; (6) Individual and community management, and (7) Monitoring and evaluation. Having assessed the innovation quality, the researcher evaluated its efficiency through the post-evaluation score with a statistically significant difference of 0.05 higher than the pre-evaluation score.

**Keywords:** Environmental education, Asian Elephant, Elephant Conservation

## Introduction

Global society has presently played a significant role in the conservation and protection of domestic and wild elephants. The International Union for Conservation of Nature (IUCN) has put elephants on the red list of threatened species, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has also listed elephant ivory and products under no trading, with international sanction measures enforced among 180 countries around the world.

The elevated level of elephant conservation by IUCN and CITES has resulted in the ongoing establishment of numerous organizations with specific goals to educate and protect elephants. However, the related organizations, or specific units, responsible for protecting elephants in such endangered incidents among each country are not sufficiently equipped with systematic educational promotion. Thus, conservation related problems continue to arise. Although their operational knowledge regarding the conservation of both African and Asian elephants had

surfaced, those organizations tend to be located far from elephant habitats. This situation prevents people in the communities from accessing the knowledge, which in turn negatively impacts increased awareness and perception of elephant conservation. This causes various limitations to elephant conservation, for instance, the lack of global standardization to protect elephants as the Super Keystone Species, social disparity which allows affluent elites to adorn themselves with lavish elephant products, as well as the decline in habitat or fragmented habitats which causes the reduced population of elephants. (Leimgruber et al, 2003: 347-359) In addition, the reduction in elephant populations is also caused by agricultural forestation in some countries or by mega infrastructure projects such as dam or high speed rail construction.

With regard to ecological balance, the reduced wild elephant population seriously impacts environmental imbalance, which causes falling numbers of some other species within their habitats as well. Such is the reason why elephant conservation and protection is so critical. The success in elephant conservation will not only have a positive impact on elephants but will also lead to greater ecological balance among other species in the ecological area. (Shoshani & Eisenberg, 1982) However, African and Asian elephant conservation in the past has shown some following noticing public perception and participation. (1) Knowledge management; although there is some progressive implementation at present, the problem remains in that it is still limited to a small group of experts in fields directly to elephant conservation, namely government and private organizations, officers, academic technicians and researchers, ecologists, biologists, and management figures. (2) Policy making including international and national legislation in

response to the reduction of elephant populations is mostly driven by NGOs. (3) Elephant conservation and promotion plans are primarily handled by local and international bodies. (4) The main purpose of conservation focuses significantly only on wild elephants. (5) Indigenous knowledge of elephant conservation and management has not yet been driven to the international level. On the contrary, some misleading local elephant management was globally circulated such as chained-raising elephants and elephants driven on hook etc. (6) Efforts to promote and support knowledge among local bodies continues to remain fragmented, rather than through any continuing and sustained process. (7) There are no concrete outcomes to solve the human-elephant conflict in any country. (8) There are no educational measures, only legal, to solve elephant population reduction. We therefore constructed and designed a model of Asian elephant conservation based on environmental education in Thailand, in order to provide an alternative approach to effectively and sustainably conserve Asian elephants in the future.

The purpose of this research focuses on the 4 following specified objectives: 1. A situational study of perceptions, pertaining to the body of knowledge, knowledge management and expectations regarding Asian elephants in Thailand. 2. Analysis of the weaknesses and strengths of Asian elephant conservation in Thailand. 3 Synthesis of Asian elephant conservation models based on environmental education in Thailand. 4. Evaluation of the quality and efficiency of the designed innovation.

### **Literature Review**

General Information about Asian Elephants Elephants are classified as primitive proboscis, evidenced in rock strata 60 million years ago in Morocco's Sidi Chennane quarry known as Eritherium,

(Gheerbrant, 2009) Proboscidea (Illiger, 1811) the same family as the current Asian elephant. It was first studied by Linnaeus 259 years ago. He studied samples from Sri Lanka and named it *Eliphas maximus* (*Elephas maximus*), the ancestor of Elephas. It was separated from the Gompothaires in the late Miocene period. The first species were split into several genera, one of which was the *Primelephas* (Maglio, 1970) which were found in Kenya during the late Pliocene age or about 3 million years ago. They were believed to be the direct ancestor of the *Elephas* and mammoths (Maglio, 1970; 1974) Cuvier later named the Asian elephant *Elephas indicus* in 1798 (Sukuma, R., 1989: 1-2) In Scientific terms, elephants are classified as mammals. (Eltringham, S.K., 1982: 5) Their life span is around 60-70 years with the duration of reproductive age between 10-15 years. (Shoshani and Eisenberg, 1982). The current population of Asian elephants by average is around 28,000 - 42,000 with tendency to rapidly reduce. (IUCN, 1978) This is in accordance with confirmation from Olivier's study that the total population of Asian elephants is around 25,000-36,000. (Olivier, 1978) In Thailand, the current elephant population total is yet to be determined. However, some reports mentioned that there were about 20,000 Asian elephants at work in the Northern region of Thailand (Seidenfaden, 1967). In 1950, the domestic elephant population was reported to be around 13,397, while in 1969 the remaining number of domestic elephants was found to be around 11,022 during 1967-1971, and 245 elephants were exported (McNeely, 1975). Lekagul & McNeely, (1977b) specified that there were about 2,600-4,450 wild elephants living in various parts of Thailand; with 200-500 elephants in the Phetchabun forest, 200-350 in the South, 900-1,500 at Kra Peninsula, 400-600 in the North and 900-1,500 in the West. In 1979,

Storer estimated the number of 650-925 wild elephants in Thailand by interviewing officers in National Parks and Wild Animal Sanctuaries. (Humphrey, 1990

#### Status of Asian Elephants

IUCN declared elephants in the list of endangered species due to occurring threats from the quality of habitats and rapid reduction of elephant population through poaching. This is in accordance with the report stating that 50% of the elephant population in the world has decreased within three elephant generations spanning 60-75 years (IUCN SSC Asian Elephant Specialist Group, 1998). This is similar to the cases in the Indian Sub-continent during 1868-1990 that found that 19,000 wild elephants were hunted with the aim of being put to work. In Assam, 400 wild elephants were caught and killed per year, averaging up to 30,000-50,000 within a century. (Sukuma, 1989)

#### Habitat and Ecology

The Asian elephant habitats are located within the tropical rain forest 3,000 meters above mid sea level in the East of the Himalayan Mount of Northern India. (Choudhury, 1999) Elephants are Mega-Herbivores with seasonal migration around diversified habitats (Owen-Smith, 1988). For example, in the Southern part of India (Sukumar, 1992), during the dry season, grass constitutes 70% of food for elephants, while in the rainy season, this tends to be reduced to 55%. This is similar to Baskaran's study (2002) that found not less than 82 plant species for elephant foods were grasses.

In Thailand, about 103 plant species at Khao Yai National Park are consumed by elephants each season. (Chukaew, 2003) Elephants spend around 14-16 hours each day eating with the weight of the foods sometimes reaching up to 150 kilograms. (Vancuylenberg, 1977) Their excretion of about 100 kilograms expelled over 16-18 times a day is considered

beneficial to the propagation of plant seeds. (Williams, Tiwari, Goswami, de Silva, Kumar, Baskaran, Yoganand, & Menon, 2020). According to the study on female elephant dietary behaviors in Southern India, it was found that they travelled around 600 square kilometers for food. (Baskaran et al., 1995) In the North of India, the research findings revealed that female elephants used around 184-326 square kilometers and males around 188-407 square kilometers when looking for food. (Williams, 2002) In Sri-Lanka smaller areas of around 30-160 square kilometers, were used by female elephants and 53-345 square kilometers by males. (Fernando et al., 2005) Given such vast amount of food areas, the pseudonym "Umbrella species" has been used when referring to wild elephants to convey the meaning of the elephant conservation, which ultimately leads to plant species conservation within their habitats, as well as the "Keystone Species" which helps to maintain their habitat ecology. (Shoshani and Eisenberg, 1982; Williams, Tiwari, Goswami, de Silva, Kumar, Baskaran, Yoganand, & Menon, 2020).

#### Elephant Conservation

Elephants have been included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora as absolutely no trading except for researching or reproducing and the urgent conservation aspects such as their habitats, Human Elephant Conflict, legal improvement for elephant protection, patrolling, and protection of elephant trading. (Sukuma, 1989) However, the significant challenge of the ineffective elephant conservation remains. The threat to elephants still remains a reality, with Asian elephants being close to endangerment with African elephant populations left only in 28 countries from 35 countries. (Douglas, 1987) The decrease in elephant population

at present will lead to distinction in the short future. (Sukuma, 1989)

The concern on elephant population issues resulted in the establishment of international organizations for elephant conservation covering various aspects, ranging from enacting the law of elephant habitat protection, enforcing CITES regulations, creating the action plans for domestic and wild elephant conservation to building the elephant pathway, managing and finding solutions to solve the agricultural plant and elephant conflicts, hunting control, initiating the monitoring system for the elephant population inspection and supporting research institution. (Santiapillia & Jackson, 1988) In the future, elephant conservation should cover monitoring, evaluating and inspecting the quantity of elephant habitats, elephant movement and abundance. (Salter, 1986)

#### Human Elephant Conflict (HEC)

The conflict between humans and both African and Asian elephants largely stems from the destruction of agricultural plants caused by greater land use within elephant habitats by increasing population numbers. (Sukuma, 1989; De Silva, 1998) This ignites a serious conflict of interest between both villagers and elephants. (Eltringham, 1982) In Thailand, this will eventually result in greater severity in the future due to increased needs for agricultural farming, farmer settlement, population growth and infrastructural expansion. (Chukaew, 2003) The solutions differ from location to location for instance, the translocation, habitat enrichment, elephant population management, monitoring system of the elephant seasonal migration, herbivores population control, elephant barrier building, land uses reformation, community distancing, the establishment of the elephant management units, the dissemination of the elephant research findings, and out of natural condition elephant raising (De Silva., 1998)

### Environmental Education

Environmental education is the educational process concerning attitude, behavior and value creation on environmental and living quality development. (Weerawatananont, 2003) Environmental education instills knowledge, skills, attitude and experience as the basis of the ability to make the right decision and ability to systematically pinpoint the problems to sustain better environment. (Chankaow & Praphan 1982) However, the basic concept of environmental education is interdisciplinary (Rawang, 2020) in which the United Nations has promoted as “Education for Sustainable Development” (ESD). The environmental sustainability involves not only the physical environmental aspects, but also human intellect. This is the reason why the philosophy of the environmental education is regarded as the integration of Intellectualism, Reconstructionism as well as Connectivism. Intellectualism is considered as the conceptual-based belief that “Natural Truth can be reached by human intellectualism.” while the Reconstructionism believes that “Social changes make new approaches of human ways of life.” and the Connectivism considers that “Networking make power of action by advanced technology.” If the “**Intellectualism**” is integrated with “**Reconstructionism**” and “**Connectionism**”, it will give rise to a new concept that people are apt to find new ways of life to respond to the environmental changes. It creates an innovation that focuses on conceptual transformation of the environmental management to reciprocate the global concepts of sustainable environment.

### Research Concepts and Theories

Cognitive, Theory Chomsky believes that human learning is not only the relation of

the behaviors responding to the provocation, but it also engages the thinking process of information collecting, interpreting and forming the relationships between knowledge and solutions. As said, that “Man is not a white piece of cloth changed by what color we put in, but men have their own different thoughts, emotions, mentalities and senses, so learning design for them should also be considering individual difference.” Participatory Conservation, Cohen & Uphoff, (1981) said that the participation process concerns 4 action steps which include participating on decision making, implementation, advantage, and evaluation. System Theory, appeared first with Ludwig Von Betalanffy’s book entitled “General System Theory” which mentioned the biological system in learning how to live together and the reactions of responding with each other, this can compare to the organizations comprising variations of physical, biological, thought and operational changes. (Sa-nguannam, 2002) System Theory is comprised of 5 parts including input, process, output, outcome, and impacts. (Tanya, 2002) However, it can be applied to various dimensions as Developmental System Theory and Motivational System Theory. (Patton & McMahon, 2006) Kirkpatrick Evaluation Model, 4 steps of evaluation include (1) Reaction Evaluation, (2) Learning Evaluation, (3) Behavior Evaluation, and (4) Public Benefits Evaluation (Kirkpatrick, 2006: 21-26)

### Research Methodology

The research was conducted at Khao Yai Elephant Conservation Center, Pak Chong District, Nakhon Ratchasima Province in Thailand during 2017-2019 to design a framework or model in order to create environmental actualization to the public.

The researchers studied primary and secondary information regarding

situations on elephant conservation perception, knowledge and its management, expectations as well as an in depth analysis of weaknesses and strengths prior to synthesizing the model of Asian elephant conservation based on environmental education and evaluation of the designed model quality and efficiency by environmental experts and participants respectively.

A combination of quantitative and qualitative research methodology was used to design this research. Thus, the use of some questionnaires from 400 informants, structured interview of 8 field experts, and a small group discussion of 12 local leaders was applied to study the situations of Asian elephant conservation perception, knowledge and its management and expectation. Then, the research and development was used to synthesize a model of Asian elephant conservation based on environmental education in Thailand. Personal Information, There were 2 groups of informants participating before and after the design of the innovation. Prior to the design, the research demographics showed that most informants were Buddhists (94.50%), male (66.25%), the average age of 27.65 years old (49.75%) with Bachelor degrees (71.75%) and (50%) students. They had 0.59 year of participation on elephant conservation (83.50%), and received information from the mass media (61.00%). While after designing the innovation, the research revealed that most informants were Buddhists (98.00%) female (64.00%) age between 35-40 years old (52.00%) with Master degrees (74.00%), Business occupation (46.00%), and (8.00%) had no

experience on elephant conservation with (40.00%) received information from the mass media. The action research was applied to evaluate the model efficiency and statistically analyze the data through Percentage (%), Mean Score (MSx), Standard Deviation (S.D.), Weight Mean Score (WMS), IOC (Index of objective Congruence), and t-test.

### Research Findings

#### Situations of Asian Elephants

Situations of Asian elephants refer to the perception on knowledge, knowledge management and expectation on Asian elephant conservation in Thailand. The findings revealed that most informants showed low levels of Asian elephant knowledge ( $\bar{x} = 1.89$ ). Elephant knowledge can be classified into 20 dimensions i.e. religion, national history, biology, ecology, culture, belief and tradition, domestic elephants, confrontation between human and elephants, elephant health, wild and domestic elephant management, population, anatomy and physiology, behaviors, law, international convention, situations and heaths, communication, policy and acting, and education. However, the research revealed moderate level of some particular dimensions which included (1) Dimension of national history ( $\bar{x} = 3.16$ ), (2) Dimension of benefit and tradition ( $\bar{x} = 2.57$ ), (3) Dimension of Ecology ( $\bar{x} = 2.31$ ), (4) Dimension of Biology ( $\bar{x} = 2.11$ ), (5) Dimension of Human and Elephant Confrontation ( $\bar{x} = 2.09$ ), and (6) Dimension of Religion ( $\bar{x} = 2.08$ ) respectively.

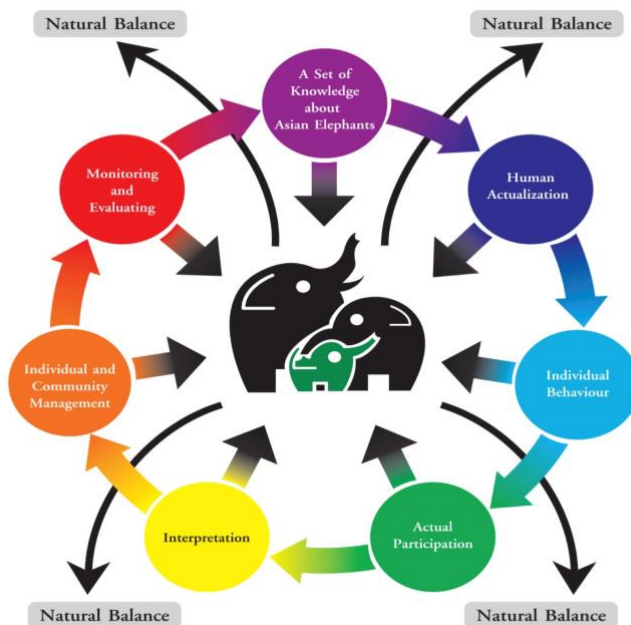
**Table 1** Perception on Asian Elephant Knowledge, Management and Expectation in Thailand (n = 400)

Items	Perception	Average
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	Very Low	Low	Moderate	High	Very High	
(1). Asian Elephant Knowledge	131 (32.75)	126 (31.50)	96 (24.00)	37 (9.25)	10 (2.50)	1.89
(2). Knowledge Management on Asian Elephant conservation	3 (0.89)	11 (2.66)	55 (13.69)	161 (40.33)	170 (43.18)	4.42
(3). Expectation on Asian Elephant conservation	3 (0.75)	12 (3.00)	73 (1.75)	143 (35.75)	169 (42.25)	4.00
<b>Average</b>	<b>(45.67)</b>	<b>49.67)</b>	<b>(74.67)</b>	<b>(113.67)</b>	<b>(116.33)</b>	<b>3.51</b>

**Table 2** Innovation Efficiency Evaluation on a Model of Asian Elephant Conservation Based Environmental Education in Thailand

Items	Before		After		Efficiency Levels
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	
<b>Internal Skills</b>					
1. Satisfaction	7.86	1.47	9.71	0.21	Very high
2. Learning	8.00	1.02	9.71	0.20	Very high
<b>External Skills</b>					
3. Behaviors	7.50	1.20	9.71	0.35	Very high
4. Public benefits	7.25	0.86	9.25	0.25	Very high
<b>Total Average</b>	<b>7.65</b>	<b>1.13</b>	<b>9.46</b>	<b>0.25</b>	<b>Very high</b>



**Figure 1:** A Model of Asian Elephants Conservation Based on Environmental Education in Thailand

Figure 1: A Model of Asian Elephants Conservation Based on Environmental Education in Thailand. The main objective of Asian elephant conservation model based on environmental education in Thailand is to improve public with environmental literacy before participating with the Asian elephant conservation. The 7 components of the innovative model are (1) Systematic Knowledge on Asian Elephants which refers to various learning dimensions e.g. elephant evolution, biology, behaviors, history and culture, religion, situations and threats, elephant management and conservation, and guideline on participation and information distribution, (2) Environmental Literacy refers to the public awareness, attitude, and systematic knowledge on environment and Asian elephants in Thailand, (3) Individual Behavior refers to environmental skill and ability to evaluate, (4) Actual Participation refers to the participatory behaviors on Asian elephant conservation based on Systematic Theory, (5) Public Interpretation refers to the dissemination of Asian elephant conservation information through various channels such as mass media, group and individuals (6) Individual and Community Management refers to the integration of environmental literacy on the Asian elephant in Thailand within the scope of individual and community responsibility to public movement, and (7) Monitoring System and Evaluation refers to the investigation on what we did to conserve the elephants in the past.

**Discussion and Conclusion**

The group discussion took 7 aspects into consideration e.g. (1) low public perception/awareness on Asian elephant conservation, (2) Various dimensions of elephant knowledge, (3) High expectations on Asian elephant conservation in Thailand,

(4) Problems related to the confrontation between human and wild elephants, (5) Weaknesses-strengths on Asian elephant conservation, (6) Components of a model of Asian elephant conservation based on environmental education in Thailand, and (7) Relationship between elephants and environmental balance

**Conclusions**

The purpose of this research aims to design a model of Asian elephant conservation based on environmental education in Thailand with a combination of both quantitative and qualitative research methodology. The situations of Asian elephant conservation perception, knowledge and its management, expectation and weakness-strength analysis were conducted by survey research, in-depth interviews and small group discussions.

Most informants were Buddhist females, ages between 21-40 years with Bachelor degrees. They had no experience in elephant conservation and revealed low perceptions of the information about the Asian elephant conservation from mass media. Some particular dimensions perceived the elephant course in the national history, culture, belief and tradition, the Human Elephant Conflict, and elephant in religion with very high level of knowledge management and expectation. While weaknesses-strengths of Asian elephant conservation found some interesting aspects which included (1) Strength: Elephants considered as the symbolic identity of Thailand and closely related to various religion; particularly, the national religion, Buddhism, (2) Weakness: Reduction of elephant population causes the reduction of participation on Asian elephant conservation, lacking of Asian elephant conservation knowledge



transferring from generation to generation, limitation of knowledge has led to low efficiency on Asian elephant conservation, low elephant conservation promotion and back support, and lack of elephants information (3) Opportunity: The world plays a significant role on environmental conservation, Influences of CITES regarding the elephant conservation in which elephants are considered an endangered species, and (4) Threat: Western society's misleading perception of the Eastern wisdoms of domestic elephant raising, Some social value distortion on elephant body parts decoration, elephant habitats degradation, and lacking of the correct understanding of the elephant conservation; particularly, the difference between wild elephants and domestic elephants.

The results of the Asian Elephant Conservation Model Based on Environmental Education in Thailand include (1) Systematic Knowledge of Asian Elephants; (2) Environmental Literacy; (3) Individual Behavior; (4) Participation in Action; (5) Public Interpretation; (6) Individual and Community Management; and (7) Monitoring system and Evaluation.

### **Recommendations**

Increasing knowledge of Asian elephants should be instilled among the public. According to the research, the informants showed very low level of the fore mentioned knowledge. Local participation on Asian elephant conservation should receive more financially support; informants have shown high expectation to conserve the elephants. Effective digital/social media should be applied in conserving elephants; as the research found high public expectations on Asian elephant conservation. There should be interdisciplinary knowledge on Asian elephant conservation in formal, non-formal and informal education curriculum

in Thailand. The government should establish a specific organization responsible for the Asian elephant conservation. Private organizations missions should focus on Asian elephant conservation in Thailand provided with sufficient academic information and provision of the modern IT technology. Innovative proposals on Asian elephant conservation projects should be publicly accepted.

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