

# Concept of Net Zero Ecotourism in Sustainable Tourism Industry Development

Kwok Tak Kit

**Abstract**—With the increase of demand and popularity of ecotourism development to address the concern of carbon emission, the acceleration of development of the concept of net zero carbon ecotourism can increase international competitiveness, sustainability and productivity. This paper aims to outline the major key components and considerations in ecotourism development with integration of net zero strategy and provide recommendation and reference to government agents, Architecture, Engineering and Construction (AEC) industry and stakeholders to contribute to the target of net zero and environmentally friendly ecotourism development project. This paper explores the alternative to the reliance on local regulation and ecotourism certification programs as a base tool to achieve the higher standard of the reduction of the use of energy and natural resources in ecotourism development and to enhance their sustainability.

**Keywords**—Net zero ecotourism, sustainability, embodied carbon, Paris Agreement.

## I. INTRODUCTION

THE Paris Agreement 2015 and the 26<sup>th</sup> United Nations Climate Change Conference (COP26) held in Glasgow in 2021 had agreed to the Glasgow Climate Pact to keep 1.5 °C.

Demand of ecotourism is increasing around the world. There are currently local regulations and rules to regulate ecotourism development and reduction of carbon emission. However, there is no specific and clear guideline for the integration of net zero requirement for ecotourism and associated enabling facilities development in different countries [12]. This paper aims to outline the major key components and considerations in net zero ecotourism development and provide recommendation and reference to government agents, AEC industry and stakeholders to contribute to the target of net zero as well as provide environmentally friendly ecotourism development project. Rather than solely relying on local regulations, reference should be made to the guideline prepared by non-profit making organizations and other internationally environmental assessment tools and ecotourism certification programs as a base tool to achieve the higher standard of minimization of the use of energy and natural resources in ecotourism development and their sustainability. Key factors and recommendations are outlined in this paper for further discussion and research.

### *Review of Traditional Tourism*

Large-scale tourism development with introduction of new high-rise hotels, infrastructure, extensive deforestation and local transportation networks construction has unavoidable

Kwok Tak Kit is with DLN Architects Limited, Hong Kong (e-mail: tkepisode@gmail.com).

adverse and irreversible impact to the natural environment, wildlife ecology and fuel consumption. [1] With the global concern in reduction of carbon emission and mitigation of greenhouse gas emission, the development of ecotourism with conservation concept is becoming the rising trend around the world.

### *Paris Agreement 2015 and Net Zero Mission*

The aim of Paris Agreement 2015 is to address current and future climate change and its possible negative impacts to the environment. The target of the agreement is to substantially reduce global greenhouse gas (GHG) emissions and limit the global temperature increase in this century to 2 °C above pre-industrial levels. In 2015-2017, parties to the agreement began submitting climate action plans known as nationally determined contributions (NDCs). Initial commitments would only be enough to slow down the warming to 3 °C. Based on the discussion in the Submit, urgent action is required to begin climate action plan in order to cut and reduce the carbon emissions and eventually reach net zero goal by 2050 [15].

### *Sustainable Tourism*

Tourism is one of the major industries in different which contribute major portion and share of the gross domestic product (GDP). The demand for sustainable tourism is increasing in recent years. The development of long-term sustainable tourism and activities required the joint effort from government authorities, communities and travel agents to maintain and manage the balance relationship between environment and tourism.

## II. DEFINITION OF ECOTOURISM

According to [9], [10], "Ecotourism is ecologically sustainable tourism focusing primarily on experiencing natural areas that foster environmental and cultural understanding, appreciation and conservation". Ecotourism development is becoming increasingly important in the growth of the economy and contribution to the economy. [9] In the past, there was a lack of international standards to guide ecotourism development. The practitioners and stakeholders can only make reference to client commercial decisions and local regulations to achieve the minimum standard of environment conservation. In fact, the environmental impact including deforestation during ecotourism development is being underestimated.

### *Sustainable Role of Ecotourism in Rural Tourism Development*

Sustainable tourism development is derived from traditional tourism and it meets the needs of tourist and host regions,

protecting and expanding the possibilities for the future [7], [8]. Rural tourism is a form of tourism related to hospitality and rest from a natural and unpolluted environment with natural resources providing attraction to tourism for leisure and exploration of natural environment. Rural place provides a leisure domestic place outside cities and tourist centers. Ecotourism is a form of tourism which motivates the tourists to observe the nature and local traditions like preservation and protection of nature, maximization of the use of local human resources and minimize the negative impact on natural environment and local culture heritage and social equilibrium [4], [5], [7], [8], [11].

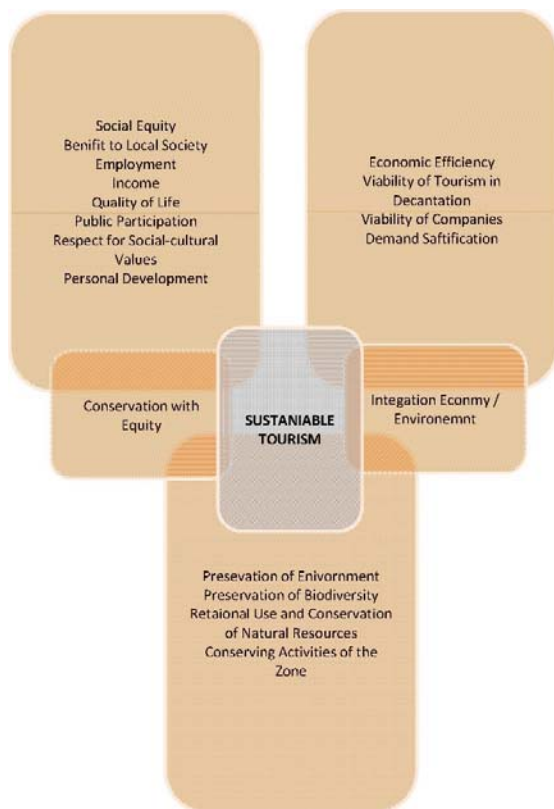


Fig. 1 Sustainable development model [10]

### Benefits of Ecotourism in Conservation

According to [1], ecotourism addresses both social and environmental goals, and it can benefit biodiversity conservation in four direct and indirect ways. (1) support for wildlife and protected areas, (2) diversified livelihoods, (3) environmental interpretation and ethics, and (4) strengthened resource management institutions.

### III. FACTORS AND STEPS TO ACHIEVE NET ZERO ECOTOURISM

The concept of net zero ecotourism is evolving and has become the trend of ecotourism development in various countries in future. [6] Certain attributes related to net zero carbon emission in net zero ecotourism development included reduction of energy demand, reduction of embodied carbon, low carbon energy and renewable energy supply, zero carbon policy, environmental assessment tools and ecotourism

certification and monitoring of energy consumption.



Fig. 2 Benefit biodiversity conservation in four direct and indirect ways

### A. Reduction of Energy Demand

The optimization of the energy efficiency of ecotourism enabling facilities and building is the major factor for decision making in the ecotourism planning stage. In the design phase, the enabling infrastructure, building and facilities associated with pre-assumption energy strategy plan have to be carefully and holistically assessed with the aim to reduce the energy consumption to a certain level which can meet the high energy performance by inclusion of sustainable architectural design, sustainable engineering and adoption of extensive renewable energy supply. AEC professionals should work together and recommend the most efficient and efficient proposal and improvement solution like form, structure, facade material, construction method and mechanical, electrical and plumbing (MEP) system to meet the target and optimize the reduction of fossil energy consumption and carbon emission.

Instead of achieving the minimum regulation standards, a performance-based assessment and methodologies should be carried out in the design stage to estimate the expected energy consumption with reference to client expectation, estimated occupancy and intended use to achieve the optimization of future operational energy consumption and provide a more accurate reflection of energy consumption.

### B. Reduction of Embodied Carbon

In the past few years, the concern of construction carbon emission during the building cycle and reducing embodied carbon is increasing in the AEC industry. In most of the ecotourism enabling building and infrastructure projects, the AEC can only rely on their own professional judgement with client commercial decisions on the selection of low upfront embodied carbon building material to minimize the impacts in the construction phase as practically as possible. Publication by the World Green Building Council recommended the target of reducing the construction-related embodied carbon by 40% by 2030 [12] which is being a latest guideline for AEC to make reference in their new projects. In new planning of ecotourism development, practitioners should also make reference to other international guidelines and life cycle

carbon assessment during the planning and construction phase to achieve the net zero target by reducing the use of upfront embodied carbon material in view of the environmentally sensitive nature of ecotourism development.

*C. Low Carbon Energy and Renewable Energy Supply*

The problem of heavily relying on national fossil fuel power supply in ecotourism enabling development is a prime concern. Unlike other tourism models, for example, large scaled theme parks, ecotourism has the highest opportunity and maximum potential to reduce the national fossil power supply and better utilize the low carbon energy supply and renewable energy technology. Adoption of on-site generation of low carbon heat and hot water supply, technology of energy storage and renewable energy in ecotourism development for decarbonization can be more practically implemented with the support of government agents and aggressive stakeholder's vision [2].

*D. Zero Carbon Policy*

Government support and establishment of incentive and funding schemes to encourage the stakeholders to contribute and commit the mission of net zero target and development are the most important influential and essential factors. Clear regulations and rules on zero carbon emission other than pollution and conservation control should be launched as early as possible to accelerate the integration of net zero commitment in tourism development particularly ecotourism. Encouragement to commit the zero carbon footprints in the ecotourism is crucial to enable facilities planning and construction to achieve net zero carbon emission [16].

*E. Environmental Assessment Tools and Ecotourism Certification*

The pattern of ecotourism development varied across countries and cities. The generation of carbon emission in ecotourism development may have to be carefully reviewed to avoid wastage of resources and generation of unexpected carbon emission. The adoption of internationally recognized environmental assessment tools and certification is matured in various major countries and cities around the world. In order to meet the Paris Agreement on zero carbon emission, ecotourism development can adopt environmental assessment tools and certification system as a reference to align the net zero road map. Innovation and advanced building technology like Building Information Modeling (BIM) and prefabrication has significant implications and benefits for ecotourism development. In 2018, US Green Building Council (USGBC) launched a certification scheme "LEED Net Zero" to promote achievement of net zero goal and accelerate the transformation to a low carbon society [16]. "LEED Net Zero" provides verification of the achievement of net zero goals in existing buildings for the aspects of LEED Zero Carbon, LEED Zero Energy, LEED Zero Water and LEED Zero Waste. Australia, for example, developed the Australian Ecocertification Program to provide the certification of ecotourism products which aim to reduce carbon emission and essential to ensure the effectiveness in stakeholders in operating the ecotourism

market. The Eco Certification Program is a world first certification established by Ecotourism Australia which aims to certify the tourism products like tours, accommodations and attractions, etc. with a primary focus on nature. The certification program is now also adopted by other countries and cities as the International Ecotourism Standard. The Eco certification program includes Natural Tourism, EcoTourism and Advanced EcoTourism [3], [13], [14].



Fig. 3 Element of Eco Certification Program [14]

*F. Monitoring of Energy Consumption*

Collaboration with government agents and stakeholders is considered a necessary step to establish a long-term planning and system. Monitoring of the energy consumption can ensure the sustainability of ecotourism and effective operational energy use.

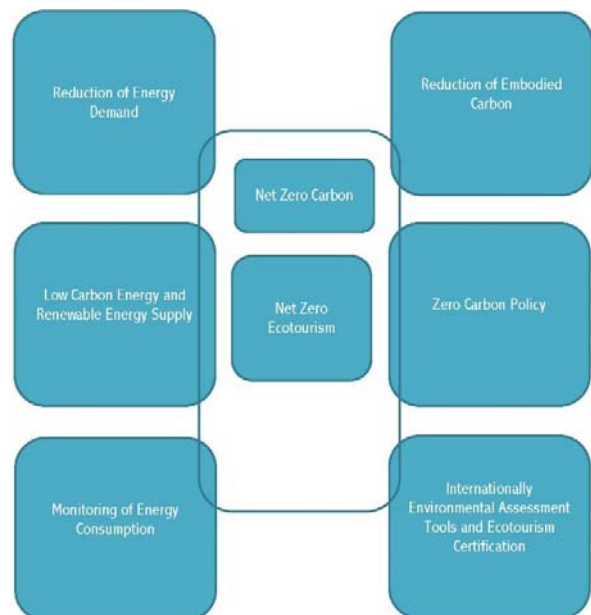


Fig. 4 Integration of Net Zero Carbon Concept into Ecotourism

IV. CONCLUSION

Based on the research, the development of long-term sustainable tourism and activities required the joint effort from government authorities, communities and travel agents to maintain and managed the balance relationship between

environment and tourism. The general principle of rural and ecotourism is also discussed in this research. This paper outlined the major attributes and consideration in net zero ecotourism development and provided recommendation and reference to government agents, AEC industry and stakeholders to contribute to the integration of net zero and environmentally friendly ecotourism development project. Rather than solely relying on limited local regulation, reference should be made to the guideline and other internationally environmental assessment tools and certification programs as a base tool. High standard of net zero ecotourism can minimize the use of energy and natural resources and eventually maintain their sustainability.

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