

Photosynthesis and *Paṭiccasamuppāda*: A Buddhist Perspective on Environmental Conservation

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Introduction

Environmental degradation such as deforestation, climate change, loss of biodiversity, and ecosystem degradation have become one of the greatest challenges facing the world today. Such environmental problems have been brought about by human activities that have upset the balance in ecosystems. There are numerous biological processes that maintain life on earth, among which the process of photosynthesis is critical as it allows plants to use carbon dioxide, water, and sunlight to produce glucose and oxygen. Photosynthesis plays an essential role in the sustenance of food chains, carbon cycles, and production of oxygen needed by living organisms for survival. Consequently, deforestation not only decreases the population of plants but also upsets the ecosystem that is crucial for survival.

The Buddhist teaching on *Paṭiccasamuppāda* (Dependent Origination) states that all conditioned things originate and end through the causes and conditions. This concept was put forth by the Buddha in the Nidāna Saṃyutta (Saṃyutta Nikāya):

"Imasmiṃ sati idaṃ hoti; imassuppādā idaṃ uppajjati; imasmiṃ asati idaṃ na hoti; imassa nirodhā idaṃ nirujjhati."

In the Pāli Canon, *Paṭiccasamuppāda* primarily explains the conditioned arising of suffering, while its underlying principle of conditionality has been interpreted more broadly in contemporary Buddhist scholarship. Although Buddhist environmental ethics has received increasing scholarly attention, few studies have examined photosynthesis as a scientific illustration of conditionality in relation to the Buddhist principle of *Paṭiccasamuppāda*. This paper attempts to explore the connection between these two concepts and discuss how it might help with environmental protection without claiming the identity of these fields scientifically or philosophically.

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Objectives

The main purpose of the current research is to investigate the relationship between the process of photosynthesis from the scientific perspective and the *Paṭiccasamuppāda* Buddhist doctrine within the scope of environmental protection. In particular, the following objectives will be pursued: (1) the description of photosynthesis as an ecological concept of interdependence; (2) the analysis of dependent origination according to the teachings of the Pāli Canon; and (3) the investigation of its applicability in modern environmental protection practices.

Methodology

This study adopts a qualitative research design employing textual analysis of primary Buddhist scriptures and comparative conceptual analysis between Buddhist philosophy and biological science. The primary source is represented by the Pāli Canon, in particular, the Nidāna Saṃyutta of the Saṃyutta Nikāya and reliable English translations of this work as well as Buddhist interpretation of *Paṭiccasamuppāda* and Idappaccayatā. As for secondary sources, they include peer-reviewed articles and academic books related to Buddhist environmental ethics, Buddhist ecology, plant biology, and the process of photosynthesis. To examine conceptual parallels of conditional dependence in photosynthesis and the concept of dependent origination, an interdisciplinary comparative method will be used.

Results

The analysis shows that both photosynthesis and the Buddhist concept of *Paṭiccasamuppāda* highlight the necessity of conditioned relations even though the two belong to different branches of science and have different aims. Photosynthesis is a natural biological process that allows the creation of glucose and oxygen by means of sunlight, water, and carbon dioxide. As scientific investigations show, photosynthesis is a major process that supports life on Earth since it regulates the atmosphere of oxygen, absorbs carbon dioxide, ensures food chain, and maintains the ecological balance.

From the very nature of photosynthesis, it becomes evident that none of the factors can cause the result separately. The sunlight by itself cannot produce oxygen; neither can water nor carbon dioxide make the process complete. Only under the conditions when all the required elements are present, the photosynthesis happens. In case one of the conditions is not met, the process is disrupted and the result is negative. The decrease in oxygen production leads to the accumulation of carbon dioxide in the atmosphere, disturbance of ecological balance, and threatens many forms of life.

A similar principle of conditionality is expressed through the Buddhist concept of Idappaccayatā ("specific conditionality"), which underlies the formulation of Paṭiccasamuppāda. The Buddha stated:

"Imasmiṃ sati idaṃ hoti; imassuppādā idaṃ uppajjati; imasmiṃ asati idaṃ na hoti; imassa nirodhā idaṃ nirujjhati."

"When this exists, that comes to be; with the arising of this, that arises. When this does not exist, that does not come to be; with the cessation of this, that ceases."

Although this formulation primarily explains the arising and cessation of suffering in Early Buddhism, the present study examines its broader principle of conditionality as a philosophical framework for understanding ecological interdependence. It does not claim that photosynthesis and Paṭiccasamuppāda are identical or that one explains the other.

In the Abhidhamma, this principle is further analysed through the doctrine of Paccaya (conditional relations) in the *Paṭṭhāna*, where phenomena are explained through multiple forms of conditionality.

While the former teaches about the arising and ending of the suffering, the underlying concept of the conditionality of this perspective can be applied to ecology as well, which makes both concepts comparable from a philosophical perspective. This way, while photosynthesis gives a scientific explanation for the interdependence in nature, Paṭiccasamuppāda offers a philosophical perspective of how conditional existence works. In both cases, the result is dependent upon certain conditions.

Such a connection of the concepts is extremely useful when speaking of environmental conservation because forests are crucial for photosynthesis. With the help of photosynthesis, the trees absorb carbon dioxide and emit oxygen, regulate the climate, and keep biodiversity. As a result of deforestation, the capacity of forests to maintain photosynthesis is damaged, which leads to the increase of carbon dioxide in the atmosphere, reduction of biodiversity, and instability of the climate.

From the point of view of *Paṭiccasamuppāda*, these outcomes clearly show that human actions create effects that go beyond mere individual needs. Humans, plants, animals, water, air, and weather occur in a chain of conditional interactions. Interfering in any of these interactions necessarily affects all others. Hence, environmental degradation cannot only be seen as resource depletion but as disruption of the very conditions necessary for existence.

Thus, it appears evident that the findings reveal the value of combining the scientific knowledge about photosynthesis with the Buddhist concept of dependent origination as an approach to environmental preservation. The scientific approach clarifies the functioning of ecological systems whereas the Buddhist approach inspires ethics of human responsibility in the ecological systems.

Discussion and Conclusion

The current research proves that there exists the conceptual link between the scientific theory of photosynthesis and Buddhist teaching of Paṭiccasamuppāda based on the idea of conditional interdependence, although the two concepts belong to different fields of knowledge. Photosynthesis describes the way of life in terms of the relationship between essential natural conditions, while Paṭiccasamuppāda describes the idea that conditioned phenomena appear and disappear due to the existence of certain conditions. Therefore, the relationship described in this study is not scientific but philosophical and does not presuppose any explanations of one phenomenon by another. Future interdisciplinary studies may further examine additional ecological processes through Buddhist philosophical perspectives while preserving the distinct aims of science and Buddhist doctrine.

It can be assumed that the conceptual relationship between the two ideas can help in the modern practice of environmental conservation because of the possibility to realize the connection between life conditions. It is possible to see that the idea of photosynthesis and the role of forests in the environment can be explained from the perspective of scientific knowledge. At the same time, Buddhism helps to understand the ethic aspect of the problem.

Finally, combining the views from science and Buddhism provides a valuable interdisciplinary way for preserving the environment. This research interprets the ecological interdependence using the idea of Paṭiccasamuppāda and contributes to the developing area of Buddhist environmental ethics.

Keywords - *Paṭiccasamuppāda; Photosynthesis; Environmental Conservation; Ecological Interdependence; Buddhist Ecology*

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