

# Biodiversity and Its Future with Edible Oil Crops and Malaysian Palm Oil

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**Abstract.** The preservation of biodiversity has become a major concern in many countries as human activities threaten to impact biodiversity in a global scale. Land use changes promoted by production of edible oil crops globally have been singled out as one of the biggest contributors to biodiversity loss. In the Americas and Australia, the attention is on the conventional soybean production; whereas Southeast Asia's palm oil industry is scrutinised. As edible oil production continues to grow towards a future of an increasing world population, the focus is on how developing countries such as Malaysian can continue to ensure the preservation of biodiversity. Developed countries should also take stock on how their edible oil production is affecting biodiversity loss in the present as well as past influences. The traditional perception of biodiversity loss through deforestation is investigated considering today's dynamic climate change circumstances. This paper examines the issues on biodiversity while painting a rationalistic perspective towards the growth and purpose of edible oil production in various places around the world. This paper also examines the sustainability of Malaysian palm oil industry and explains how palm industries can, in the long term, have the advantage of being more sustainable edible oil source compared with conventional oils such as soy beans and rapeseed.

**Keywords:** Biodiversity, Palm Oil, Edible Oils, Malaysia, Environment

## 1. Introduction

Biodiversity preservation is important in sustaining human life on Earth. Successful preservation of Earth's biodiversity will ensure the safeguarding of the planet's ecosystem services (such as air and water purification, climate regulation and generation of moisture and oxygen) which is critical for human wellbeing [1]. Biodiversity is the essence of ecosystem health and environmental security; a standard in preserving the various landscapes of which our earth is made of. From forested ecosystems to our vast ocean seascapes, biodiversity are the building blocks of our natural world.

Agriculture has been perceived as a destructive factor for biodiversity. Monoculture and the expansion of various food crops in different landscapes around the world have had a multitude of impacts on the levels of existing natural biodiversity. As the requirement for food based agriculture increases with the growing population of the world, there is a distinct need to take stock on how biodiversity is affected and where a balance can be found to meet the demand and supply of food. Biodiversity can be measured in terms of species diversity, genetic diversity and ecosystem diversity [2]. Each method of measurement provides a different perspective on biodiversity and is used discerningly from study to study.

The goal of biodiversity measurement in every method remains to quantify changes in biodiversity and more significantly, biodiversity loss. By quantifying biodiversity change, biodiversity loss over time can be accurately monitored. This will enable for its contributing factors to be identified and controlled. This quantification of biodiversity loss has become an even more important endeavour in recent years with the increase of human-related land use changes.

Though biologically diverse regions exist all over the world, the degree of biodiversity differ from continent to continent. Among the most bio-diverse regions in the world are the warmer, equatorial regions such as Brazil, Malaysia and Indonesia. These countries contain the richest tropical rainforests which are

home to the most biologically diverse places on earth. The climate in such regions makes them suitable for agriculture of edible oils (vegetable oil agriculture) such as soy beans and oil palms. The vastness of plantations of these edible oil agricultures have grown over the years as the demand for edible oils increase with the growing population on Earth. This growth comes as no surprise as oils from vegetable origin is today an important source of dietary fat and provides the feedstock for many related food products. Edible oils from palm seeds have gained attention as a favourable source of edible oil for the future as it is cheap and yields a larger amount of oil per acre of oil-crop cultivation. This has resulted in the rapid growth of palm oil industries in countries such as Malaysia and Indonesia in recent years. With this expansion, palm growing countries in Southeast Asia have been increasingly perceived as ecological destructive entities of world biodiversity. One reason for this is because the monoculture and expansion of various food crops in different landscapes around the world in the past have had a multitude of impacts on the levels of existing natural biodiversity.

The recent expansion of oil palm industries in Southeast Asia seems to replicate this and signal a red flag to experienced conservationists. The continued preservation of ecosystem services should be sustained and equally managed for food to feed in the increasing population on earth. As the requirement for food based agriculture increases with the growing population of the world, there is a distinct need to take stock on how biodiversity is affected and where a balance can be found to meet the demand of conservation and supply of food.

## **2. Gradual Change and Need for Change**

Before the industrial revolution in the 19<sup>th</sup> century, biodiversity loss mostly occurred at nature's pace through events such as the ice age and natural climate change. These events, though naturally occurring, have the potential to change the physical and natural landscape on earth. Hence, even if humans never existed to interfere with nature's activities, nature, by its own hand, would have been the dominating driving force of biological diversity change.

Though human activities through agriculture have undeniably accelerated the loss of biodiversity on Earth, it is also true that agriculture has provided the human race the means to expand their influence on Earth. Without sustainable streams of food, it would have been impossible to see the developments that we see today. Agriculture has provided the sustenance for human existence and growth for as long as human had first come into existence. It is unlikely that there would be any other way to provide for this basic human need for food. Hence, the real question here is not how to stop feeding the human population through agriculture, but how to make agriculture friendlier to nature.

Over the years, lands for agriculture have shifted from one continent to another. In the earlier years, agriculture persisted over currently developed continents like Europe, Australia and America. These agricultural lands helped feed the people who helped each of these countries grow and develop. Moreover, the export of crops to other countries provided a means for which income is obtained. The income, directed to the country's growth, helped to push technology and infrastructure in these not prosperously developed countries. The technologies developed after the period of intense agriculture brought much bearing to improving the economy and shifted these countries from being an agriculturally dependent to a less agriculturally dependent country. These countries, through their available technology, are then able to develop means to better control the environmental impacts of agriculture on its country. Agriculture, therefore, can be seen as an important part of the natural progression of a developing country to a developed country.

In the recent century, plantations of rubber and palm oil have helped currently developing countries such as Malaysia to grow. Presently, Malaysia is dependent on its exports of palm oil to sustain growth in the country. Although it would be ideal for Malaysia's plantations to be as sustainable and well managed as their developed counterparts, Malaysia's palm oil industry is already far ahead in sustainable agricultural practises comparable to the likes America and Australia in similar time frames. Although solid sustainable systems will take time to be implemented in full force, Malaysia is adapting the methods of its successful forerunners in implementing policies on biodiversity management and conservation. Malaysia would be able to, over time, develop manageable systems of biodiversity conservation and protection. This would allow Malaysian

plantations to supply food in a way that will not inhibit our future generations of its access to nature's treasure troves of biological diversity.

### **3. Future Prediction of Biodiversity Change With Increased Population**

As world population increases, more land is being cleared to shelter and provide food for the increasing number of people [3]. More forested regions are now being converted to lands for homes, shops and agriculture. Additionally, the rapid urbanization of developing regions such as Africa and Asia as well as the shifting of population habitat to urban areas contribute to further land use changes. These land use changes, if not managed properly, could have a significant impact on biodiversity loss. Actions by governmental authorities and organizations to maintain biodiversity will allow urban areas to continue to prosper and grow with the support of Mother Nature's ecosystem services [4].

### **4. The Truth about Deforestation and Biodiversity Change**

The loss of Earth's biodiversity is one way in which the decline of the environment is measured. Though there are many ways in which biodiversity can be measured (for instance, genetic diversity, species diversity and ecosystem diversity), it has been found that one of the most helpful measure of biodiversity is the differences between species [3]. This is as the benefits of biodiversity are often related to the dissimilarities in species rather than the sheer number of species alone [4][5]. Hence, it can be said that biodiversity (and therefore the benefits that it brings) is threatened when the number of dissimilar species reduces in number, leaving behind a pool of mostly similar species with little or genetic variation.

For instance, the biodiversity of a group of closely related plant species which share many traits in common will be significantly less than a group of less closely related species. Since plants are often associated within the medical context for the discovery of new cures or treatments, a less diverse gene pool can be said to reduce the probability of finding the cure for a disease.

In recent years, biodiversity loss has been attributed mainly to conversions of forests to cultivation lands by deforestation. Though it is true that deforestation contributes to biodiversity loss [6], deforestation is neither the sole nor the main driver of biodiversity loss. Research has shown that biodiversity loss in marine as well as terrestrial ecosystems is also driven by other natural and human-related drivers.

For instance, biodiversity loss can occur as a natural process of change, evolution and regeneration. Natural fires and catastrophic floods are some of the common instigators for species loss in sensitive biologically enriched areas [7]. Additionally, biodiversity loss can also occur through the introduction of invasive (non-native) species. In many regions of the world, the presence of an invasive species threatens the livelihood of native species. The native Irish species of small mammals – the wood mouse and pygmy shrew, for example, have been threatened by the introduction of two non-native species – the bank vole and greater white toothed shrew [8]. The invasive species threaten to wipe out species of wood mouse and pygmy shrew in at least 80% of their available habitat.

As world population increases, major palm oil producing countries like Malaysia have recognized the need to provide for a growing demand of edible oil source (which by 2050, will double today's to reach 240Mt [9] ). Presently, palm oil is already providing for a major 30% of the world's edible oil needs [10], more than all other oil seeds. Since land requirements per kg of palm oil is lower and yield for palm oil is higher than other existing oil crops (like rapeseed and soy bean) [11], it is likely that palm oil continue to dominate as the largest supplier of global edible oil.

As demands for edible oils grow, the need to build a sustainable method of palm production also grows. Malaysia, as the world's second largest producer of palm oil, has long recognized this need for sustainability and biodiversity conservation by introducing policies like the 1998 Malaysia National Policy on Biological Diversity [12]. This policy has recognized the need to balance economic growth with environmental sustainability, and endeavours 'To conserve Malaysia's biological diversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation.' Additionally, Malaysia has also introduced measures for sustainable forest management.

These public policies on biodiversity preservation have taken effect on the preservation efforts in the state of Sabah. Through the Sustainable Forest Management (SFM) initiative, the Deramakot Forest Reserve was able to gain certification as a well-managed forest by the Forest Stewardship Council (FSC) [13]. Under the same initiative, Sabah was able to also preserve 240,000 hectares of forest and Orang Utan habitat under the Ulu Segama-Malua project. It can be seen that, though not the main cause of biodiversity loss, Malaysia have become deeply concerned with the environmental impact of producing oil palm.

Though biodiversity preservation is highlighted more largely today, Malaysia's initiatives for biodiversity preservations did not begin in recent years. As early as 1970's and 80's, before large scale expansion of palm plantations in Malaysia, the government launched the National Forestry Act 1982. Under this act, national parks for preservation of forest reserves has taken root and today, over 55% of Malaysia is under forest cover rivalling many

## **5. Level of Changes Compared to Other Oilseed Production Output**

It is natural for farmers to clear a vast amount of land to make area for new plantations, which will differently affect the level of biodiversity. Increase of food demand will result in the increase of release of nitrogen and phosphorus for oilseed cultivation in North America due to fertilization of crops. The abundance of these elements in the soil will result in the release of potent greenhouse gases to the air from the chemical conversion by bacteria that traditionally inhibit legumes [14]. Oil Palm plantations in Malaysia on the other hand has been shown to act as a carbon sink and has the potential to neutralise carbon emission from its own activities and assist with the emissions other land use activities [15].

Countries like Malaysia are today producing towards a multilevel approach in conjunction with better conservation and management of biodiversity and natural heritage, Although, Malaysia managed to maintain its national parks and conservatories in which the number of land being conserved is more than 5 million hectares. Thus it is safe to say that Malaysians are not affected too much by the production of palm oil but more likely to benefit especially from the biodiesel industry.

## **6. Possible Measures to Reduce Impact on Biodiversity**

Preservation of biodiversity is most effective when awareness of its importance is followed by actions by relevant parties. Experts from the World Wide Fund for Nature (WWF) have recently suggested that in order to effectively preserve biodiversity, governments play an important role in bringing together different industries to come up with a master plan for environmental conservation. This suggests that, instead of independently, effective biodiversity preservation can only be achieved when different industries work together.

Additionally, governments play a significant role in implementing national policies and environmental targets which aim to preserve biodiversity [15]. These policies and targets are crucial standards of measurement for biodiversity loss and allow a country to focus their efforts on areas where it is quantitatively lacking. Specifically, WWF is suggesting for governments to:

“Develop joint implementation plans between environment, agriculture, food, water, finance, and health in order to take urgent action to reduce the rate of biodiversity loss by 2010.

Live up to their commitment to put in place effective protected area systems, with the full and effective participation of indigenous and local communities and promoting equity and benefit sharing.

To adopt a target to achieve zero net annual deforestation by 2020 and initiate collaboration between the CBD and the United Nations Framework Convention on Climate Change to reduce green house gas emissions from deforestation and degradation [16].”

In large, it is suggested that the path towards biodiversity preservation is one of synergistic efforts between different sectors of the industry and the government. Moreover, efforts in biodiversity preservation become more effective when these efforts are mutually beneficial. Efforts in biodiversity preservation in the past usually failed when, in addition to failing to provide economic incentives and other rewards, the governments failed to provide enough financial and technical support to the industries which participate in efforts towards biodiversity conservation [15].

It is clear that leaders in national development have a huge responsibility in ensuring the protection and continuation of their country's biological diversity and natural resources. Economic drivers such as the palm oil industry in Southeast Asia, and specifically in Malaysia, is leading the way in working towards better environmental stewardship and making positive steps in ensuring that the growth of environmental protection is simultaneously evolving with national development.

## 7. Conclusion

The value of biodiversity in today's world is incomparable in how it was perceived in the past. Biodiversity today inspires our hopes for the future by providing possible undiscovered cures for illnesses and as natural reserves for better food supply and as the genetic future of our planet. Biodiversity also harbours our greatest fears of environmental degradation, species extinction, and ecological catastrophe. It is how we respond to the threat and the existence of our biodiversity that is most important to the future development of our needs. Although the approaches from various stakeholders are different, the global edible oil industry walks a tightrope between providing nutrition and sustenance for the world's population while working toward preserving and continuing the natural progression of biodiversity in different landscapes. As we see change and further development in the global position of edible oils, we are expecting to encounter greater conflicts on the environment and ultimately, our planet's greater biodiversity. 20 years after the Convention of Biological Diversity, we are still haunted by the future of environmental and nutritional demands of our ever infinitely increasing population. Where and how do we begin coping with this eventually is the measure of our future drive to survive and the planet's ability to support. Already, humans are living beyond the capacity of this planet to sustain our needs. With these great urgency of human needs, is it practical to consider the biodiversity loss from deforestation as suppose to biodiversity loss from a greater scale in different landscapes. Plus do we consider this loss as important compared to feeding the nutritional needs of a seven billion and rising population? Unfortunately we can only speculate.

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