

A Review of the Sustainability of Production and Consumption of Coffee

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Coffee is enjoyed by millions around the world for its stimulatory effects. It is one of the extremely important agricultural commodities around the globe because an estimated 125 million people from Africa, Latin America, and Asia depend on it for their livelihoods. The demand for coffee is at an all-time high as it has an annual production of about nine million tons in almost 80 tropical countries of the world (Murthy and Naidu, 2012). However, the production and consumption of coffee is a complex issue in the agricultural world that has been the subject of much debate in recent years. The debate is largely about whether the production of coffee is sustainable and if yes, to what extent the world is producing a sustainable amount of this beverage. There are many factors to consider when evaluating the sustainability of this agricultural commodity, including economic implications, labour practices, and environmental impacts of this beverage on producers and consumers. This review report aims to provide a shred of evidence for the nutritional value of coffee, its environmental impacts, and an overview of the socio-cultural and economic factors that are relevant to the sustainability of coffee production and consumption.

Nutritional Value of Coffee

Coffee consumption is on the rise around the world as compared to other food products, with a large number of coffee consumers touting its numerous benefits, including reducing the risk of diabetes, heart disease, and cancer. In fact, recent research studies have found that coffee may also help reduce the risk of depression and dementia in many people suffering from mental illnesses. It has been shown to have a high nutritional value as coffee beans contain a high concentration of antioxidants, which protect cells from damage and disease. The main nutrients that coffee contains are potassium and magnesium, which are essential for the human body to function properly. Magnesium is shown to be beneficial for bones, muscles, and the nervous system, while potassium is an electrolyte that helps to regulate heart rate and blood pressure. The beverage also contains other nutrients, including vitamin B6, protein, and manganese (George et al., 2008). In addition to these nutrients, coffee has caffeine, which has been shown to have a wide variety of benefits to human health, including improvement of memory, mental alertness, and reaction time. It has also been shown to improve physical performance, enhance physical endurance, reduce fatigue, and decrease the perception of pain.

A nutritional analysis of the beverage of coffee has shown that coffee beans contain contents of 13.6g/100g protein, 8.6 cellulose, 36.7g/100g hemicelluloses, 1475.1mg/kg phosphorous, 1293.3mg/kg magnesium, 118.7mg/kg iron, 32.3mg/kg copper, 777.4mg/kg calcium, 3549 mg/kg

potassium, and 15.1mg/kg zinc respectively (Mussatto et al., 2011). A sociocultural practice survey in Ethiopia reported that coffee beans are not only the products that are used for the production of coffee but coffee spices and leaves are also used in the production process. The spices used for making coffee have digestive stimulant action as they are composed of an impressive list of antioxidants, essential oils, and phytonutrients. These spices have antiviral, anti-cancer, and anti-inflammatory properties, which reduce the risk of many diseases, including heart attacks, diabetes, and depression (Yitayal and Achame, 2014). Together with potassium, calcium, sodium, potassium, and phosphorus, ferrous (Fe) is shown to be useful to supplement the body's requirements for energy and health, especially for adult women.

Environmental Impacts of Coffee

One of the most important issues when considering the sustainability of coffee production is the environmental impact of this beverage as it is grown in many different countries around the globe, and every country or region has its own distinctive environmental conditions as well as impacts. Coffee is typically grown in tropical areas around the world, which are the most biodiverse areas on the earth. The crop requires a large amount of water and nutrients to thrive efficiently in the ground. Moreover, the use of fertilizers and pesticides can have negative impacts on the inhabitants of that place used for coffee plantations, including human beings, wildlife, and other native species. Although coffee is relatively a small crop and an efficient user of nutrients and water, it has a large impact on the surrounding system. For instance, monoculture plantations can lead to loss of habitat or biodiversity for native species and deforestation. On the other hand, shade-grown coffee plants are often considered more environmentally sustainable because they provide a habitat for the wildlife of the surrounding environment (Brommer et al., 2011).

In most of the countries which grow coffee, the regions are characterized by a dry and hot climate making it difficult for other crops to grow on that land. As coffee trees are grown in a monoculture environment, it can potentially lead to soil erosion, deforestation, loss of habitat or biodiversity, and depletion of nutrients. This means that coffee producers often have to clear a large area of land in order to plant coffee trees in that specific part of the land which leads to deforestation. Cutting off trees in large numbers results in minimizing water resources and minerals in the soil of that land. Moreover, the use of fertilizers that helps to grow coffee plants and pesticides that protect this crop from pest invasion can negatively impact the local ecosystem and biodiversity as pesticides can contaminate waterways. The negative impacts are not only limited to the biodiversity of that region but they can also adversely affect human health (Harvey et al., 2021).

Socio-Cultural and Economic Implications of Coffee

Many countries that grow this high-demand commodity rely on the sale of coffee as a source of foreign income, but many of these regions depend on a handful of coffee buyers for the majority of

their exports which leads these countries more vulnerable to price fluctuations and economic shocks. This creates an unstable market for coffee exports as small fluctuations in the prices or demands can have a big impact on the economies of these companies. Another worth noting socio-cultural and economic implication in the sustainability of production and consumption of coffee is that the majority of coffee producers are located in developing countries whereas the majority of coffee consumers live in developed countries. This creates an imbalance where the people who are most impacted in terms of both economic and environmental impacts by coffee production are not usually the ones who benefit from the consumption of this beverage. This significant economic imbalance creates potential problems with equitable trade in developing vs. developed countries that further complicate the issue of sustainability (Bulitta and Duguma, 2021). Resultantly, this economic imbalance contributes to the exploitation of labour rights that leads to poverty in coffee-producing regions.

Another major implication when considering the sustainability of coffee production is the impact on the lives of those who grow and harvest this commodity for their countries. Working conditions of workers serving in the coffee fields can be hazardous as they are exposed to dangerous chemicals in the fields that ultimately lead to an unhealthy work environment. Growers have been known to use child labor, and they are often paid very low wages to earn more profits while cutting the cost of laborers. In some cases, coffee producers do not have access to the resources and support needed for coffee production at a large scale as they are small-scale farmers who cannot compete with larger commercial operations (Ango et al., 2022). These all factors make it difficult for coffee growers to earn a living wage. They cannot afford adequate housing and quality healthcare because they often work long hours in the fields for little payment, which is mere exploitation of labour rights.

Consideration of Synergies or Trade-offs for the Sustainable Production and Consumption of Coffee

In the recent decade, the planet has survived a lot of calamities brought about due to the intrusion of man into nature. Coffee production is one of the ways man has altered the way of nature, such as deforestation due to the cutting of trees in the areas where coffee trees are planted has resulted in people considering their dietary preferences. The coffee industry has been steadily growing in recent years and the demand for coffee is expected to continue to increase in the future. However, coffee production has become a source of tension between the need to produce enough coffee beans to meet consumers' demand worldwide and the desire to protect forests and biodiversity (Clay, 2018).

An ecologically sound way to improve the sustainability of coffee production and consumption in the world is to consider the implications of trade-offs and synergies between different approaches to the production of coffee in the coffee-producing regions of the world. These trade-offs include reducing the level of coffee production as the increase in production causes a decrease in soil quality as well as significant carbon emissions. Moreover, the environmental impacts of coffee production can be reduced by diversifying the crops grown on coffee farms. When coffee lands will diversify the crop

rotation, more vegetables, fruits, and other plants can be grown. The diversity of crops grown on coffee farms, whether at large scale or small scale can help reduce the overall environmental impacts of coffee production on the agricultural system (Ssebunya et al., 2019). Thus, it is important to minimize the amount of coffee production and increase the amount of land under permanent and diverse vegetation.

Conclusion

Coffee, a significant beverage and one of the most important global commodities, is an important part of many cultures around the world, and its production and consumption have significant environmental consequences. Throughout history, coffee has been consumed across the world and has been an important part of many cultures and their economies. As coffee growers, producers, exporters, and consumers grapple with how to produce and consume coffee sustainably, it is essential to examine the possible trade-offs and synergies in achieving these goals. Producing coffee more sustainably has the potential to both improve the well-being and health of coffee-growing communities and reduce the global burden of poverty in developing countries.

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