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Brazil, Sustainable Agriculture

Sustainable Agriculture in Brazil

Introduction

This paper discusses the challenges faced by agriculture in Brazil as well as various solutions that can be implemented to prevent consequences and enable more sustainable agriculture. Brazil is a large country both seen to its size and population and is also one of the world's largest agricultural nations. Because of this, the sustainability of farming practices is pivotal not only for Brazil but for large parts of the world that rely on the export of agricultural products from Brazil. The unique climate that the rainforest, the Amazon, generates has an impact on agriculture. The rain that the Amazon provides is also an asset for agriculture in Brazil. The rainforest also has a major impact on the health of the entire earth, which is why what is happening with the Amazon is a global concern.

Facts about Brazil

Brazil has a population of around 211.8 million and roughly 85% live in cities or in slum areas that have appeared within or in the outskirts of the cities. These areas are often referred to as “favelas” and within these areas, there are major issues with poverty and crime, amongst other things. Since 1985 Brazil has gradually been democratized from a military government (1964-1985) to today being a federative state with a presidential government. The country consists of 26 states with a federal district located in Brasilia, the capital of Brazil. The states have a high degree of independence and are basically copies of the federal level with their own constitutions, courts, and significant competencies in various respects. The President is elected for a four-year term in a general election and may be re-elected once. To be elected, an absolute majority (more than half of the votes) is required, and the election may therefore need to take place in two rounds. (Nationalencyklopedin, u.d.).

The current president Jair Bolsonaro, elected during fall 2018, is a right-wing nationalist, law- and order advocate, and former military officer. On several occasions, he has expressed admiration for the military regime that ruled Brazil from 1964 to 1985. When Bolsonaro was elected president, several scandals had emerged in which a majority of mainstream politicians were accused of corruption. This was in connection with the increase in violence and crime in the country, which meant that Bolsonaro, with his outsider status and his campaign for law and order, appealed to many voters (Wallenfeldt, 2021). When it comes to environmental issues Bolsonaro has deliberately weakened the systems in place for protecting the Amazonian resources by substituting the heads of key control institutions. Following these changes, an increase in the deforestation of the Amazon has been noted as well as the increase of deforestation by burning. This resulted in the 2019 wildfires having a significantly larger scope than previous years and for this Bolsonaro received a lot of criticism (Wetterblad, 2020).

According to the Corruption Perceptions Index (CPI), Brazil ranks as number 94 out of 180 countries with a score of 38/100, where 0 is highly corrupt and 100 is not corrupt at all. This, compared to The United States of America with a score of 67/100 and ranking as number 25 out of 180 countries and Sweden with a score of 85/100 and ranking as number 3 (Transparency International, 2020). During the 2018 election, many citizens were hopeful that Bolsonaro, who had been outspoken about the corruption problem in the country, and the government would make changes that prevent corruption from happening. But there has been a political pushback on the anti-corruption efforts. Congress has approved a law, which is intended to punish any abuse of authority by prosecutors and judges, but the way the law is written can potentially be used by powerful individuals to intimidate law enforcement. Furthermore, an anti-corruption reform package has been stalled in Congress and the hopes of approval are low (Transparency International, 2019).

Brazil's economy has been characterized by a heavily state-stimulated development that lasted until 1990, which resulted in economic fluctuations, inflation, and an exceedingly uneven social and regional resource allocation, which eventually led to the financial crisis in the late 1990s. After this, the economy began to recover and a growth of about 5 percent lasted for many years. During this time, Brazil was one of the world's five largest emerging economies (Nationalencyklopedin, u.d.). In 2014, Brazil entered the worst recession in a century and when the curve had started to turn upwards again, the Corona crisis hit in 2020 (Lindahl, 2021).

The financial crisis that hit Brazil in 2014 has led to widespread unemployment, increased poverty, and increased income inequality and the recovery from the recession has been modest (Wetterblad, 2020). Deep social divisions characterize the distribution of income in Brazil, which is among the most unequal in the world. As a result of the industrialization and urbanization of Brazil the slums, favelas, around the big cities grew larger (Nationalencyklopedin, u.d.).

With an area of 8.6 million km², Brazil occupies nearly half of South America's surface and is the world's fifth-largest country by size. An estimated 6% of the country's surface is used for farming, making Brazil one of the world's largest agricultural nations (Nationalencyklopedin, u.d.). Brazil's annual harvest takes up about 69 million hectares annually. The main crops are soybeans, maize, sugar cane, and rice, which make up 90% of the total arable land. Of these crops, the majority (>90%) of soybeans, maize, and sugarcane are grown in rain-dependent conditions (Marin, o.a., u.d.).

Challenges

In Brazil, the climate can be described as tropical, or subtropical, except for the northeastern part of the country, which instead has a predominantly dry climate. Just over half of Brazil's area is made up of forests (Nationalencyklopedin, u.d.). One of the challenges facing Brazil's agriculture is low tropical soil fertility. In tropical and subtropical environments, low soil fertility often occurs and this is due to the high temperatures combined with heavy rainfall, which causes the leaching of nutrients to accelerate. Low soil moisture may also be due to a lack of management of the soil, i.e. the nutrient depletion of the soil when harvesting the crops occurs at a higher rate than the time it takes for the soil to recover. As a consequence, even soil that used to have high levels of nutrients could now lack nutrients (Guilherme, Scheid Lopes, & Branco Corguinha, 2018). In addition, more infertile soil means that farmers must increase the use of pesticides to ensure a good harvest (Amazon Watch, 2020). Another problem related to agriculture, that not only affects Brazil but affects the whole world as it is the main cause of soil degradation, is soil erosion. The consequences of soil erosion are a lack of nutrients in the soil that in the worst case can leave permanent damage to the soil and its capacity (Guilherme, Scheid Lopes, & Branco Corguinha, 2018).

Pesticides have a large global market and at the top is Brazil, which is estimated to spend \$10 billion a year on various pesticides. More than half of these pesticides are very dangerous and are used almost exclusively for the cultivation of livestock feed. The main crops that these pesticides are used for are soybeans and corn. The Bolsonaro government has so far approved over 150 new pesticides that can be used for agriculture, and many of these pesticides are heavily criticized or already banned in Europe. The use of these dangerous pesticides has major implications for biodiversity. They affect both aquatic and terrestrial species and pesticides have also been found in groundwater resources and also in the soil. Since the pesticides are often used in spray form, they can travel with the wind far from the field where they were intended to be used. One of the species particularly affected by this is the bees, which play a very important and central role in ecosystems through pollination. Over the course of three months, over 500 million bees had died in Brazil by 2019 and their deaths could be linked to the use of dangerous pesticides (Amazon Watch, 2020). Why bees are so important for agriculture is because they pollinate different kinds of crops on which we humans depend. If all bees were to go extinct, it would affect our entire food supply and food chains and entire ecosystems would collapse (The Swedish Society for Nature Conservation, u.d.).

The Amazon rainforest, which covers large parts of Brazil's land area, has a key role in both the local and the global climate. Even though important parts of The Amazon are found in Bolivia, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela, it is mainly associated with Brazil (Nationalencyklopedin, u.d.). The Amazon is the largest contiguous rainforest area on earth and it binds 90-140 billion tons of carbon, which helps stabilize the climate. Deforestation in which large amounts of carbon are emitted in the form of carbon dioxide means an increased greenhouse effect, which can have catastrophic consequences for the Earth (World Wildlife Fund, u.d.). In connection with the expansion of agriculture, deforestation of the Amazon is increasing to make way for arable land for soybeans and maize, amongst other crops. Another important factor in the deforestation of the Amazon is the illegal agricultural industry, which, through the terrorization of indigenous peoples, steals territories or areas. These illegal land takeovers take place mainly in nature reserves in the Amazon or indigenous territories and result in illegal deforestation in the Amazon. This is to make way for livestock farming and pasture. Bolsonaro has relaxed most laws and cut back on institutions that existed to keep track of and protect the environment and indigenous people, which has made it easier for criminal activities to carry out illegal land takeovers (Amazon Watch, 2020).

Solutions

The challenges facing agriculture in Brazil can in many ways be linked to the Amazon forest. Why, then, is the rainforest so important to agriculture? One reason is that the unique climate brought about by the rainforest gives agriculture conditions they would not otherwise have had. This is especially true of the rain generated by the Amazon, which irrigates most Brazilian farms. Deforestation of the Amazon causes changes in rainfall, which means a higher risk of drought resulting in problems for farms that depend on rainwater. Torsten Krause, an associate senior lecturer at Lund University's Centre for the Study of Sustainable Social Development, explains that "agriculture in Brazil is helping to destroy the system that enables its survival and expansion" (Egan, 2020). Because of this, solutions to reduce the deforestation of the Amazon are also relevant to agriculture and its sustainability in Brazil.

As mentioned earlier, the Amazon has an important role for agriculture in Brazil, but also for the well-being of the Earth and a major problem is the deforestation of the rainforest. Not least the deforestation that occurs illegally. To prevent this from happening, laws and regulations are needed, but mainly institutions and authorities that work with monitoring and prevention for this not to happen. The authorities in place have been weakened under the current government and President Bolsonaro (Wetterblad, 2020). This has negative consequences for the rainforest, which is more easily exposed to illegal deforestation. The risks increase that a chain reaction will start where damage to the Amazon cannot be restored and the entire system shifts to another ecological state, from forest to savanna (Egan, 2020). This, in turn, harms agriculture, which is affected by a changing climate in which the water previously generated by the rainforest is not present for agricultural use. This in turn affects both food security in Brazil but may also affect the health of the planet and global food security. It should therefore be in everyone's interest to prevent this from happening.

To encourage farmers to use sustainable cultivation methods, various aid and compensations can be issued. Such subsidies for environmental services could then allow farmers to move to a sustainable agricultural system. In Brazil, there are already organizations working on this, including The Nature Conservancy, which together with the Brazilian National Water Agency developed the Payment for Environmental Services program aimed at landowners in key land areas for the water supply. Landowners receive financial support for restoring forests and preserving and caring for the forest. There is considered to be great value in these lands and a financial compensation which ensures that the value is maintained, can therefore be motivated (The Nature Conservancy, u.d.). Similarly, this could be implemented in agriculture. The Conservation Strategy Fund is working on an initiative to improve the cultivation of soybeans and make them more sustainable. They do this by analyzing the challenges and obstacles that may exist and developing mechanisms to overcome these obstacles (Jericó-Daminello, 2019). To support farmers and landowners, projects like these are important

because they can help to find new technologies and strategies to facilitate sustainable agriculture for the environment but also long-term economic stability.

The Rio de Janeiro Sustainable Rural Development Project is an example of an initiative that has been taken to help farmers transition their agricultural practice to a more sustainable and environmentally friendly one. The project was financed by the International Bank for Reconstruction and Development (IBRD), who provided two loans of US\$39.5 million and US\$100 million, the government of Rio de Janeiro, who provided US\$39.5 million, and the private sector, that implemented an economic sustainable system (ESS) which provided US\$3.6 million. The project was implemented from 2010 to 2018 and as a result of this project, productive and sustainable systems were introduced by 37,172 smallholder farmers/family farmers (The World Bank, 2020).

Several of the UN's global sustainable development goals are relevant in the issue of sustainable agriculture in Brazil. Goal 15, ecosystems and biodiversity, is highly relevant because agriculture risks disrupting these ecosystems and hampering biodiversity. Target 15.3, halting desertification and restoring destroyed land, also goes hand in hand with the fight against deforestation of the rainforest. In addition, target 15.A makes it clear that to preserve and sustainably exploit ecosystems and biodiversity, financial resources need to be increased (United Nations u.d.). As these global goals exist, it is only logical that cooperation between the UN and Brazil should be arranged in which Brazil could receive financial aid to care for and preserve the rainforest and work towards more sustainable agriculture.

In addition to providing financial support, it may be equally important to provide support through education in sustainable agriculture. Courses where farmers are informed about the impact of agriculture on the planet but also gain knowledge on how to transition to a sustainable way of growing. Although many farmers already use sustainable methods, there is room for improvement (Jericó-Daminello, 2019). Greater knowledge of what can happen if we do not act serves as a motivator for wanting to be part of the solution.

There is much that can be done at the societal level when it comes to financial support and education, but what can farmers themselves do to contribute to more sustainable agriculture?

One approach is to use agroforestry, which means that different types of crops are grown together, which benefits biodiversity. Such diversity of crops and plants gives rise to cleaner air but can also benefit bees and their pollination (The Swedish Society for Nature Conservation, u.d.). Another method of promoting biodiversity is to grow organically, which means that no chemical pesticides or fertilizers are used. This means removing the risk of these chemicals spreading to watercourses, lakes, and groundwater. It has also been shown that organically grown food contains more beneficial antioxidants and omega 3 fats and, in addition, it contains less of the environmental poison cadmium (The Swedish Society for Nature Conservation, 2019). Agroecology is another concept that also describes agriculture where no chemical pesticides or fertilizers are used and the idea behind it is to maximize the use of the ecological processes. An example is legumes that can trap nitrogen out of the air. Another is to use natural enemies of various pests to keep them in check (Krav, 2019). Low soil fertility is also a challenge faced by farmers in Brazil. One solution for this is to correct the acidity of the soil and replenish a lack of nutrients. This can be done through the use of limestone, among other things, as well as the application of minerals and organic fertilizers (Guilherme, Scheid Lopes, & Branco Corguinha, 2018). *Table 1* lists the advantages and disadvantages of the different solutions.

Table 1: Advantages and disadvantages of the solutions suggested for farmers to develop sustainable agriculture.

Solutions	Advantages	Disadvantages
Agroforestry	<ul style="list-style-type: none"> Beneficial for biodiversity. 	<ul style="list-style-type: none"> May be difficult and economically costly for

	<ul style="list-style-type: none"> • The trees could improve the fertility of the soil and offer protection against soil erosion. 	<p>large scale farms to introduce and re-direct agroforestry.</p>
Organic farming/ agroecological farming	<ul style="list-style-type: none"> • No pesticides which could risk pollution or negative impacts on biodiversity. • Organic food has health advantages. • Contributes to decreased soil erosion. 	<ul style="list-style-type: none"> • Lower yield, and therefore larger land areas for farming is required.
Soil restoration	<ul style="list-style-type: none"> • There is already efficient technology developed to allow for soil restoration in Brazil, this is therefore a feasible solution. 	<ul style="list-style-type: none"> • Soil restoration is not enough if the problem is soil erosion.

Conclusions

In conclusion, there are many challenges facing agriculture in Brazil, but there are also sustainable solutions. It is a complex problem that requires solutions from many different directions and that means that farmers and landowners cannot bear the weight of solving this all on their own. A change is needed to secure the future of the rainforest, but also for agriculture in the long run and for food security. As this transition can be difficult to make, farmers must receive financial support through investments or subsidies. It is also important to promote international cooperation because Brazil and, in particular, the Amazon has a huge impact on the health of the entire planet, making it a global problem if deforestation continues at the same rate as today to make way for agriculture.

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