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Colombia, agriculture.

### **Colombia, a more effective land usage**

Colombia is a democratic republic in the northern parts of South America bordering Venezuela, Peru, Ecuador, Brazil and Panama. Today there are a multitude of factors limiting food security in the nation. This literature study aims to review the complex interplay of these factors with a focused viewpoint on land usage and how to effectively use the crops produced. Firstly, this text will analyse the current demographic and socio-economic prerequisites of Colombian society, and a more detailed description of issues with and causes of the present land usage. This paper will present the suggestion of one solution to the presented issues and the study will close with a conclusion.

Colombia has a population of 51,5 million inhabitants of which 81% lives in urban areas. (UN, 2023) The climate is mostly tropical, and the country is partially covered with rainforests. 44,6% of Colombia's total area is used as agricultural land, and a large portion of the population works within the agricultural industry. (Lindahl, 2020) Almost all arable land is used as grazing lands for cattle while small farms that cover only a few percent of this area make up for almost half of the total food production. (CIA, 2021) The largest legal exports are coffee and bananas. However, the money laundering industry springing from cocaine exports are estimated as 5% of the total GDP, this places cocaine as the largest export (UN, 2023)

As of 2018 the Colombian diet consisted mostly of rice, bread, beef, poultry and eggs. (Statista, 2022) 30% of the consumed food is imported. According to assistant professor Erik Lundström, (referring to DANE) most Colombians work within agriculture, industrial production as well as profits from the unofficial market. GDP per capita is 5667 USD/year. 14,6% of the population lives in extreme poverty. (UN, 2023) According to Alicia Arango, the Minister of Labour of Colombia, 44% of workers earn less than the current minimum wage of 226 USD/month, 42% lives below the poverty line and the unemployment rate is 14,3%. One third of all Colombian households does not have a secure source of food as well as three quarters of the country's immigrants, The level of chronic malnourishment is 10,8%. (UN: s World Food Programme, 2022) (United Nations, 2023)

The water supply in urban and rural areas is up to standard and all inhabitants have water and sanitation to some degree, even though some must rely on primitive systems such as wells and latrines where a sewage system is not employed. Due to an overuse of chemical pesticides have caused poor water quality in some areas. (UN, 2023) The compulsory school attendance in Colombia is 10 years long and starts at age 6. The quality of education is not particularly good which is reflected by the results of Colombian students in the 2018 PISA-tests which showed 40% of students were underperforming in mathematics, literacy and natural sciences and very few students were overperforming in any subject.

The main method of transportation within the country is via the road network, 1/8 of which is asphalted. The substandard infrastructure is the underlying cause of difficulties when transporting people and fresh produce in Colombia and ultimately limits the availability of food and the possibilities of education for the rural population. (Harvey F. Kleine & Robert Louis Gilmore, 2023)

Colombia's possibilities for sustainable agriculture are great as they possess large areas of fertile soil and a favourable tropical climate close to the equator which permits crop cultivation all year round.

Despite this, a large portion of Colombians risk hunger and eventually malnourishment. An important limiting factor to the amount of produced food every year and thus food security is an ineffective usage of the arable land. As little as 2% of the country's total area is used as permanent cultivation areas. The remaining agricultural land is used as grazing grounds for cattle, this equates to 42% of Colombia's total area. (CIA, 2021) The meat industry is an important source of export wares, but the grazing field yields considerably smaller amounts of food (in mass) in comparison to crop fields of comparable size. The production of one kilogram of beef requires 70 kgs of dry feed and 16 000 litres of water. (M.M Mekonnen, 2010)

Additionally, in 2021 approximately 204 000 hectares (increasing) of land was used for the cultivation of the local coca bush. The leaves of the coca bush are classified as narcotic, unfit for human consumption and are used in the production of the illegal drug cocaine. As of today, it is favourable for many farmers to grow coca bushes instead of conventional crops as they thrive in acidic soil and more importantly, due to the inadequate infrastructure that does not reach the rural countryside. This makes production and trade of fresh produce impossible in the warm, humid climate, thus incentivizing the coca cultivation as it can be dried and stored with ease. (United Nations Office on Drugs and Crime, 2021)

The coca cultivation increased steadily between 2013 and 2017 but was on decline until the pandemic outbreak of 2020 and is now seeing an exponential growth. During this timeframe there has been an increased production of cocaine hydrochloride in the country. Reasons for the current development is a worsened socio-economic status for the country's inhabitants, the establishment of criminal groups that transport cocaine over the Colombian borders illegally. One other reason is lessening the preventative measures to combat harvest losses and the increasing yield of coca bushes per hectare as a result of employing agrochemicals to a greater extent than earlier. (United Nations Office on Drugs and Crime, 2021)

The coca plantations, the associated use of agrochemicals and the production of cocaine hydrochloride is having a directly negative impact on local biodiversity. As many of the chemicals used in its cultivation have inhibitory effects on species native to the plantation area, which is especially damaging when cultivation is located in nature reserves. Agrochemicals such as pesticides are carried with rainwater and eventually ends up in lakes, rivers and other watercourses. This is a graver issue when it comes to coca cultivation as there are no regulations regarding which pesticides are permitted which risks the spread of environmental toxins throughout the ecosystem. (Cederlöf, 2023)

The average citizen is not directly impacted by the coca farming or the cocaine production. Though they are indirectly impacted as these coca farms are not used for cultivating crops fit for human consumption or for the best of the economy. The general population are negatively impacted by the social, financial and ecological consequences that the farming of the coca bush implies and also by the consequences that informal labour has on the economy and the tax income of the state. As the food access in the nation is already poor, further development of the problem risks causing further problems supplying the population with sufficient nutrition which can result in malnourishment. Malnourishment mainly affects younger children that may suffer chronic damage when growth is hindered. (Shawish, 2023)

It is also worth mentioning that the farming of the coca plant is of great cultural importance to some parts of the country's indigenous peoples.

My suggestion for a solution to the shortcomings in food security as well as the problems that arise from the cultivation of the coca bush is called the "redistribution cycle". It is divided into 7 phases that should result in proceeds that can be reinvested into the cycle to increase its effectiveness for each cycle. The yield from each cycle comes from developments and redistributions in agriculture and the usage of crops that thrive in the given environment, which will have great yields per hectare. Such crops can then be sold as- or be processed into foodstuffs and exports.

The Cycle:

### **P1I: Phase 1 Investment**

The first phase of the cycle is investment. The state makes investments in mainly infrastructure to enable farming of fresh produce crops in rural areas by minimizing transportation time, larger harvests of fruits can withstand the heat. A large portion of transportation within the country is carried out via planes which is not environmentally sustainable. The paving of roads should be prioritized in areas where most inhabitants have access to a private or collective means of transportation. Otherwise, investments should be made to expand railways that can quickly transport harvests from larger farms over long distances. When the area in which fresh produce can be reached for larger communities expands, small farmers will have greater incentive to grow fruits, vegetables and cereals rather than coca bushes.

### **P2TR: Phase 2 Termination and Redistributing**

Phase 2 aims to redistribute the arable land from low to high yield on the legal market. This means to terminate the cultivation of coca bushes in order to use the land to cultivate crops that thrive in similar soil as the coca bush such as citrus, coffee, peppers, tomatoes, potatoes, lettuce, onions and sugarcane.

The first coca plantations to be redistributed is those belonging to the indigenous population that has been growing the bush for medicinal purposes for thousands of years. This should be done in dialogue with the indigenous population that would use their land to farm aforementioned crops. In return they would gain legal permit to grow coca bushes on designated land provided they do not use it for cocaine production or employ use of any harmful agrochemicals in their cultivation. Using this method, it would be possible to make up to 10% of the coca cultivation area available for food

production depending on how isolated these areas are from existing roads and railways. (United Nations Office on Drugs and Crime, 2021)

The next step in termination regards the 21% of the coca bush cultivation area that belongs to Afro-American communities. In such communities the coca bush farming can be combated by increased opportunities for legal agriculture by increased contact with urban areas, expanding on peace work and financial support to prevent harvest losses. These measures will eventually increase the socioeconomical status in these areas which enables voluntary extermination of the coca bush. (United Nations Office on Drugs and Crime, 2021)

The redistribution can be carried out much in the same way in areas with a low concentration of coca plantations where the problem is easier to overcome. The last areas to be redistributed is those with a high concentration of coca plantations where resources must be focused to incentivize legal crops by improving infrastructure, expanding peace work, improving security and surveillance and making farming equipment and agrochemicals less available to coca farmers. (United Nations Office on Drugs and Crime, 2021)

The redistribution of 50% of the coca bushes range equals 102 000 hectares of arable land. Furthermore, making use of nearby land with similar soil quality may be possible with more advanced farming equipment previously unavailable to the coca farmers.

### **P3D: Phase 3 Decontamination.**

Coca bushes are often sprayed with powerful pesticides, this may have negative impacts on soil and water quality. Traces from environmental toxins remain in the soil for extended periods of time and decontamination of the soil may be necessary before crop cultivation commences.

### **P4EC: Phase 4 Equipment and Construction.**

In this phase all preparations required for launching a full-scale farming industry. Preparing the fields, constructing the residences and storage spaces required if there is not already such buildings present.

### **P5AH Phase 5 Agriculture and Harvest**

The fifth phase of the cycle includes the crop production itself, when doing so it is important to use the arable land as effectively as possible. In more acidic areas farmers should aim to grow tomatoes, onions, potatoes and strawberries, all of which thrive in acidic soil and yields a harvest the first few years. In following cycles these soils can be used to cultivate citrus and coffee that requires some years before the first harvest. The more neutral soils can be used to cultivate sugarcane that can yield up to 66,5 metric tonnes per hectare, bananas can also be grown in such soil depending on the availability of sunlight and waterflow. (Ritchie, 2022)

When viewing this issue through the lens of food security it should be recommended to employ cultivation of the three sister crops: corn, tropical squash and climbing beans whenever possible.

These three crops can be companion planted to support each other, they thrive in acidic soil, and they cover most nutritional needs of humans. Cultivating these three crops together on large scale would have great contributions to the food security of Colombia. Another benefit of farming them is that the world needs a tropical country like Colombia to be productive, producing crops that cover the basic needs of humans in favour of luxury items such as coffee or juice would be of great value to food security from a global viewpoint. (Ngapo et.al, 2021)

Harvests can be sold to urban- or rural- based companies and supermarkets as they can now be transported via road or railway that connect the cities and countryside. Normal economic phenomenon such as investment, loans from state and banks are applicable here.

### **P6P: Phase 6 Processing.**

When the harvest has been transported to larger communities and cities crops will be processed into foodstuffs. Crushing sugarcane into sugar, roasting coffee beans and turning fruits into juice or jam are all examples of such processing. Packaging is also a part of this phase.

### **P7LSE: Phase 7 Local Sale and Export**

The needs of the local population must be met and produced crops and foodstuff can be sold at local supermarkets or similar businesses. The excess can be exported to other countries which yields profit for companies and tax revenue for the state. Such tax revenues as well as the tax income generated from economic stimulation springing from previous phases can be reinvested at phase 1 (P1I) of the cycle, thus expanding its reach and effectiveness. Eventually the need for infrastructural expansion and coca plant termination will decrease, other investments such as agricultural research and equipment should then be prioritized in their stead.

The benefit of the redistribution cycle is that despite a requiring a large investment to initiate the first cycles, the economic growth should be stimulated enough to finance its own development. Another benefit is that some aspects of the Colombian infrastructure would be developed and expanded for each cycle which can help combat issues such as unemployment and low education levels. The primary downside of the cycle is the massive investments required for initiation as well as the first cycles being relatively slow. There is also a risk to start conflicts with criminal organizations.

To summarize. Today Colombia faces problems with their food security. Furthermore, there is issues with unemployment and illegal drug trades. Education as well as fresh produce are largely unavailable in rural areas due to substandard road networks. The situation could potentially develop into a crisis if action is not taken. Therefore, the redistribution cycle is presented as a method of redistributing arable land from illegal coca farming and make it available for crop cultivation. The method aims to do so in a way that develops infrastructure and stimulates economic growth.

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