

Sugarcane Commodity Chain

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Abstract

Sugar, in all its sweet glory, is found in many places across the world. It goes through a rigorous process to get from sugarcane to the crystalized sugar you put in your coffee. The process, though, has a negative impact on essential parts of living. The environment, human health, and the livelihoods of the farmers are all at stake if we do not find a more sustainable way to get our sugar fix.

Sugar is a global commodity that is found in every country around the world. In the 18th century, sugar was considered to be a luxury and was not available to the general public. Once sugar began to be harvested all over the world, it became a staple to many diets, while also being considered a sweet treat in many cultures. Crystallized sugar is derived from either sugarcane or sugar beets. The latter, farmed on plantations in high temperate regions, accounts for approximately 22% of sugar produced globally. The tools and resources required make it the more expensive way to get the product, and so it is seen more in the developed world. In under developed countries with tropical climates, however, we see the harvesting of sugarcane. This plant makes up about 78% of sugar produced, as it is cheaper to farm and can be harvested and refined with manual labor instead of mechanizing the entire process. Sugarcane is farmed on plantations in over 100 countries, but the two main exporters are Brazil and India.

Americans actually eat 150-170 pounds of sugar every year on average (Corwin). Imagine all 327.5 million Americans consuming these massive amounts of sugar. Now imagine that, but in hundreds of countries around the world. We produce approximately 131.2 million tons of sugar per year and approximately 27.5 million liters of ethanol per year. In order to consume that much sugar, it needs to be produced on a massive scale. But the question is, how does it affect us? Are there more efficient ways to harvest these sweet crystals? Is it sustainable? Is it ruining the planet? Is it ruining our bodies? Not all of these questions come to mind when

you bite into a cookie, but it is important to know how we come into contact with these staples in life.

Sugarcane goes through quite a long process to get from the ground and in your belly. The process begins with agricultural production, from sugarcane plantations to sugar mills for raw sugar extraction. Here, there are two main producers involved, ASR Group and US Sugar, who are both privately held. Next, the sugar makes its way through processing, transport, trade, and distribution. From the mills to refineries, then split to make refined sugar, sweeteners, and bioproducts such as biofuel, bioplastics, and sugarcane ethanol. The top two refiners are ASR Group and Imperial Sugar Company. The global traders are Bunge, Cargill, ED&F Man, Louis Dreyfus, Sucden, and Czarnikow. These six firms control two thirds of the trade in both raw and refined sugar. From here, it moves on to food and non-food manufacturing. Non-food uses include biofuel and other industrial products. The packaged food manufacturers are name brands that we see everyday, including Coca-Cola, General Mills, Kellogg Company, and Nestle. After being manufactured, the sugar gets moved to retailers and other outlets, such as McDonald's, Starbucks, and Yum! Brands (Taco Bell, KFC, Pizza Hut) as well as Costco, Walmart, and other food retailers (Engage the Chain). From there, the consumers buy it in many different forms and put it in our cakes, coffee, and more.

There are several different areas of life that this commodity impacts, but the most affected is the environment. Sugarcane requires high water volume to continue growing. It takes about 1,671 liters of water to make 1 kilogram of sugar. This comes from growing and watering the plant, as well as cleaning it before refinement. More often than not, the farmers are using an unsustainable method of watering their plantations, and are over withdrawing from aquifers or putting strain on the rivers nearby. In many areas, such as Brazil, the plantations are rainfed. In other areas, such as India and Pakistan, there is already much water stress in the region, meaning that the existing water supplies are experiencing intense competition, and there is regulation in place. About 31% of sugarcane production is in an area with water stress. For example, in Maharashtra, India, sugarcane only accounts for about 3% of the land, but utilizes 60% of the state irrigation supply (Sugar and the Environment). Additionally, farmers are not managing their irrigation systems well, for a variety of reasons. First, the most efficient way to water crops - a drip or trickle method - is also expensive. It requires a lot of equipment that many farmers in underdeveloped countries cannot afford. Instead, they use a much less efficient, cheaper method by utilizing surface water (The 2050 Criteria). This is also called flooding or furrowing, and about 54% of sugar is produced using this method. Because of this incredibly inefficient method; only about 30 to 35% of water reaches the crops, and the rest is lost from irrigation channels by

evaporation and through run-off from the field. This runoff is polluted with sediment, pesticides, and nutrients that contaminates the bodies of water nearby.

Harvesting practices also contribute to air pollution, greenhouse gas emissions, and respiratory risks for laborers and the surrounding communities. Before manual harvesting, the sugarcane fields are burned, releasing toxins from many different agrochemicals in the air. This, combined with the smoke generated from burning the fields is harmful to people's lungs and puts them at risk for diseases such as lung cancer (O). These practices also create substantially elevated levels of carbon monoxide and ozone in the atmosphere, as found in Sao Paulo, Brazil during pre-harvest burning of the field (Sugar and the Environment). Also, when mills are cleaned (once a year) they release these same toxins into the air, creating more of these same kinds of issues.

Plantations require space. More often than not, this space comes from cutting down massive amounts of trees, or deforestation. In the state of Alagoas, Brazil, sugarcane is used as raw material for fuel alcohol production. In order to make room for more plantations, much of the rainforest was cut down, and only about 3% of it remains (Sugar and the Environment). Many countries, like the United States, have also taken to draining natural wetlands to convert for agricultural use. In the United States, about 70-90% of wetlands have been lost to this drainage (Sugar and the Environment). Both of these methods cause massive issues for the

environment, leading to massive losses in species and habitats, which results in a large range of impacts on ecosystem function. Because of statistics like these, as well as the massive amount of land being used for the farming of sugarcane, the crop has caused the greatest loss of biodiversity - more than any other crop (Sugar and the Environment).

In addition to this great loss of biodiversity, people, communities, and small-scale producers are being displaced from their homes in regions where there are unclear or unenforced property rights. The big companies will swoop in, cut down the trees, and start farming without a second thought regarding the people who already lived there. For example, in Brazil sugarcane production tripled from the years 2007-2012. The country went from 180,000 hectares dedicated to sugarcane to 570,000 hectares. This massive jump displaced many indigenous people who are fighting to reclaim their ancestral lands (The 2050 Criteria Report). In Pakistan, small scale farmers make up the majority. They have less than 5 hectares per plantation. In Brazil, somewhere between 20 and 500 hectares is typical. This skews the pricing for the supplies needed to farm sugarcane, and the smaller farms end up receiving less money for their cane. This leaves them in a debt trap that is extremely difficult to get out of. The demand for sugar, ethanol, diesel, bioplastics, jet fuel, and much more are no match for the bigger farms, and the small plantations can't keep up.

These bigger plantations are also able to afford more specialized equipment such as pesticides. This will increase their yield most of the time, but the excessive use of fertilizer and other agrochemicals eventually produces runoff that negatively impacts unique marine systems such as the Great Barrier Reef (Engage the Chain). Where flooding is common, the topsoil is also contaminated with these agrochemicals and when it gets washed away with silt, contaminates the bodies of water nearby. This causes algal blooms, which destroys much of the biodiversity in the water (Engage the Chain). Other soil health related issues include the use of heavy machinery, pre- and post-harvest burning, and poor irrigation practices that lead to salinization and waterlogging. In Russia, extensive studies have been done with long-term agrochemical and ecological experiments. The results show that an accumulation of toxic substances in the roots occur, as well as retardation of growth and a reduction in sugar content (Sugar and the Environment). It is not only the farming process that affects the environment, though! When the mills are cleaned, there is a discharge of mill effluents, liquid waste or sewage. These get deposited into nearby bodies of water and contain pollutants that reduce the oxygen levels in the water, therefore affecting the natural biochemical processes (The 2050 Criteria). Many of these pollutants are heavy metals, oil, grease, and cleaning agents.

With all of these negative effects on the environment, it would be cruel to not mention the effects on the laborers. In Brazil and India, the US Department of Labor has identified that

there are incredibly poor living and working conditions, including the lack of contracts from laborers, forced or bonded labor, child labor, and human trafficking (The 2050 Criteria). These workers are earning inadequate compensation and lack a multitude of necessities, such as protective equipment, water and nutrition, first aid equipment, as well as sufficient protection from agrochemicals, and any access to healthcare or education. In Brazil, India, as well as many other developing countries, the farmworkers are involved in a high level of occupational accidents due to the operation of sharp tools, heavy machinery, and long monotonous tasks on a regular basis. They also are exposed to high toxicity of pesticides, and have an increased risk of lung cancer and chronic infections (O). One of the by products of sugar cane is a dry, pulpy residue called bagasse. It can be used as fuel for electricity generators and the exposure the sugar cane workers have to this material can expose them to bagassosis (John). These workers have no choice, though, as this is their way of making a living.

As for the developed world, and those of us who do not work on a sugarcane plantation, we are at risk for many different illnesses by the sheer amount of sugar the average person consumes. There is dental decay, because the bacteria in plaque rapidly metabolizes sugars (even brushing your teeth twice a day can't exclude you from this), and the risk of obesity, diabetes, or heart and circulation diseases if there is too much sugar consumed. You may not think that you

are eating much sugar, but it has become a common item to find even in savory foods like a McDonald's Big Mac.

There are several American companies, such as Pepsico, General Mills, and Coca-Cola that have all committed to sustainably source 100% of their sugarcane by 2020 (Engage the Chain). Some things that everyone can do to follow suit is trying to engage directly with producers (they are in over 100 countries!), support government policies to prevent indigenous people from being run over, encourage use and development of sustainability standards, and of course, cut back on the sugar intake.

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