



sustainability, a new concept emerges that of bioeconomy. It must be admitted that when biotechnology developed it left aside aspects of sustainability with honorable exception of the Asilomar Conference in the seventies of the past century, concerned with the use of technology in humans through gene therapy, today fully possible and safe using Adeno Associated Virus. There are no rules and laws for many advances in biology in Brazil and in fact in the whole world. Science moves faster than laws are adopted. Brazil needs through an Environmental Bioeconomy Program to be prepared to deal with this cast of controversies through a background of important laws. Biology has progressed intensely in recent years and frequently technologies for the application of these advances do not occur to serve as the basis for their safe use neither for the environment nor for human and animal health. This is not a new suit. In 1975 at the Asilomar Conference a moratorium was established mainly in view of the possibility of using viral vectors for genic therapy. Forty-five years later it is possible to safely do genic therapy using Adeno Associated Virus as vectors but we do not have adequate legislation for the use of this technology in Brazil that begins to arrive in the global pharmaceutical market. When Dolly's event happened, our biosecurity law prevented the manipulation of embryos. Today animal reproduction laboratories do the same technology as assisted reproduction in humans routinely. We now have a more serious issue because although Carpentier in Germany and Doudna in the United States won the Nobel Prize for chemistry for its advances in gene editing based on technology known as CRISPR CAS 9, we have no laws

allowing the safe use of this technology. A researcher from China was banned from science because he used technology without its regulation. Its research made possible through gene editing that a gene is essential for HIV to access the immune system was modified. As result children of mothers with HIV were born healthily. The world spends billions of dollars annually on HIV research but statistics show that the pathology is not decreasing. Gene editing will allow mosquitoes to compete with malaria vectors in California in the near future, reducing the focus of this serious disease in developing countries. There are other advances not yet covered by appropriate legislation, anywhere. An example is the technology called Transcriptome mining that will make possible the use on an industrial scale molecule of the secondary metabolism of Brazilian Biodiversity that has the possibility of functioning in cancer therapy among other diseases. The law regulating access to genetic resources of biodiversity 2015 does not prevent the export of tons of copaiba oil or jaborandi pilocarpine but hinders and often impedes the necessary exercise of science to enable the sustainable development of Brazilian biodiversity. Laws are missing in Brazil and the laws that exist do not satisfy the use of the science we have exercise to promote the adequate sustainable use of the Brazilian biodiversity. We are still discussing in the Supreme Court about genetic engineering and the world is dealing with synthetic biology.

There are facts and fakes that are said about the Amazon. A fact is that we deforested an area larger than Germany in the last four decades [1] (Figure 1).

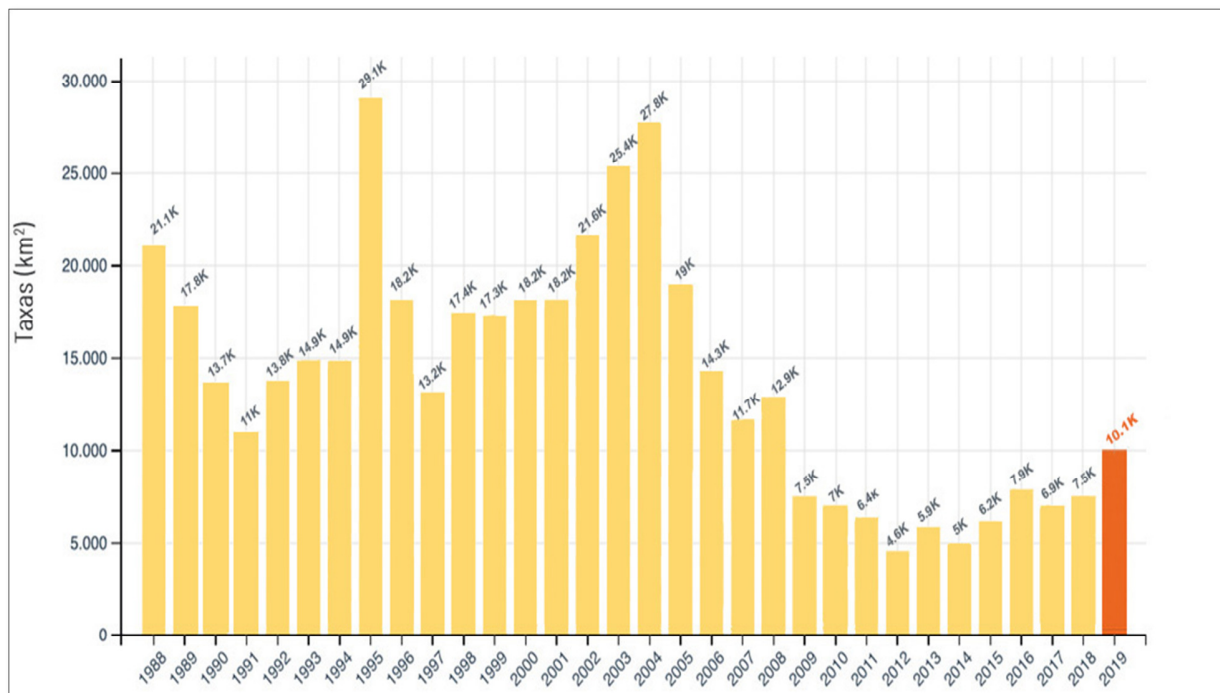


Figure 1. Deforestation in the Amazon from 1988 to 2019 in square kilometers.

A fake is the 70% of the soybean we export comes from the Amazon [2]. Evaristo de Miranda that is the Head of Embrapa Territorial is probably the best expert in this subject said in its interview to Mercado e Companhia. He said about agriculture in the Amazon: "There are 500 cities in the Amazon and close to 29 million people there. We have 1 million of farmers and what they produce is irrelevant for the GNP of the Country but it is fundamental for the survival of this population because they are the small farmers that feed the population of the region" He also mentioned about fire losses comparing Brazil to Argentina, Uruguai and Paraguai. Another important topic. Loss of forest to fires is happening systematically in many countries. Particularly in the California of the USA, Australia and Portugal recently. It is criminal in many cases but also results from climatic changes that are gradually giving rise to extreme events like storms that bring rays together. Of course, criminal fires must be treated heavily by specific

laws that are missing in Brazil. To learn these facts, it is important that we become aware how Brazil occupies its territory which is shown in **Figure 2**.

I will use the numbers to explain what is in **Figure 2** which is in Portuguese. Brazil preserves 66.3% of its territory and uses 30.2% to the Agriculture and Animal Husbandry. From the area .to produce food and feed only 7.8% is used to produce all the crops we use and export. 13.2% is occupied with planted pasture and 8.0% with native pasture Included in the 66.3% of the area preserved in the Brazilian territory 25.6% belong to farmers that cannot use this area to crops. This year Brazil will use roughly 60 million hectares to produce close to 140 million tons of grain. 8.0% is native pasture. Out of the 66,3 preserved 13.8% is indigenous land. 10.4% constitute Integral Conservation Units. 16.5% is native vegetation in land that is not included in the so-called CAR system (Rural Record System). Very little, 1.2% is planted forests and 3.5% is infrastructure occupied by cities.

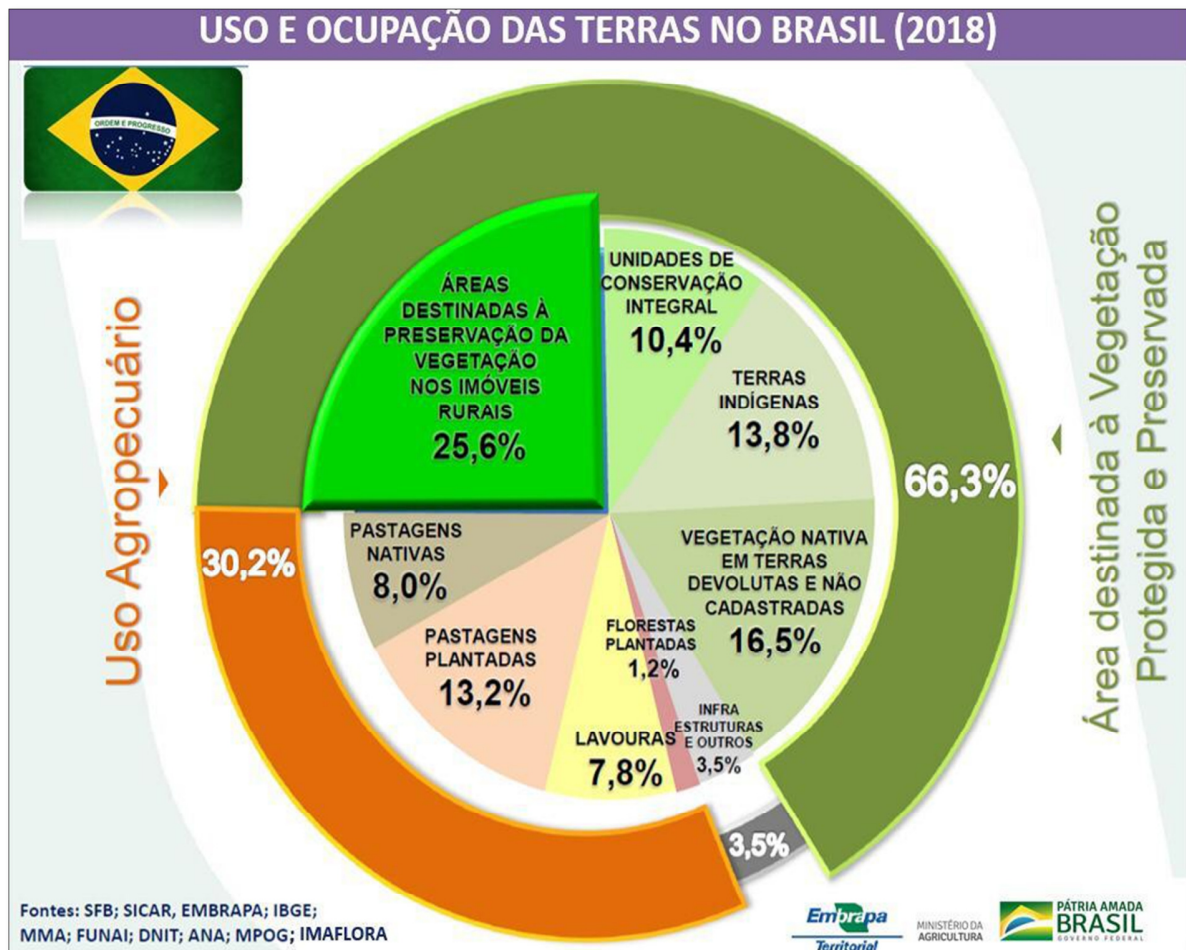


Figure 2. Use and occupation of land in Brazil.

We need an adequate legal framework to deal with the degradation not only of the Amazon but of all other biomes.

We have only 17% of the Cerrado left. Only 50% of the Caatinga vegetation left. 4% of the Mata Atlantica, 50% of

the Pampa not to speak about the ocean [1]. This is Bioeconomy: Sustainable use of Biotechnology and an adequate legal framework to assure that sustainability is maintained. Brazil as said before promised to the Paris Protocol that we will stop illegal deforestation until 2030 not only that Brazil will reforestate 12 million hectares. The cost was calculated and published [5]. During fourteen years the cost will be from 6 billion US\$ to 8.6 billion US \$ Considering all together perhaps we will need more money than Mr Biden announced but less than Collor de Mello promised but has not disbursed. One should not forget though that in adaption to deforestation and fires we have other problems in the Amazon such as smuggle that is hard to control and the look for gold (“garimpo”) using mercury that pollutes the rivers attempt against human health Finally NGOS are buying land in the Amazon with foreign money in strategic areas. To mention just one example an NGO called “Opção verde” (no site in Portuguese) purchased more than half of the Coari territory rich in petroleum and gas [6]. Coari has 58 thousand square kilometers. Indeed, a complex scenario.

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