

1.5 Air Pollution Problems in Brazil

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Brazil faces air pollution problems of a regional and global nature. On regional terms, problems of industrial and urban origin exist only in a very localised way although serious in many cases. The town of Cubatão, considered the most polluted area in the world until recently, suffered landslides over the town due to the destruction of slope vegetation, with loss of life. Identification of cause/effect relations on vegetation damage is needed. The city of São Paulo (9.7 million inhabitants) is one of the most polluted areas of the world due to motor traffic. With a 14.2% growth per decade, the atmospheric conditions of São Paulo would be worse if alcohol had not substituted about half of the otherwise gasoline fuel, eliminating lead use and reducing about 20% of carbon monoxide and hydrocarbon emissions. However, in 1989, due to the low world price of oil and the more attractive world price of sugar making ethanol production less economical, Brazilian ethanol fuel production was insufficient. Ethanol was substituted with methanol from natural gas but this increased aldehyde emission leading to enhancement of ozone. The acid formation resulting from the aldehyde affected the works of art in the museum (the greatest Baroque centre in the world).

On the global basis, the Brazilian atmospheric emissions of the greenhouse gas CO₂ have increased by 3,118% in the last twenty seven years. Although the increase in CO₂ emissions due to fossil fuel burning accounts for 318% of the total, the Brazilian per capita emission is low (0.38 tons C per capita), corresponding to 4.53% of the USA emission in 1982 and 33.5% of the world's per capita emission. The low per capita CO₂ emission in Brazil is due to extensive hydroelectric power, 85% in 1984 and 94% in 1989. However, most of the large-scale low-cost hydroelectric capacity is already being utilised and further expansion will involve high investment and high ecological cost. Alcohol use as fuel prevents an additional 12.5% of the present CO₂ emission (13×10^6 m³/year ethanol used in automobiles, replacing the combustion of 10.8×10^6 m³/year of gasoline). The remaining increase is due to forest burning which accounts for about 6.1% of the present estimated world emission of 5.5×10^9 tons C/year. Many uncertainties are involved in this estimation, mainly the following: biomass density on C uptake from recovering forest, grasslands and soil, annual deforestation, fraction of unburnt phytomass, inorganic carbon which is left over and in the soil, and depletion of soil organic carbon.

Many measures have been taken to avoid forest burning in the last two years. Farmers are discouraged from clearing forests for cattle ranching by removal of tax concessions. There are also limits on timber exports.

Illegal forest burning is being detected by remote sensing via satellite and heavy fines are imposed. As a result, the clearance and burning of the Amazon forest has slowed down significantly. However, Brazil is pressed by the increase of its population and has an urgent need for development which will cause a substantial increase in energy demand and use of natural resources. Additionally Brazil has foreign debts amounting to more than US \$120 billions. Constraints on usage of natural resources because of global environmental effects will hardly be accepted by the politicians and the population. Brazil has been pressed by the developed countries to preserve its nature and as a result the Government announced in April 1989 an ambitious new environmental programme. There is, however, a nationwide feeling that the developed countries have already destroyed their forests in the past and are presently responsible for the greater part of C emissions.

Brazilian emissions of non-natural greenhouse gases (CFCs) are insignificant and those of natural ones (N₂O and methane) are not estimated. There is a great need for research in many aspects of this problem.

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