

Agriculture as a Greenhouse Gas Contributor

The role of climate as a determinant of agriculture has long been recognized. It is only in the last decade, however, that the reciprocal effect has come to light: the role of agriculture as a potential contributor to climate change. Clearing forests for fields, burning crop residues, submerging land in rice paddies, raising large herds of cattle and other ruminants and fertilizing with nitrogen, all release greenhouse gases to the atmosphere. The main gases emitted are CO₂, CH₄, and N₂O. From about 1700 to 1900, the clearing of northern hemisphere forests for agriculture was the largest agent of change in the carbon cycle. Emissions from agricultural sources are believed to account for some 15% of today's anthropogenic greenhouse gas emissions. Land use changes, often made for agricultural purposes, contribute another 8% or so to the total. As a result, agriculture ranks third after energy consumption (which is also in part agricultural) and chlorofluorocarbon production as a contributor to the enhanced greenhouse effect.

Emissions of greenhouse gases from agricultural sources are likely to increase in the years ahead, given the necessity to expand food production in order to provide for the world's growing population. This imposes a task upon agricultural researchers to devise ways to continue improving yields while at the same time holding down emissions. Some possible improvements include reducing land-clearing and biomass burning in the tropics; managing rice paddies and livestock so as to reduce methane emissions; and improving fertilizer-use efficiency to reduce the conversion of nitrogen to gaseous N₂O.

Much research is still needed to understand the processes by which greenhouse gases are emitted from different agricultural practices. Needed as well are efforts to disseminate the knowledge gained in order to apply it on the farm. Reductions in some gases are likely to be more easily achievable than in others, and appropriate strategies will vary by region. The task of reducing emissions will doubtlessly be complicated by accompanying changes in climate variables such as temperature and wind and

precipitation, that interact with the processes through which greenhouse gases are released.