

1.3 TERRESTRIAL ECOSYSTEM IMPACTS

The effects of transboundary air pollution on terrestrial ecosystems have been reviewed on the basis of direct effects on vegetation, effects on soils, and effects on wildlife.

1.3.1 Effects on Vegetation

Three main pollutants are of concern with regard to vegetation effects. These pollutants are sulphur dioxide, ozone, and acidic deposition. Ozone and acidic deposition occur at concentrations above background levels at long distances from emission sources. Sulphur dioxide is more of a concern to vegetation in proximity to point sources of emissions than at long distances, where dispersion effects can reduce atmospheric levels to those of background.

1.3.1.1 Sulphur Dioxide

Near point sources, the adverse effects of sulphur dioxide on vegetation can be both visible and subtle (without development of visible foliar injury). Visible effects can be associated with both doses of high concentrations of sulphur dioxide over short periods of time and low concentrations over extended periods. However, in a few specific cases, atmospheric sulphur dioxide deposition may have beneficial effects on agricultural vegetation grown on borderline or sulphur deficient soils.

Visible effects of sulphur dioxide have occurred on pine forests in Canada subjected to average growing season concentrations of sulphur dioxide of 0.017 ppm. Visible injury to the perennial foliage of coniferous trees results in premature needle drop, reduced radial and volume growth and early death of trees. Reduced growth and yield of crops without the development of visible injury have also been found in certain field experiments.

Annual doses of sulphur dioxide of 0.02 ppm have been associated with habitat modifications in grasslands and the elimination of certain sensitive species of lichens near point sources. Lichens may be markedly affected by sulphur dioxide and are considered as bioaccumulators of very low level sulphur dioxide exposures. Direct effects including visible injury, effects on reproductive capacity and species mortality have been encountered in the field at concentrations of sulphur dioxide as low as 0.006 - 0.03 ppm annual average.

Despite such documented evidence of instances of direct effects, obviously not all, but probably most exposures to sulphur dioxide on a regional scale are below levels producing phytotoxic reactions. However, long-term, low-dose studies have demonstrated direct effects on lichen communities and indirect effects on several plant species.