

## **Climatic effects of changes in radiative forcing due to clear-cutting in Sweden**

Anthropogenic land cover conversion affects climate by imposing changes in the surface properties and by enhancing carbon dioxide emission. In general, the political imperative is that afforestation and reforestation can counteract climate change because trees remove carbon dioxide from the atmosphere. Consequently, forest management is seen as an opportunity for faster climate change mitigation induced by the utilisation of fossil fuels.

However, by taking into account the role of vegetation in shaping the atmospheric circulation, not all forest management practices mitigate climate change. Forest management programs often disregard that modifications in land cover influence the exchange of energy between the surface and the atmosphere. Vegetation cover defines albedo, a ratio between reflected energy from the Earth's surface and incoming energy from the Sun.

The aim of this study is to determine the net climatic effect of clear-cutting in high-latitude regions by examining the importance of climate drivers, albedo and carbon dioxide in Sweden. Comparative analysis of albedo change and carbon dioxide release due to clear-cutting is performed at three different latitudes, 56°, 60° and 64°N in Sweden.

The findings reveal that the magnitude of the net climatic effect of clear-cutting differs within high-latitudes. Although with a low confidence level due to the lack of available data, the outcome underlines results from previous studies by indicating that clear-cutting in northern Sweden might induce climate cooling but could also lead to climate warming in southern and central Sweden. Therefore, instrumental data on radiation and carbon dioxide fluxes should be recorded for a longer continuous time period to provide more accurate results. Given these points, this study implies that the albedo effect has an essential role in the estimation of the climatic effect of clear-cutting and should thus be incorporated in future forest management strategies.

**Keywords:** Physical Geography and Ecosystem Science, land-cover change, ICOS, albedo, carbon dioxide, radiative forcing, clear-cutting

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