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# Terrestrial biodiversity loss in Norway due to hydropower production: A life cycle assesment approach

Martin Dorber<sup>\*†1</sup>, Francesca Verones<sup>1</sup>, and Roel May<sup>2</sup>

<sup>1</sup>Industrial Ecology (NTNU) – Norway

<sup>2</sup>Norwegian Institute for Nature Research (NINA) – Norway

## Abstract

Life cycle assessment (LCA) is a commonly used tool for analyzing the complete environmental impacts of a product or process throughout its life cycle. However, LCA is also still developing and does not cover all environmental impacts yet. This is especially true regarding the impacts of renewable energy technologies on biodiversity. As impacts from hydropower can be significant, it is essential to develop methods for quantifying all these environmental impacts and for identifying trade-offs between them. Hydropower impacts can affect both aquatic and terrestrial ecosystems. Terrestrial biodiversity is affected by the construction of dams and reservoir creation, which inundates land and causes habitat loss for terrestrial species. Freshwater biodiversity suffers from the consequences of changes in the natural flow regime. Here we present an approach to quantify the effects of habitat loss due to reservoir creation on terrestrial species in Norway. To quantify the habitat loss we used remotely sensed images (satellite and aerial images) of Norway in combination with historical lake maps before reservoir creation. IUCN range maps provided information about the affected species (terrestrial mammals, birds, reptiles and amphibians), resulting in individual habitat loss per reservoir and species. Results show a significant impact for the 1200 reservoirs in Norway. For instance, 53 terrestrial mammal species are affected, with a maximum loss of 38 square kilometers habitat per reservoir. Subsequently, we calculated the Potentially Disappeared Fraction of species (PDF) per kWh electricity produced. This is a commonly used unit used in LCA to ensure comparability of results.

**Keywords:** Life Cycle Assessment, Hydropower, Land use, Habitat loss, Biodiversity los

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\*Speaker

†Corresponding author: martin.dorber@ntnu.no