



## **Reducing greenhouse gas emissions through urban planning and policies with nature-based solutions**

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Human-induced changes affect climate change, which requires mitigation and adaptation measures to reduce the future impacts on society. This paper aims to develop and use a planning and decision support tool to understand the complex interactions between land use changes and greenhouse gas (GHG) emissions, in order to support policy and planning decisions to mitigate future GHG emissions. The tool can provide information regarding the areas where development should be prevented or allowed, the impacts of different development types, and the potential of nature-based solutions (NbS) to reduce and mitigate GHG emissions.

The study is based on coupling a GHG module to an existing Landuse Evolution and Impact Assessment Model (LEAM). LEAM uses a 30x30m grid to spatially model the urban development of an area in terms of land use change given a particular set of drivers. The modelling exercise is focused on Stockholm County, Sweden, given the expected urban development during the next years. The coupled GHG module calculates the annual net GHG emissions of those sources expected to be impacted by urban planning decisions: transportation, building, and land cover change. These emissions are offset against the carbon sink potential, also calculated for the area. The emissions from the base year (2010) are then compared to those from a possible future scenario in 2040, as forecasted by LEAM land use change model. The tool can be used to test and compare any number of possible future scenarios, in order to determine best policy decisions and practices to promote sustainable urban planning for sustainable development with NbS to effectively minimize future emissions.

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