

Nitrogen Stocks and stock changes to Enhance Nitrogen Budgets (SENB)

ABSTRACT

Human activities have consequences on our natural environment. One of the most pronounced changes, globally, is the doubling of the natural nitrogen cycle as a consequence of human ingenuity. Nitrogen is essential for plant growth. Mineral fertilizers contain nitrogen and are essential for feeding the world. It has been estimated that half the world's population can be nourished only due to this nitrogen fertilizer, an invention of the early 20th century. At the same time, nitrogen compounds have multiple negative impacts. These compounds are air pollutants or water pollutants, acidify the soil, harm biodiversity, or act as greenhouse gases. Effective measures target on synergistic reduction of nitrogen pollution generally rather than on isolated addressing of single problem areas. In order to find such overarching solutions, nitrogen budgets have been created on national or regional scale, to trace the flows of nitrogen compounds across different environmental pools.

The SENB project picks up from this existing methodology of quantifying individual flows, and it develops methods to also measure changes in nitrogen stocks. Nitrogen compounds accumulate in sediments of rivers, in soils, in the biomass of animals and plants grown for human use, but also in our homes and offices with increasing amounts of fibers, dyes, or organic materials accumulating. Such accumulation may be released again after conversion (e.g. following dispersal of sediments, or via irregular waste disposal). A release of nitrogen compounds with a time delay not only requires proper accounting for nitrogen budgets to work, it may also give rise to time-shifted appearance of environmental problems. SENB will allow to rectify cause-effect relationships in order to better constrain the underlying reasons of environmental problems, and to allow environmental policy find the right responses for alleviation.