

Sustainable mitigation and land use options for human health and environmental quality in respect to the nutrition system and the nutrients C, N, P, S

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Abstract

Anthropogenic sources account for about 60 to 80% of the C- (only ca. 3% for CO₂-C), N-, P- and S-fluxes involved (in-)directly both in **global eutrophication, acidification as well as climate change**, each enhancing mostly the other, and damaging actually more than 60% of the **protection spheres like pedosphere, hydrosphere, atmosphere, lithosphere and biosphere and the anthroposphere within the nutrition system and human health especially in respect to food and water supply** (4th UNEP-Report: Global Environment Outlook (GEO) Environment for Development / 25th October 2007).

Resulting from Life Cycle Analysis (LCA's) about 50 (20-80) % of these anthropogenic C-, N-, P-, S-fluxes, - emissions and corresponding damages are caused by the **system nutrition of agriculture with plant and animal nutrition (production), human nutrition (consumption) and waste as well as waste water management (destruction, disposal)**, the resting similar shares by use of (fossil) energy and industrial / trade activities mainly in the so called developed countries. Therefore there is a need to optimise sustainable use and management of the nutrients C, N, P and S in respect to environment (→ Consistency), corresponding consumption (→ Sufficiency and Human Health) and production (→ Efficiency), especially within the above mentioned nutrition system.

With a holistic approach integrated protection aims / nutrient standards are set here as critical C, N, P, S levels and loads as well as for healthy human nutrition for all the above mentioned environmental spheres and anthroposphere, respectively. These aims are necessary prerequisites for cause oriented and sufficient mitigation and adaptation options and measures done simultaneously with special references to the nutrition system and land use. Those options and measures only in respect to water quality and only on catchment scales cannot be (by definition) "sustainable", referring especially to the multifunctional nutrients C, N and S. There are no "vulnerable zones" to C-, N-, P-, S-emissions like those of river catchments but only vulnerable life styles and land use managements.

Sufficiency in (especially animal) food and feed as well as in bioenergy consumption and only corresponding production leads particularly in the developed and industrialized countries with their tremendous over-nutrition to ca. 70 (60-80) % of the needed emission reductions of reactive C, N, P, S, flanked by "only" ca. 30 (20-40%) reductions with technical measures. This is exemplarily shown for the river catchments of the Danube Basin (EU-RP-5/ daNUbs) and the Upper Rhine Valley (Model Family MoNit) EU-Interreg III A-Project: See here also contribution M. Finck) in respect to the nutrients N and P. Additionally e.g. in Germany about 48% of the total health / illness costs (250 billion € yr⁻¹) and 78% of untimely death caused by over-nutrition are avoided potentially by sufficiency.

"End of pipe technologies" like C-, N-, S- sequestration especially in soils (sediments) and biosphere must be rejected in respect to the needed retardation times of at least 1000 to 10 000 years (50 to 500 generations of mankind) and its potential function as future chemical time bombs (CTBs) of C, N and S within a few years or decades.

Corresponding actually not integrated but future needed integrated (inter-)national legislation is shown especially in respect to the above mentioned nutrition system and land use.

In this way BSNLC integrates/synthesizes e.g the following two EU-ACTIONS (2006-2011):

- 1. COST 869: "Mitigation options for nutrient reductions in surface water and groundwaters"** in the background of the European Framework Directives for water, groundwater and soils as well as the Marine Strategy (<http://cost869.alterra.nl>)
- 2. COST 639: "Greenhouse-gas budget and land use (Burn-Out)"** in the background of former and future needed climate protection agreements (protocols). (<http://www.cost639.net>)

The above mentioned nutrition system and land use are challenged eminently in this way. Both actions of COST 869 and 639 can also lead to activities within the EU-7th Framework-Programme (FP7).