



Nitrogen and Phosphorus Loading

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Dear Friends,

This month, we shall talk about Nitrogen and Phosphorus Loading. This is the third boundary that we humans have crossed, so far as Nitrogen is concerned. We shall try to understand why this qualifies to be a planetary boundary, what are its causes, and the possible remedial measures. This note is based upon a lecture by Sarah Cornell, Coordinator of the International Planetary Boundaries Research Network at Stockholm Resilience Centre.

All forms of life on earth require nutrition, and 'the flow of nutrients through land, ocean and atmosphere ultimately regulate all of life on the planet'. Our activities are changing these basic cycles, endangering other forms of life on earth with which our lives are intimately interlinked.

Two German scientists Haber and Bosch discovered the method for manufacturing synthetic ammonia, and revolutionized modern agriculture. Farmers add this new 'reactive nitrogen' to the soil for larger crops. But most of this gets washed out and end up in water bodies in rivers, lakes and the seas. In fact, natural flows in the eco-system causes very high concentrations of reactive nitrogen in seas far away from the human settlements, often causing permanent shifts like anoxia (loss of oxygen in water, making it inhabitable for fish and other forms of life) and / or eutrophication of lakes (dominance of one form of marine life over others, eventually causing the water body to dry up). These effects are seen at local, regional and global levels, at a slow but steady rate. They also contribute to climate change. These are the reasons for listing it as a planetary boundary.



It is estimated that we humans introduce reactive nitrogen in the ecosystem through four processes:

- Industrial fixation of atmospheric N_2 to ammonia – 80 Mt/Yr
- Agricultural fixation of atmospheric N_2 via cultivation of leguminous crops – 40 Mt/Yr
- Fossil-fuel combustion 20 Mt/Yr; and
- Biomass burning 10 Mt/Yr

What can we do?

Understand that our Mother Earth is a biogeochemical system, where the living and the non-living parts of the earth system interact through chemical processes. Hence,

- Never waste food, as food production is at the root of this phenomenon. It is estimated that overall, one-third of all food produced gets wasted.
- Try and avoid all activities that require increased burning of fossil fuels, for example using a private transport in the place of a public transport or going by air instead of going by rail etc.
- Discourage all unnecessary burning of bio-mass, and encourage their decomposition into bio-fertilizers
- Promote consumption of organically produced food items

Wishing a sustainable future for our children and grand-children.

