

The Human Impacts on the Nitrogen Cycle : The positive role of the water sector



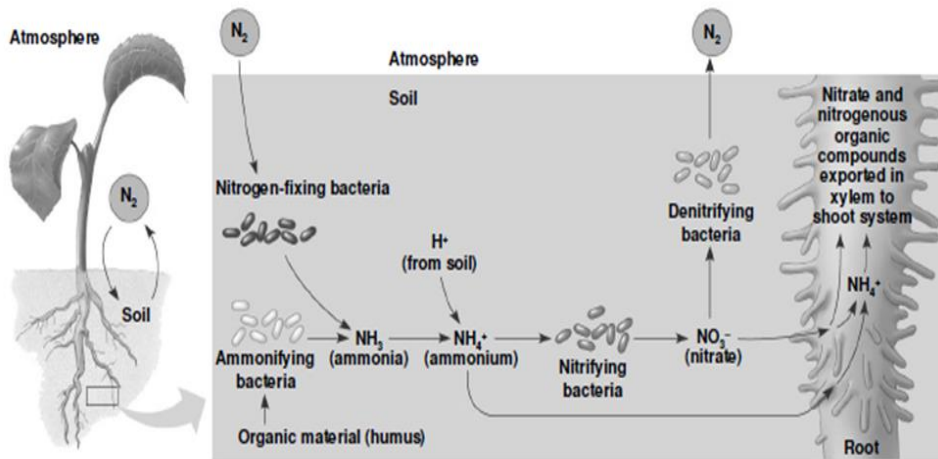
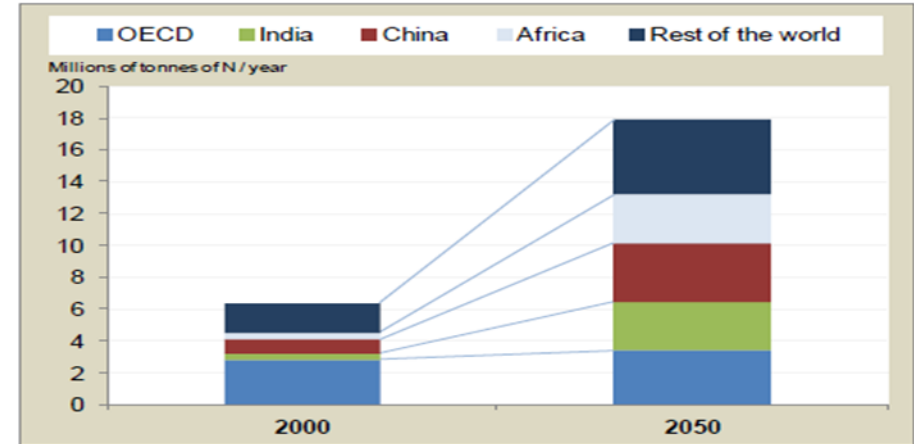
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The Nitrogen cascade and Consequences in Water

- ❑ Nitrogen in Water
- ❑ Managing Nitrogen in Drinking Water Production Plant
- ❑ Managing Nitrogen in WWTP
 - *N2O Focus*
- ❑ N Policy Target for Water Activities
- ❑ The positive role of the Water Sector

Nitrogen in Water

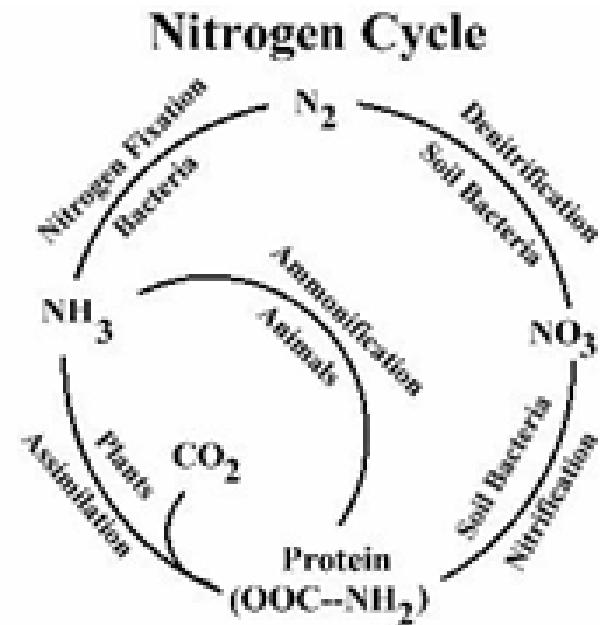
- ❑ Essential nutrient
- ❑ Reactive Nitrogen
- ❑ WWTP Nitrogen Effluents
 - ❑ *Estimated grow by 180%*



- ❑ Key role of nitrogen bacteria

Nitrogen in Water

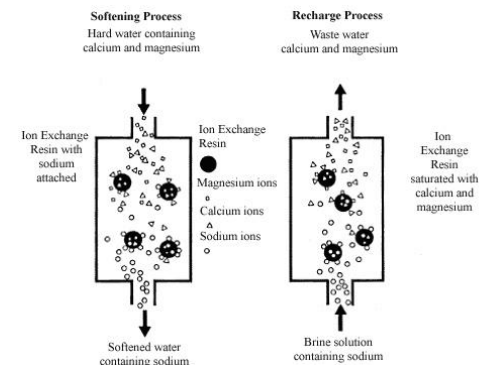
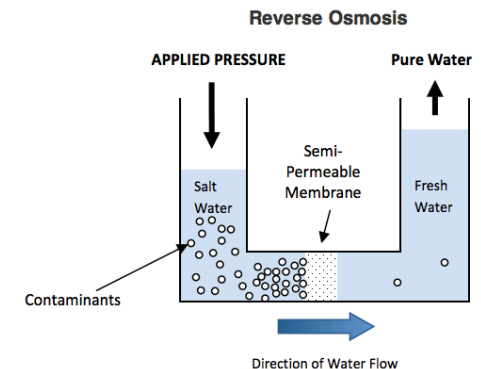
- ❑ Interaction between Nitrogen & Water Cycles
 - ❑ Coastal dead zones
 - ❑ Biodiversity loss
 - ❑ Groundwater pollution
 - ❑ Eutrophication & Acidification
 - ❑ Global climate change



Managing Nitrogen in Drinking Production Plant

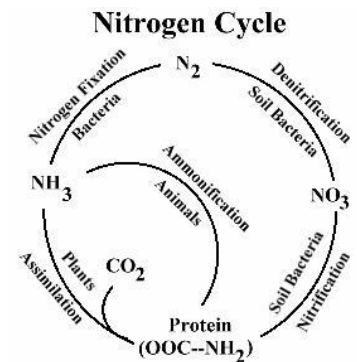
- ❑ Nitrogen in ground- and surface waters
- ❑ 4 methods of reducing or removing nitrate
 - ❑ Demineralization by distillation or reverse osmosis
 - ❑ Ion exchange
 - ❑ Biological process
 - ❑ Blending

❑ N Policy Target



Managing Nitrogen in WWTP

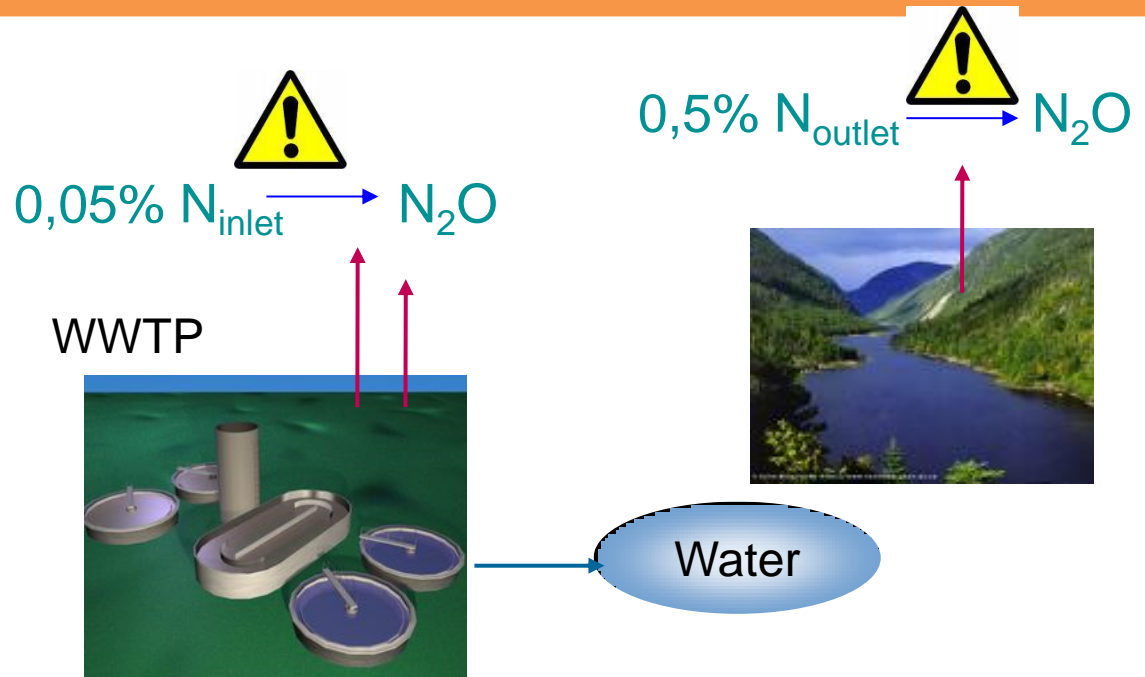
- ❑ Origin of the Nitrogen in WWTP
- ❑ Heart of our activities : The treatment processes
 - ❑ Primary treatment
 - ❑ Conventional secondary biological treatment
 - ❑ Tertiary treatment
- ❑ Focus on Nitrification / Denitrification
- ❑ N Policy Target



Managing Nitrogen in WWTP

IPCC Guidelines

According to the IPCC guidelines, treating N in the WWTP under 'controlled conditions' reduces 10 times N_2O emissions in the water body under 'uncontrolled conditions'



□ N_2O Focus

- Complex topic
- Present IPCC guidelines shows the added value of the WWTP to reduce GHG
- N_2O is produced during nitrification and denitrification
- The contribution of N_2O in term of CO_2 eq can be in the same range as the aeration electricity consumption of the WWTP
- Necessity to conciliate Energy savings, GHG reduction and treatment performances

The positive Role of the Water Sector

- ❑ Removing the ammonia and subsequently nitrate loads from the wastewater treatment plants, with a removal efficiency higher than 80 % in the sensitive areas in Europe
- ❑ Reducing the N₂O emissions due to direct wastewater emission in the receiving bodies, by more than 90 %
- ❑ Proposing alternative fertilizers by land application of the sludge coming from the wastewater treatment plants or by the valorization of struvite obtained by co-precipitation of nitrogen and phosphorus
- ❑ Reducing the amount of nitrate and ammonia in drinking water with dedicated processes