

Name:

Nitrogen balance

Definition:

Based on the IRENA 18 indicator (Gross nitrogen balance) it reflects the possible excess of nitrogen in agricultural land. It is estimated by calculating the difference between nitrogen intake and nitrogen loss/outputs. It counts all inputs and outputs including residual nitrogen emissions into the soil, water and air. Therefore, it includes volatilization of ammonia. The main inputs include nutrient volumes such as inorganic fertilizer, livestock manure, nitrogen fixation per crops and atmospheric deposition per hectare. The main products include the amount of nutrients extracted from harvested crops and the grass / forage eaten by the livestock per hectare.

Method of calculation:

This indicator is calculated by estimating the average nitrogen balance in each plot/crop:

$$\text{Indicator} = \frac{\sum_i (NB_i \times A_i)}{A_T}$$

Where:

Indicator: Total nitrogen balance (kg N per ha per year)

NB_i: The nitrogen balance of crop *i* (kg N per ha per year?)

A_i: Area for the crop *i* (ha)

A_T: Total area considered (ha)

The balance of each crop / plot is calculated as the difference between the N inputs into the system and the N losses from the system:

Inputs: nitrogen applied through organic and inorganic fertilizers, through the legumes nitrogen uptaken and through the irrigation water.

Outputs: existing nitrogen in harvested crops and agricultural products.

Interpretation:

The higher the balance, the greater the amount of nitrogen in the soil and therefore the greater the risk of contamination.

Using the values of this indicator, two other indicators can be calculated giving information on the management of fertilization:

- Nitrogen use efficiency, which is the ratio between the amount of fertilizer N removed from the field by the crop and the amount of fertilizer N applied.
- Nitrogen productivity, which represents the crop yield (kg) per kg of N applied.

Information source:

Crop area, applied inputs and yields of the different crops are taken from a survey to farmers. The values of extractions of nitrogen by the crops and the fixation by legumes are taken from the bibliography.

Bibliography and references:

European Environment Agency. Indicator Fact Sheet IRENA 18.1 – Gross nitrogen balance

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OECD / Eurostat. Gross nitrogen balance handbook (2007)