

## Ecosystem quality and trends in soil pH, 2018

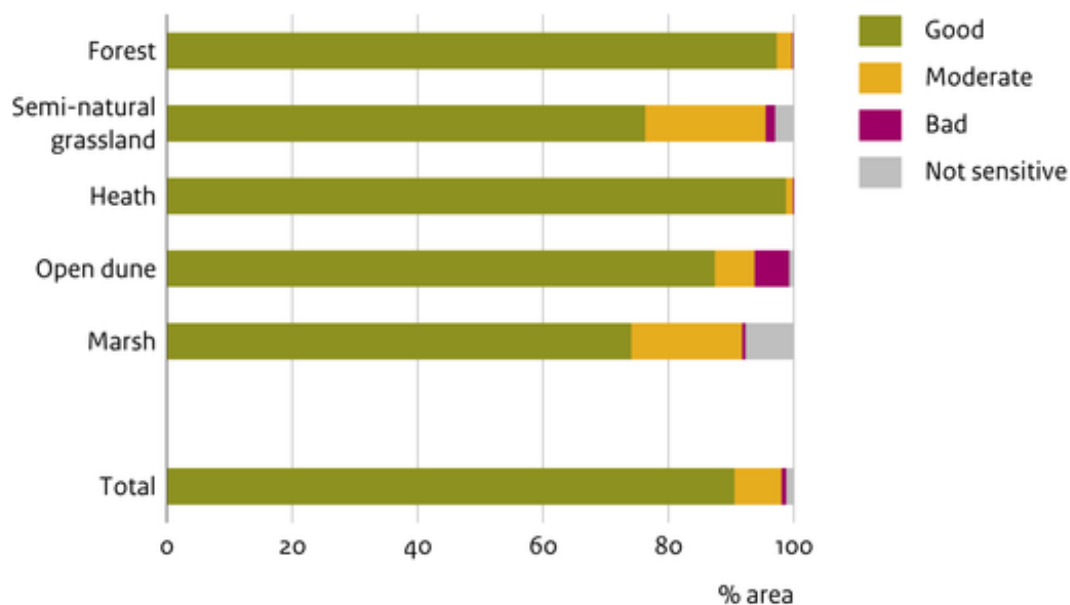
Indicator | 9 November 2021

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In many ecosystems soil quality in terms of soil pH is good. But soil pH in parts of natural and semi-natural grasslands, open dunes and marshland is not yet within acceptable levels. In all ecosystems soil pH is on average slightly decreasing, which means the soils are becoming a little more acidic.

[figuurgroep]

### Suitability of soil pH for terrestrial ecosystems, 2009 – 2018

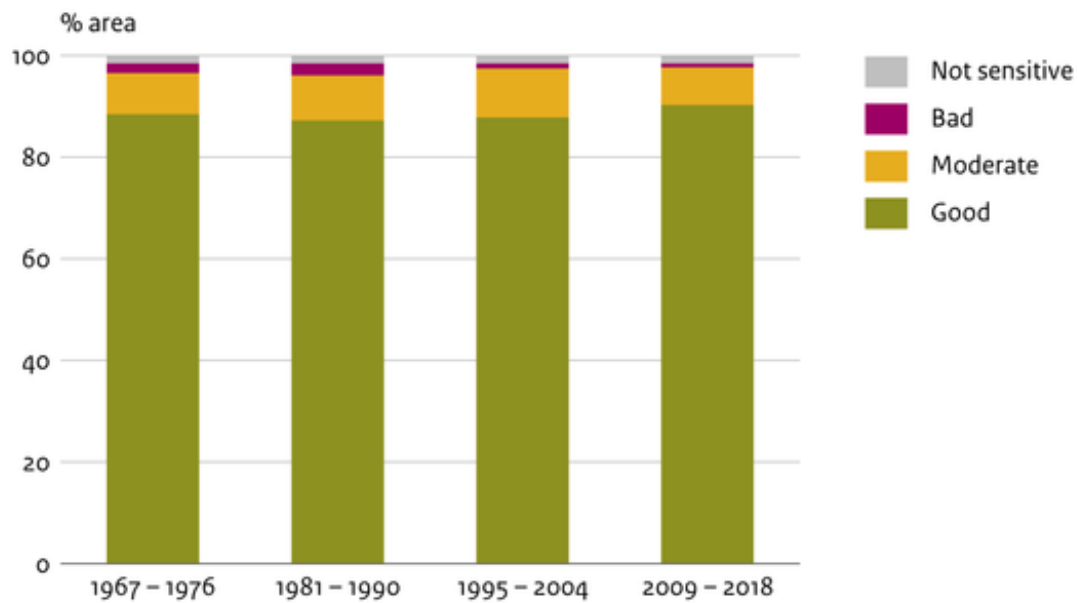


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## Suitability of soil pH for terrestrial ecosystems

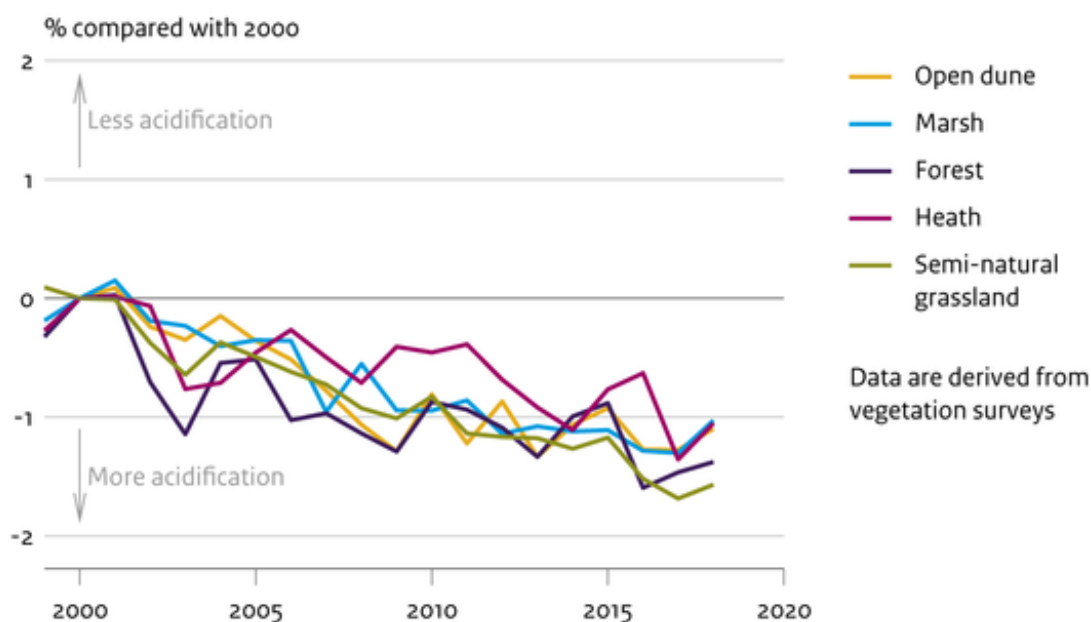


Source: WUR, provinces

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## Trend in soil pH



Source: LMF (provinces, CBS)

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## Soil pH in parts of grasslands, open dunes and marshes is unfavourable

In all ecosystems the trend is that soil pH is decreasing (becoming more acidic) across the country. When soils in natural areas become more acidic, various plant species may disappear as conditions become unsuitable for them. In about a tenth of the area of natural and semi-natural ecosystems the environmental conditions in terms of soil pH are not good. Locations where soil pH is currently moderate to bad are found mainly in natural and semi-natural grasslands, open dunes and marshland. In forests, and to a great extent in heathland, the environmental conditions in terms of soil pH are generally good.

National calculations of soil pH since 1967 show a decrease in pH of sometimes more than a whole unit, for example in the Veluwe region in the centre of the country. For the more acid sandy soils this is a considerable fall in pH and will certainly have an impact on the presence of species. Although the pH is decreasing, the soils in almost half of the area of dry heath and dry forest still have a pH of 4 or more. These pH values fall within the requirements for these ecosystem types and so conditions are still classified as 'good'. If the acidification continues, the number of sites where soil pH is too low, and therefore categorised as moderate or bad, will increase; the conditions in these areas will not be suitable enough to support the desired level of ecological quality.

The vegetation in these areas may respond to the reduction in pH at a later date, in which case the indicative values based on species composition will indicate a higher pH than the actual pH when

measured.

One of the causes of acidification is nitrogen deposition. Atmospheric deposition of acidifying substances causes acidification of the soil in natural areas, leading to a decline or loss of plant and animal species in those areas. Soil acidity is also influenced by changes in hydrological conditions, for example if the flow of base-rich groundwater seepage ceases, or through the accumulation of organic matter in the humus layer. The latter occurs in marshland, especially in fens. The accumulation of organic matter (natural ageing) leads to a lower groundwater level and as a result the influence of rainwater is increased; the marsh becomes drier, nutrient poorer and slightly more acid.

## **Presence of plants indicative of environmental conditions**

Direct measurements of soil and water can be used as indicators of changes in environmental conditions and whether or not current conditions are suitable for the sustainable conservation of ecosystems. However, the availability of such measurement data is limited. Environmental conditions can also be estimated indirectly from the presence of certain plant species and changes in species composition, because plants have specific environmental requirements. The vegetation composition found in an area is therefore indicative of the prevailing environmental conditions at site level. A complicating factor is that vegetation responds later to changes in emissions than, for example, atmospheric concentrations or soil chemistry. It is also possible that no recovery in vegetation composition is observed - and in some cases vegetation composition may even deteriorate - because environmental pollution is still too high and has not declined at all in recent years. The pH values shown here are based on indicative values based on plant species composition.

In the 'monitoring and evaluation methodology' document (van Beek et al., 2018), the provinces and conservation management organisations have set down how environmental conditions can be determined. In anticipation of the first set of monitoring data from the provinces, these and the two indicators below provide a picture of current environmental conditions. Any pronouncements about environmental conditions (good, moderate, bad) are based on comparisons between the current situation and the requirements of the characteristic vegetation types of the management types.

## **Policy focuses on improving environmental conditions**

The Netherlands has made international commitments to meeting the goals of the Convention on Biological Diversity, the Birds and Habitats Directives (Natura 2000) and the EU Biodiversity Strategy.

To prevent the effects of eutrophication and acidification, Dutch environmental policy focuses on reducing emissions of eutrophying and acidifying substances in the Netherlands and surrounding countries. Over the last few decades, both national and international environmental policies have led to cleaner air, resulting in lower acid and nitrogen deposition on ecosystems (Buijsman et al., 2010). Over the same period, the levels of acid deposition caused by sulphur compounds have also been greatly reduced. The acidifying effect of nitrogen deposition has not been reduced, but is much less than the acidifying effect of sulphur deposition in the past. Despite the reduction in environmental pressure of acidifying deposition, a slight increase in soil acidification can be seen in all ecosystems. This is caused by the acidifying effects of nitrogen deposition, but is also partly a result of natural succession. The results achieved are not yet sufficient to halt acidification and create good conditions for the sustainable conservation of ecosystems and species.

- [indicator=nl0183] (in Dutch)
- [indicator=en1592]

## **Restoration measures to combat eutrophication and acidification**

Nature restoration measures have been taken in natural areas since 1989, first under the subsidy scheme for effect-oriented measures (EGM) and in recent years under the 'quality initiative for nature and landscape' (SKNL) and the Integrated Approach to Nitrogen (PAS). In the Nature Pact (EZ, 2013) the national and provincial governments have agreed to maintain ecological quality within the national ecological network by providing a sufficient level of standard conservation management and to raise ecological quality by intensifying efforts for temporary or permanent restoration measures aimed at improving water quality and environmental conditions.

Many of the restoration measures are not only geared to removing nutrients, but also aim to combat acidification and reduced groundwater levels/desiccation. The availability of nutrients depends not only on the current deposition of nitrogen, but also on reduced water levels and the quality of surface water and groundwater. Nitrogen deposition raises the acidity of soils in natural areas, leading to the decline or disappearance of plant and animal species in those areas. Soil acidity can also be influenced by changes in hydrological conditions, such as a loss of base-rich groundwater seepage or the accumulation of organic matter in the humus layer. Acidification, eutrophication and desiccation are environmental factors that can reinforce each other.

- [indicator=en1594]
- [indicator=en1592]

## References

- Buijsman et al., (2010). Zure regen. Een analyse van dertig jaar verzuringsproblematiek in Nederland. PBL publicatienummer 50009300
- EZ (2013). Kamerbrief Natuurpact. Ministerie van Economische Zaken, Landbouw & Innovatie, Den Haag.
- Van Beek, J.G, R.F. van Rosmalen, B.F. van Tooren & P.C.van der Molen (2018), Werkwijze Monitoring en Beoordeling Natuurnetwerk en Natura 2000/PAS. Utrecht: BIJ12

## Relevant information

- [Aanpak stikstof](#) [11]
- [indicator=nl0461] (in Dutch)
- [indicator=nl0441] (in Dutch)
- [indicator=nl0493] (in Dutch)

## Reference for this page

CBS, PBL, RIVM, WUR (2021). [Ecosystem quality and trends in soil pH, 2018](#) [12] (indicator 1593, version 03 , 9 November 2021 ). [www.environmentaldata.nl](http://www.environmentaldata.nl). Statistics Netherlands (CBS), The Hague; PBL Netherlands Environmental Assessment Agency, The Hague; RIVM National Institute for Public Health and the Environment, Bilthoven; and Wageningen University and Research, Wageningen.

**Source URL:** <https://www.clo.nl/en/indicators/en159303>

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