



Update target achievement water quality 2018

Addendum to the report *A closer look at integrated pest management*

Note

Aaldrik Tiktak

28 November 2019

Update target achievement water quality 2018. Addendum to the report *A closer look at integrated pest management*

© PBL Netherlands Environmental Assessment Agency
The Hague, 2019

PBL-publication number: Addendum to PBL-publication 3878

Auteur

Aaldrik Tiktak

Contact

Aaldrik Tiktak [aaldrik.tiktak@pbl.nl]

Graphics

Beeldredactie PBL (figuur 1), Aaldrik Tiktak (figuur 2 en 3)

This publication can be downloaded from: www.pbl.nl/en. Parts of this publication may be reproduced, providing the source is stated, in the form: Tiktak A. (2019), *Update target achievement water quality 2018. Addendum to the report A closer look at integrated pest management*. PBL Netherlands Environmental Assessment Agency, The Hague.

PBL Netherlands Environmental Assessment Agency is the national institute for strategic policy analysis in the fields of the environment, nature and spatial planning. We contribute to improving the quality of political and administrative decision-making by conducting outlook studies, analyses and evaluations in which an integrated approach is considered paramount. Policy relevance is the prime concern in all of our studies. We conduct solicited and unsolicited research that is both independent and scientifically sound.

Update target achievement water quality 2018

The number of exceedances of the water quality standards for chronic exposure of aquatic organisms has decreased by approximately 30% in 2016-2018, compared to the reference period 2011-2013. For acute exposure, exceedances occurred 50% less often. In the report A closer look at integrated pest management, PBL reported a decrease of 15% for chronic exposure and 30% for acute exposure. These figures were based on the period 2015-2017, because the 2018 monitoring results were not available when the report was published. It can be concluded that the water quality has further improved; however, despite this improvement, the target set in the policy document has not been achieved for chronic exposure. The trend is uncertain because of the increased use of non-testable substances. Non-testable substances are toxic substances that have a water quality standard lower than the limit of quantification. More attention is needed for better monitoring of these non-testable substances.

In the policy document 'Healthy Growth, Sustainable Harvest' (EZ 2013), the Dutch Government presented its plant protection policy for the 2013–2023 period. The policy document is the Dutch implementation of the European Directive on the Sustainable Use of Pesticides (2009/128/EC). The policy document sets targets based on measured exceedances of the Environmental Quality Standards of the Water Framework Directive (WFD). The target is to reduce the number of exceedances of the water quality standards by 50% by 2016-2018, compared to 2011-2013.

According to the interim evaluation of the policy document 'Healthy Growth, Sustainable Harvest' (PBL 2019ab), the target of reducing the number of exceedances by 50% has not yet been achieved. This was based on monitoring results for the period 2013-2017 because the monitoring results for the year 2018 were not yet available. This note provides an update of this evaluation.

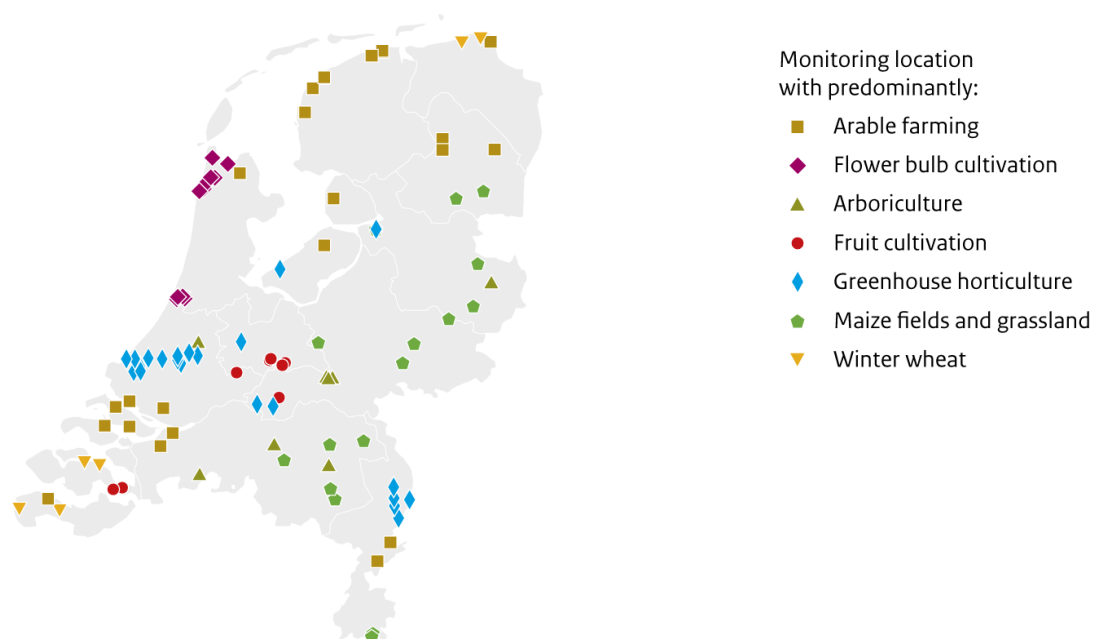
1 Methods

Evaluation based on a network specifically designed for this evaluation

In accordance with the policy document, the assessment is based on the water quality standards of the Water Framework Directive (WFD). The WFD has two standards: a standard for chronic exposure of aquatic organisms in which the annual average concentration level of a substance in water is tested (the AA-EQS) and a standard for acute exposure of aquatic organisms in which the maximum measured annual concentration is tested (the MAC-EQS). The WFD requires both standards to be met. Both standards have therefore been considered in this evaluation. Contrary to previous evaluations, we now use a monitoring network specifically set up for the evaluation: The National Crop Protection Monitoring Network (LM-GBM; De Weert et al. 2014). This network has been operational since 2013 and contains 96 fixed monitoring points (Figure 1). This makes it easier than before to determine a trend based on the measurements. Trend projections are made robust by considering a three-years moving average instead of annual values, so target achievement is evaluated by comparing the averages for the 2011-2013 and the 2016-2018 periods (Tamis & van 't Zelfde 2017).

Figure 1

Monitoring locations in the National Monitoring Network Crop Protection, 2017



Source: www.bestrijdingsmiddelenatlas.nl

2 Results

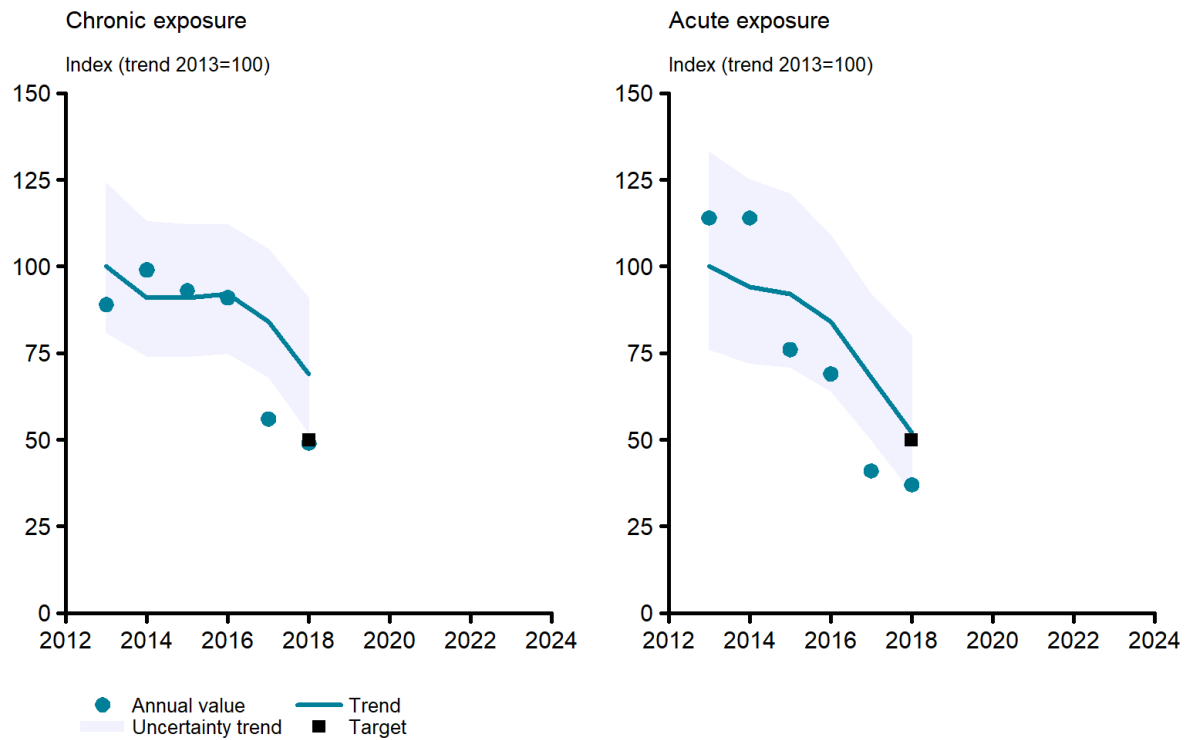
The number of exceedances is further decreasing...

The number of exceedances of the water quality standards for chronic exposure of aquatic organisms has decreased by approximately 30% in 2016-2018, compared to the reference period 2011-2013 (Figure 2, on the left). For acute exposure, exceedances occurred 50% less often (Figure 2, on the right). In the report *A closer look at integrated pest management* (PBL 2019b), PBL reported a decrease of 15% for chronic exposure and 30% for acute exposure. It can therefore be concluded that the water quality with respect to plant protection products has further improved. However, despite this improvement, the target set in the policy document has not been achieved for chronic exposure. The decrease in exceedances of the MAC-EQS is good news for aquatic organisms, as particularly high peak concentrations have a negative impact (EFSA PPR Panel 2013). The decrease in exceedances of the MAC-EQS is mainly due to the reduced use of the substance imidacloprid. This implies that restrictions on the use of the most toxic substances is an effective measure to improve water quality.

... but the number of sites where exceedances occur remains almost the same

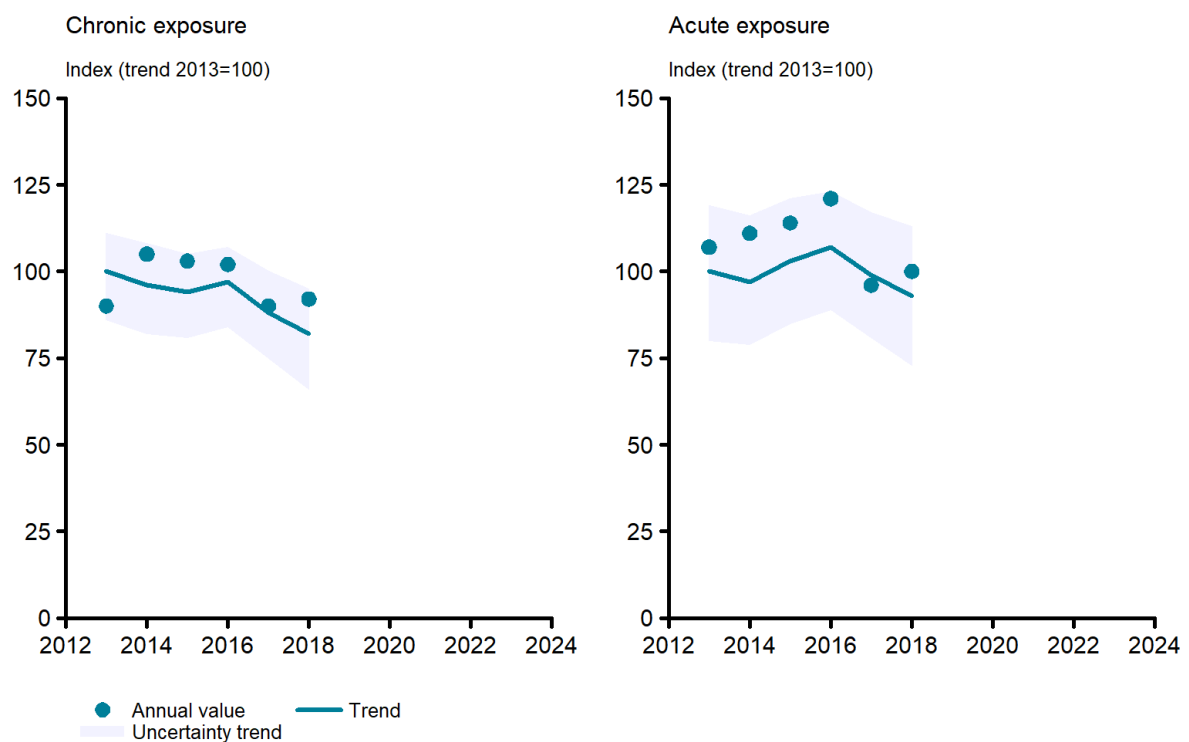
The reduction in the number of exceedances has not led to the same reduction in the number of locations with exceedances of the water quality standards (Figure 3). According to the WFD, if at a certain site at least one substance is found above the standard, the entire site is in exceedance (the 'one out-all out' principle). Depending on the extent to which one substance exceeds the standards, the effect on aquatic life may already be significant (Brock et al. 2011; EFSA PPR Panel, 2013). Most exceedances are found in ditches near tree nurseries, flower bulbs, fruit cultivation and greenhouse horticulture (Tamis & van 't Zelfde 2019), which is in line with results of the earlier evaluation (PBL 2012).

Figure 2
Exceedances of the Water Framework Directive quality standards



Source: www.bestrijdingsmiddelenatlas.nl

Figure 3
Locations where Water Framework Directive water quality standards were exceeded for at least one substance



Source: www.bestrijdingsmiddelenatlas.nl

Imidacloprid is still the most important problem substances

Table 1 shows the 10 most important problem substances. Imidacloprid concentrations were most often above the water quality standards; however, the number of exceedances has decreased since 2011-2013. This decrease is caused by restrictions on the use of the substance in 2013. In 2019, further restrictions have been imposed. Future monitoring must reveal if this leads to further improvement of water quality. Notice that the most toxic substances such as esfenvalerate and ETU are often not-testable (next paragraph). Trend predictions based on measurements are therefore laced with uncertainty.

Table 1

Substances that most often exceeded the standard for chronic exposure

Substance	Group	Locations where the standard is exceeded (%)	
		2011-2013	2016-2018
Imidacloprid	Insecticide	64	37
Fluoxastrobin	Fungicide	28	17
Thiacloprid	Insecticide	12	14
Esfenvalerate	Insecticide	7	11
ETU	Fungicide	33	12
Spinosad	Insecticide	17	12
Pendimethalin	Herbicide	3	9
Carbendazim	Fungicide	9	9
Pyraclostrobin	Fungicide	25	8

Source: www.bestrijdingsmiddelenatlas.nl

More attention needed for non-testable substances in the measurements

The most toxic substances do not appear in the measurements, because in practice they cannot be measured in surface water. These so-called non-testable substances have a water quality standard that is lower than the limit of quantification for this substance. PBL (2019b) showed that the use of these toxic substances has increased. This is particularly the case for the insecticides deltamethrin, lambda-cyhalothrin and esfenvalerate. PBL (2019b) also showed that these three substances account for 90% of the total calculated aquatic risk. It is therefore likely that the trend in environmental risk that is based on measurements alone is too optimistic. Trend predictions could be improved by paying more attention to the monitoring of these non-testable substances, for example by applying dedicated analytical methods.

3 Conclusions

Further improvement of measured water quality; however, due to the increased use of non-testable substances this statement is uncertain

The number of exceedances of the water quality standards for chronic exposure of aquatic organisms has decreased by approximately 30% in 2016-2018, compared to the reference period 2011-2013. For acute exposure, exceedances occurred 50% less often. In the report *A closer look at integrated pest management*, PBL reported a decrease of 15% for chronic exposure and 30% for acute exposure. These figures were based on the period 2015-2017, because the 2018 monitoring results were not available when the report was published. It can be concluded that the water quality has further improved; however, despite this improvement, the target set in the policy document has not been achieved for chronic exposure. The trend is uncertain because of the increased use of non-testable substances. Non-testable substances are toxic substances that have a water quality standard lower than the limit of quantification. More attention is needed for better monitoring of these non-testable substances.

Additional policies are needed to achieve the ultimate target of the policy document

The ultimate target of the policy document *Healthy Growth, Sustainable Harvest* is to reduce the number of exceedances in 2023 by 90% compared to 2013. Additional policies are needed to achieve this target. The report *A closer look at integrated pest management* (PBL, 2019b) mentions several options including:

- Repairing shortcomings in the Dutch authorisation procedure of plant protection products;
- Additional emission reducing measures with the note that these should not be accounted for as a mitigation measure in the authorisation procedure;
- Reduction of the use of the most toxic substance by setting a ceiling to the total environmental risk;
- Region-specific and sector-specific projects. These projects are especially effective if they increase the awareness of growers through intensive support and by discussing results of environmental monitoring with growers. In addition, subsidies may help to take non-statutory measures; for example, to limit emissions from farm yards to surface water.

References

- Brock T.C.M., G.H.P. Arts, T.E.M. Hulscher, F.M.W. de Jong, R. Luttik, E.W.M. Roex, C.E. Smit & P.J.M. van Vliet (2011), Aquatic effect assessment for plant protection products. Dutch proposal that addresses the requirements of the Plant Protection Regulation and the Water Framework Directive, Alterra Report 2235. Wageningen: Alterra.
- De Weert, J., E. Roex, J. Klein, G. Janssen (2014), Opzet Landelijk meetnet gewasbeschermingsmiddelen land- en tuinbouw. Deltares rapport 1207762-008. http://publications.deltares.nl/1207762_008.pdf
- EFSA PPR Panel (2013). Guidance on tiered risk assessment for plant protection products for aquatic organisms in edge-of-field surface waters. *EFSA Journal* 11(7):3290.
- EZ (2013). Nota Gezonde Groei, Duurzame Oogst. Den Haag: EZ.
- PBL (2012), Evaluatie van de nota duurzame gewasbescherming, PBL Publicatienummer 389. The Hague: PBL Netherlands Environmental Assessment Agency.
- PBL (2019a), Geïntegreerde gewasbescherming nader beschouwd. Tussenevaluatie van de nota Gezonde Groei, Duurzame Oogst, PBL publicatienummer 3549. The Hague: PBL Netherlands Environmental Assessment Agency.
- PBL (2019b), A closer look at integrated pest management. Interim assessment of the policy document 'Healthy Growth, Sustainable Harvest', PBL Publication number 3860. The Hague: PBL Netherlands Environmental Assessment Agency.
- Tamis, W.L.M. & M. van 't Zelfde (2017), Uitwerking referentieperiode Tweede nota Duurzame Gewasbescherming, Leiden: CML.
- Tamis, W.L.M. & M. van 't Zelfde (2019), Gewasbeschermingsmiddelen in het oppervlaktewater in Nederland: metingen. Bijdrage aan het deelrapport milieu van de Tussenevaluatie van Gezonde Groei, Duurzame Oogst, Tweede nota duurzame gewasbescherming periode 2013 tot 2023, Leiden: CML.
- Verschoor, A., J. Zwartkruis, M. Hoogsteen, J. Scheepmaker, F. de Jong, Y. van der Knaap, P. Leendertse, S. Boeke, R. Vijftigschild, R. Kruijne & W. Tamis (2019), Tussenevaluatie van de nota 'Gezonde Groei, Duurzame Oogst' : Deelproject Milieu, RIVM rapport 2019-0044, Bilthoven: RIVM.