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FINAL REPORT OF A FACT-FINDING MISSION  
CARRIED OUT IN  
SWEDEN  
FROM 12 TO 16 JUNE 2017  
IN ORDER TO  
EVALUATE THE IMPLEMENTATION OF MEASURES TO ACHIEVE THE  
SUSTAINABLE USE OF PESTICIDES

*In response to information provided by the competent authority, any factual error noted in the draft report has been corrected; any clarification appears in the form of a footnote.*

## ***Executive Summary***

*This report describes the outcome of a fact-finding mission in Sweden, carried out from 12 to 16 June 2017 as part of the published Directorate-General for Health and Food Safety programme for 2017.*

*The objective of the mission was to investigate the implementation of measures to achieve the sustainable use of pesticides, in particular the implementation of the requirements set out under Directive 2009/128/EC of the European Parliament and of the Council, and to identify the main obstacles/difficulties encountered in the implementation of this Directive, as well as good practices.*

*Sweden has had action programmes to reduce the use of chemical pesticides since the 1980s. The current National Action Plan focuses on reducing the risks associated with, and dependency on, pesticides. It establishes clear objectives, with specific targets in some cases. The first formal review of the current plan is on-going, and is expected to be concluded by the end of 2017. Therefore, it cannot yet be determined whether the objectives of the plan have been achieved. Nevertheless, the risks to human health and the environment associated with pesticides in Sweden are low by historic standards, and remain stable against a backdrop of increasing use in recent years.*

*The Competent Authorities have taken a range of measures to implement the Directive. These include systems for training professional users and distributors, and for testing pesticide application equipment. Aerial spraying has been prohibited, and no derogations have been granted to date. Measures have been put in place to protect the aquatic environment and drinking water, and data from the monitoring of municipal water supplies demonstrates high levels of compliance with drinking water quality standards.*

*The Swedish approach to Integrated Pest Management is based around training and education, with a focus on sustainable agriculture in general, rather than on plant protection in particular. There is independent, publicly-funded information available to guide professional users in Integrated Pest Management. The Competent Authorities believe that the vast majority of professional users implement the principles of Integrated Pest Management, however there is no systematic assessment of implementation of the eight principles of IPM as described in Annex III of the SUD.*

*The report highlights a number of good practices identified in the course of the mission, such as an extensive pest monitoring system. In addition, both the Competent Authorities and other interested parties identified potential obstacles to the sustainable use of pesticides such as the lack of applied research under Swedish conditions to facilitate professional users in the implementation of Integrated Pest Management and difficulties in assessing the implementation of Integrated Pest Management.*

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## ABBREVIATIONS AND DEFINITIONS USED IN THIS REPORT

<b>Abbreviation</b>	<b>Explanation</b>
CA(s)	Competent authority(ies)
CAB	County Administrative Board
EU	European Union
ha	hectare(s)
IPM	Integrated Pest Management
KEMI	Swedish Chemicals Agency
MS(s)	Member State(s)
NAP(s)	National Action Plan(s)
Natura 2000	Network of nature protection areas
NFA	National Food Agency
PAE	Pesticide Application Equipment
PPE	Personal Protective Equipment
PPP	Plant Protection Product
SBA	Swedish Board of Agriculture
SEPA	Swedish Environmental Protection Agency
SFA	Swedish Forest Agency
SLU	Swedish University of Agricultural Sciences
SPIC	Swedish Poisons Information Centre
SUD	Sustainable Use Directive
SwAM	Marine and Water Authority
UAA	Utilisable Agricultural Area
WEA	Work Environment Authority

## **1 INTRODUCTION**

This mission formed part of the Directorate-General for Health and Food Safety planned programme for 2017. The mission took place from 12 to 16 June 2017. The mission team comprised two staff members from DG Health and Food Safety and one expert from a European Union (EU) Member State (MS).

This fact-finding mission was carried out in agreement with the Competent Authorities (CAs).

An opening meeting was held with all CAs listed in Chapter 5.2 and one municipality. At this meeting, the mission team confirmed the objectives of, and itinerary for, the mission and information required for the successful completion of the mission was requested.

## **2 OBJECTIVES AND SCOPE**

The objectives of the mission were to:

1. Investigate the implementation of measures to achieve the sustainable use of pesticides, as set out under Directive 2009/128/EC of the European Parliament and of the Council, hereinafter referred to as the Sustainable Use Directive (SUD).
2. Identify the main obstacles or difficulties encountered, as well as good practices with regard to the implementation of the SUD.

Article 2 of the SUD states that it shall apply to pesticides that are defined as plant protection products (PPPs) under Regulation (EC) No 1107/2009 and in keeping with this approach, all references to pesticides in this report also refer to PPPs.

In pursuit of the mission objectives, meetings were held with the Swedish Environmental Protection Agency (SEPA), the Swedish Chemicals Agency (KEMI), the Swedish Board of Agriculture (SBA), the National Food Agency (NFA), the Swedish Poisons Information Centre (SPIC), the Geological Survey of Sweden, the Marine and Water Authority (SwAM), the Swedish University of Agricultural Sciences (SLU), the Swedish Forest Agency (SFA), the Work Environment Authority (WEA), one country administrative board and one municipality. There were also meetings with representatives of other relevant bodies, such as farmers' and food retailers' associations, private quality assurance schemes and private advisory services. In addition, the mission team visited a research farm, a golf course and a demonstration farm.

The scope of the mission included relevant national legislation, the designation of relevant CAs, and the communication and co-operation within and between these CAs. The mission focused on Articles 4 to 15 of the SUD.

## **3 LEGAL REQUIREMENTS**

This fact-finding mission was carried out in agreement with the CAs. Relevant legislation and applicable standards are listed in Annex I.

## 4 BACKGROUND

### 4.1 LEGAL CONTEXT

The SUD establishes a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of Integrated Pest Management (IPM) and of alternative approaches or techniques such as non-chemical alternatives to pesticides.

Article 4 of the SUD requires MS to adopt National Action Plans (NAPs) to set up quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use and to encourage the development and introduction of IPM and of alternative approaches or techniques in order to reduce dependency on the use of pesticides. In addition, the NAPs shall also include indicators to monitor the use of pesticides containing active substances of particular concern, especially if alternatives are available. In their NAPs, MS shall describe how they will implement measures pursuant to Articles 5 to 15 of the SUD. NAPs shall be reviewed at least every five years and any substantial changes shall be reported to the Commission without undue delay.

### 4.2 PREVIOUS AUDIT SERIES

This was the last of six fact-finding missions planned for 2017 in MS to investigate the implementation of measures to achieve the sustainable use of pesticides under the SUD.

During 2012–2014 and 2015–2016, two audit series covering official controls on the marketing and use of pesticides were undertaken, during which 19 and 11 MS were audited, respectively. In both series, some aspects of the SUD were examined. In relation to the SUD, the overview report of the 2012–2014 series concluded that *"Initial measures were adequately put into place for the implementation of Directive 2009/128/EC, in particular, training and certification of professional users, safe handling and storage of PPPs, their containers and remnants, IPM and application equipment. This is a step forward to ensure the sustainable use of pesticides."* (See overview report DG(SANTE)/2015-7567) [http://ec.europa.eu/food/audits-analysis/overview\\_reports/details.cfm?rep\\_id=79](http://ec.europa.eu/food/audits-analysis/overview_reports/details.cfm?rep_id=79).

The overview report of the 2015–2016 series concluded that *"All Member States visited had taken significant steps in the implementation of those aspects of Directive 2009/128/EC on the sustainable use of pesticides which were examined. These included the establishment of operator training programmes and sprayer testing systems. Areas treated with plant protection products by aerial spraying have declined significantly in recent years, and this practice is now confined to limited areas, under derogation."* (See overview report DG(SANTE)/2016-6004) [http://ec.europa.eu/food/audits-analysis/overview\\_reports/details.cfm?rep\\_id=109](http://ec.europa.eu/food/audits-analysis/overview_reports/details.cfm?rep_id=109).

### 4.3 COUNTRY PROFILE AND STATISTICS

DG Health and Food Safety has published a country profile for Sweden which can be found on the web-site of DG Health and Food Safety [http://ec.europa.eu/food/audits-analysis/country\\_profiles/details.cfm?co\\_id=SE](http://ec.europa.eu/food/audits-analysis/country_profiles/details.cfm?co_id=SE). This summarises the control systems for food and feed, animal health and welfare, and plant health, and gives an overview on the implementation of recommendations of audit reports.

Sweden comprises 40.8 million hectares (ha), of which 70% is covered in forest. The Utilisable Agricultural Area (UAA) is just over three million ha, and comprises 85% arable

land and 15% permanent grassland and meadow. The most important crops are cereals and fodder crops. Arable farming is confined to the southern parts of Sweden, and 60% of all pesticides are used in Skåne, the most southern, and hence the most intensively cultivated county, in the country. The area dedicated to organic production has increased by 40% since 2010, and now accounts for over 460 000 ha, equivalent to 15% of UAA, significantly above the EU average of just over six per-cent.

Pesticide sales, measured in tonnes of active substance, range between 2 300 and 2 400 tonnes per year, and account for 0.6% of the total EU market [http://ec.europa.eu/eurostat/statistics-explained/index.php/Pesticide\\_sales\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Pesticide_sales_statistics).

Herbicides comprise approximately 80% of the market, with fungicides between 10-15%. The total number of active substances in authorised pesticides is approximately 150. The number of non-chemical active substances in authorised pesticides has increased sharply in recent years from just one in 2010 to 16 in 2015, so that this category of pesticide now comprises 11% of all active substances in authorised products in Sweden.

## **5 FINDINGS AND CONCLUSIONS**

### **5.1 RELEVANT NATIONAL LEGISLATION**

#### **Legal requirements**

Article 23 of Directive 2009/128/EC on transposition

Article 291 of the Treaty on the Functioning of the EU

#### **Findings**

1. The CAs confirmed to the mission team that Sweden transposed Directive 2009/128/EC into national law via a Regulation on Pesticides (2014:425).
2. The following implementing national legislation in relation to SUD is in place:
  - SEPA Ordinance on application and handling of pesticides (NFS 2015:2);
  - Regulation on environmental supervision (NFS 2011:13);
  - KEMI Ordinance on pesticides (KIFS 2008:3);
  - SBA Ordinance on the use of pesticides (SJVFS 2014:35);
  - SBA Ordinance on amendments to, and General Advice on, Integrated Plant Protection (SJVFS 2014:42);
  - SBA Ordinance on documentation requirements for professional users of pesticides (SJVFS 2015:49);
  - SBA Ordinance and General Advice on Review, Function Testing and Approval of Pesticide Application Equipment (SJVFS 2016:23);
  - Swedish Forest Agency's Ordinance and general advice concerning the use of pesticides on forest land (SKSFS 2016:2);
  - SwAM Regulations on classification and environmental standards for surface water (HVMFS 2013:19 and HVMFS 2015:4);

- Geological Survey of Sweden Ordinance on status classification and environmental quality standards for ground water (2013:2);
  - NFA Ordinance on drinking water (SLVFS 2001:30);
  - Waste Regulation (SFS 2011:927).
3. Implementing guidance has also been issued. A SEPA guidance document deals with the application and interpretation of NFS 2015:2 for municipalities and users of pesticides. SEPA and SwAM have jointly issued a guidance document for issuing permits for the use of pesticides in water protection areas.

## **5.2 COMPETENT AUTHORITIES**

### **Legal Requirements**

Articles 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 of Directive 2009/128/EC

### **Findings**

4. The following CAs are responsible for the implementation of the SUD:
- Ministry of the Environment and Energy: National policy for the environmental aspects of the SUD, supervision of SEPA and KEMI;
  - Ministry of Enterprise and Innovation: National policy for all areas, except environmental aspects of the SUD, and supervision of SBA and SFA;
  - SBA: Co-ordination, monitoring and evaluation of the NAP;
  - SEPA: Environmental aspects of the SUD;
  - KEMI: Controls of manufacturers and importers of pesticides;
  - Swedish Forest Agency: Use of pesticides in forestry;
  - SPIC: Acute poisoning linked to pesticides;
  - Geological Survey of Sweden and SwAM: Pesticides in ground water;
  - SLU: Pesticides in the aquatic environment;
  - NFA: Control of pesticides in drinking water (tap water) under Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption (the Drinking Water Directive).
  - County Administrative Boards (CABs): Training of distributors and professional users of pesticides and awareness raising;
  - WEA: Safety of pesticide users and data on chronic poisoning;
  - Municipalities: Implementation of controls regarding sales and use of pesticides.

## **5.3 NATIONAL ACTION PLAN**

### **Legal Requirements**

Article 4 of Directive 2009/128/EC on National Action Plans

### **Findings**

5. Action programmes to reduce the use of chemical pesticides have been in place since the 1980s in Sweden. Whereas previous action plans focused on use reduction, the current NAP focuses on reducing the risks associated with, and dependency on, pesticides. The CAs stated that this fundamental change in policy occurred because their experience showed that reduction in use is not the most effective means to reduce the risks associated with pesticides.
6. The overall Swedish environmental policy is encapsulated in 16 environmental quality objectives ([www.miljomal.se](http://www.miljomal.se)), which have been adopted by the Parliament. These objectives cover a range of areas such as climate change, air and water quality, biodiversity and non-toxic environment. The objective of the non-toxic environment is relevant to the sustainable use of pesticides. This states that the occurrence of man-made or extracted substances in the environment must not represent a threat to human health or biological diversity. The current NAP is aligned to this high level national objective. It covers the period 2013-2017 and specifies objectives, the actions needed to achieve these, and monitoring activities to measure progress towards the achievement of the objectives.
7. The NAP has five main objectives, but there are very few specific quantifiable targets established in the plan. Finally, while progress towards achievement of four of the objectives can be measured, at least to some extent, there are no clear criteria proposed to measure progress in developing sustainable cultivation systems, leading to a reduction in dependency on chemical pesticides.
8. The first objective is reducing the risks to the environment and to health.
  - The NAP states that progress towards this objective will be assessed by;
    - i. The proportion of agricultural land under organic cultivation,
    - ii. The number and total size of protected areas. (Protected areas are not formally defined in the NAP, but the CAs explained that these are areas from which surface water or ground water is used for drinking water),
    - iii. The proportion of conifer saplings protected using non-chemical methods,
    - iv. The proportion of non-chemically treated seed,
    - v. The use of growth regulators in crops other than rye,
    - vi. The use of pesticides in cereal crops before harvest.
9. The second objective is reducing the levels of pesticides in surface and groundwater to almost zero in line with the Swedish Parliament's 'Non-toxic environment' environmental quality objective by 2020.
  - Progress towards this objective is assessed by;
    - i. Findings of pesticides in water monitoring programmes,
    - ii. The number and total size of protected areas,
    - iii. The proportion of agricultural land under organic cultivation,

- iv. Statistics on the sales of products containing *bentazone*, *pendimethalin* and various *pyrethroids*.
10. The third objective is ensuring that pesticide residues in domestically grown vegetables are low and do not present a risk to consumers.
    - Progress towards this objective is assessed by;
      - i. Monitoring changes in the total intake of pesticides residues from domestically grown vegetables,
      - ii. The quantities of growth regulators used in cereals,
      - iii. The proportion of agricultural land under organic cultivation.
  11. The fourth objective is ensuring that professional users of pesticides are exposed to a low level of risk by taking safety measures and establishing appropriate working processes.
    - Progress towards this objective is assessed by;
      - i. Monitoring the goals on the basis of statistics and other investigations,
      - ii. Monitoring the use by professional users of personal protective equipment (PPE).
  12. The fifth, and final, objective is developing sustainable cultivation systems to a greater extent, including alternative approaches or techniques, in order to reduce dependency on chemical pesticides.
    - Progress towards this objective is assessed by;
      - i. Reports from supervisory projects on the application of rules on IPM,
      - ii. The proportion of agricultural land under organic cultivation,
      - iii. The proportion of conifer saplings protected using non-chemical methods,
      - iv. The proportion of non-chemically treated seed,
      - v. The use of growth regulators in cereal crops other than rye.
  13. The revision of the NAP was on-going at the time of the mission. The CAs stated that the review of the current NAP, and the new NAP, should be finalised by the end of 2017, with the new NAP planned to cover the period 2018-2022.

### **Conclusions**

14. Sweden has had action programmes to reduce the use of chemical pesticides since the 1980s.
15. The current NAP focuses on reducing the risks associated with, and dependency on, pesticides. It establishes clear objectives, with specific targets in some cases.
16. The first formal review of the plan is on-going, and is expected to be concluded by the

end of 2017.

## 5.4 TRAINING AND CERTIFICATION OF OPERATORS

### Legal Requirements

Article 5 of Directive 2009/128/EC on training and certification

Article 6 of Directive 2009/128/EC on pesticide sales

### Findings

17. Under national legislation, Sweden classifies pesticides into three classes. Prior to 1990, Sweden required that users of Class 1 pesticides (i.e. those which are more hazardous) had to be trained. This requirement was extended to all professional use pesticides, i.e. Class 1 and Class 2, in 1990. Initial training comprises four days, followed by an exam, which must be passed in order to receive the certificate. Certificates are valid for five years. Operators must undertake one day additional training within the five-year period to remain certified.
18. Training is also required for distributors/retailers of both professional and non-professional use pesticides. All premises selling pesticides must have a trained person available to provide advice on safe pesticide use. The CAs' view is that their policy of requiring retailers of amateur use pesticides to have trained staff available helps to ensure that amateur users receive sufficient advice at the time of purchase to guide them in safe use. They believe that this approach is preferable to relying on people to read the product label or other relevant literature and as such, they consider that this is a good practice.
19. The CAs stated that in Sweden, training and certification is not mandatory for advisors, but may be undertaken on a voluntary basis. They believe that, in practice, the majority of advisors have relevant training or experience, attend the initial and additional training, and are certified.
20. SBA has drawn up a curriculum for the training of users and KEMI has developed a curriculum for the training of distributors. The curriculum covers all aspects in Annex I of the Directive. SBA and the CABs provide training for professional users and distributors. In addition, SBA organises annual training for CAB staff involved in providing training to update them as necessary. SBA maintains a register of certified users. This is not publicly available, but is available upon request to other authorities.
21. At the time of the mission, there were over 20 000 trained professional users and about 100 trained distributors. The CAs do not know what proportion of all operators that are required to be trained and certified have complied with their obligations in this area.

## **Conclusions**

22. Sweden has established a system for the training and certification of operators involved in the distribution and use of pesticides authorised for professional use, in line with EU requirements, with the exception of advisors, in which case, the CA do not require these operators to be trained and certified.

## **5.5 INFORMATION AND AWARENESS-RAISING**

### **Legal Requirements**

Article 7 of Directive 2009/128/EC on information and awareness-raising

Article 10 of Directive 2009/128/EC on information to the public

### **Findings**

23. The CAs stated that there is a wide range of information in relation to SUD available to the public. They publish and distribute leaflets and brochures, such as the "Gifter & Miljö 2014" brochure, which provides information on pesticides in water <http://www.naturvardsverket.se/Om-Naturvardsverket/Publikationer/ISBN/6600/978-91-620-6623-9/>. In addition, they attend agricultural fairs to inform attendees, comprising both professional users and the general public, about the risks associated with pesticides, and in particular, risks relating to human health.
24. The authorities also referred to websites with relevant information and gave examples of the website of the SEPA <http://www.swedishepa.se/>, which has relevant legislation and information on pesticides in the environment and the KEMI website (<http://www.kemi.se/en>) with targeted information on pesticides for the general public, such as Guidance on pesticides for home gardens (<http://www.kemi.se/en/guidance-for/consumers/articles-and-chemical-products>).
25. The SPIC is the CA responsible for gathering data on acute poisoning caused by pesticides. They record the number of queries received, rather than the number of confirmed cases, relating to acute poisoning. In addition, queries relating to both PPPs and biocides are recorded under pesticides, and it is not possible to retrospectively determine what proportion of queries relate to PPPs. The WEA maintain a register of all workplace related accidents and injuries, which includes chronic poisoning linked to pesticides. They emphasised that it is very difficult to collect accurate data on chronic health impacts linked to pesticides, as there is a wide range of contributory factors associated with chronic health problems and there can be a significant time lag between exposure to the pesticide and expression of symptoms.
26. The CAs added that the public must be informed at least one week prior to pesticide use in areas where persons could be exposed to spray drift. This is done by the spray

operator/landowner, by erecting signs at the location to be treated. These signs must remain in place for one month after the treatment has been applied.

## **5.6 PESTICIDE APPLICATION EQUIPMENT**

### **Legal Requirements**

Article 8 of Directive 2009/128/EC on inspection of equipment in use

### **Findings**

27. Testing and certification of pesticide application equipment (PAE) was not obligatory in Sweden prior to the SUD, but there was a voluntary system. The current inspection requirement covers all boom sprayers (including those with booms less than 3 metres wide), aerial spraying equipment, orchard blast sprayers, spray trains and pesticide application through irrigation systems. The testing interval is three years in all cases and new equipment must also be tested within three years of purchase, both of which go beyond the minimum requirements of the Directive. Sweden does not require testing of hand held equipment e.g. knapsack sprayers, granule applicators, seed treatment equipment or smoking/fogging equipment.
28. The SBA is the CA responsible for testing and granting of certificates for PAE. The SBA also trains and approves PAE testing operators and manages the register of tested PAE. There are about 120 certified inspectors. The CAs stated that supervision of PAE testing operators is planned to start during 2018. They added that the tests are in line with Annex II of the SUD and the relevant EN standard, where applicable. Currently, about 5 000 sprayers have been tested. The SBA estimate that there are a further 5 000 - 10 000 sprayers in the country, but believe that many of these may no longer be in use. Municipalities first examined compliance with PAE testing requirements as part of end user controls in 2017 and at the time of the mission data was not yet available on compliance rates.

## **5.7 AERIAL SPRAYING**

### **Legal Requirements**

Article 9 of Directive 2009/128/EC on aerial spraying

### **Findings**

29. Aerial application of pesticides has been prohibited in Sweden since 1986, except under derogation, and is currently prohibited under the Environmental Code, with the possibility of granting derogations under the Regulation on Pesticides 2014/425. The most recent derogations granted were in 1998 to control insect pests in forestry. The SEPA are the CA responsible for dealing with derogation requests. The criteria for assessing applications are defined in the Regulation on Pesticides 2014:425, and are in line with Article 9 of the SUD.

30. The CAs indicated that pesticide application using drones is prohibited under Article 9 of the Directive and under national legislation, and is only possible under derogation.

## **5.8 WATER PROTECTION**

### **Legal Requirements**

Article 11 of Directive 2009/128/EC on specific measures to protect the aquatic environment and drinking water, and relevant provisions of Directive 2000/60/EC

### **Findings**

31. There is a general requirement in Sweden to choose the least dangerous chemical if alternative products are available (the so-called product choice principle). This principle is further reinforced through a requirement in the Regulation on Pesticides 2014:425, which creates an obligation to give preference to pesticides that are not classified as dangerous to the aquatic environment or containing priority hazardous substances as set out in the Water Framework Directive (2000/60/EC).
32. Sweden, like other MS, establishes product-specific aquatic buffer zones when authorising pesticides. These product-specific buffer zones are complemented by a range of buffer zones in Swedish legislation, which requires a minimum buffer zone of two metres alongside open ditches, sewers and drains, six metres adjacent to lakes and other water courses, and 12 metres next to wells used to abstract drinking water. Furthermore, PAE cannot be filled or cleaned within 30 metres of open ditches, sewers, drains, water courses, lakes or wells. In addition to buffer zones defined in national legislation, local provisions are issued by municipalities or CABs for water protection areas often containing protective regulation with regard to use and storage of pesticides. Finally, national legislation sets out licensing requirements for the use of pesticides in water protection areas which imply a general prohibition on the use of pesticides except under license.
33. CABs or municipalities may establish water protection areas. These are areas from which surface water or ground water is, or can be used, for drinking water. The CAB, or municipality, can enact a set of rules to protect water quality in these water protection areas. Under these rules, the use of pesticides may be banned or, more typically, prohibited except under a licence. Municipalities grant these licences on a case by case basis, based on an application and having considered a range of factors such as the pesticides to be used, soil type and what alternative plant protection measures have been applied to avoid the need for pesticide use.
34. Before pesticides are used along roads, very permeable surfaces and sealed surfaces, a licence must be obtained by the relevant municipality. The municipality visited stated that request for such applications are similar to those for pesticide use in water protection areas.

35. Monitoring of the aquatic environment is undertaken by various authorities. Analysis of official samples is conducted in designated public and private laboratories. The CAs stated that the laboratories used are accredited to ISO 17025 for analysis of pesticides in water. The Centre for Chemical Pesticides and SwAM issued a report on pesticides in Swedish groundwater based on available data from 1986 to 2014. One or more pesticides were found, at some level, in 36% of groundwater samples throughout the study period. The most commonly detected substance was 2,6-dichlorobenzamide, a metabolite of *dichlobenil*, which was detected in 33% of samples, followed by *atrazine* and its metabolites in up to 9% of samples. The CAs stated that both *dichlobenil* and *atrazine* were prohibited, and withdrawn from the market, in Sweden since 1990, but due to their persistent nature, remain the pesticides most commonly found in Swedish groundwater. *Bentazone*, which is detected in about 3% of samples, is the only active substance in currently authorised pesticides that is found with any frequency in groundwater samples. The NFA monitor for pesticide and other chemical and microbiological contamination in drinking water under the Drinking Water Directive. They stated that all drinking water samples analysed for pesticides in municipal drinking water in recent years were compliant.

## 5.9 PESTICIDE USE IN SPECIFIC AREAS

### Legal Requirements

Article 12 of Directive 2009/128/EC on the reduction of pesticide use or risks in specific areas

### Findings

36. According to the Swedish Regulation on Pesticides, a licence from the municipality is needed before pesticides can be applied on public parks and gardens, sports and recreation grounds, school grounds and children's playgrounds. The municipality must also be notified before pesticides are used on public areas larger than 1 000 square metres.
37. This licensing system is similar to that for water protection areas. Applications for licences must be assessed by the municipality according to the product choice principle, which means that, if several products are available, the least hazardous product must be used. The validity of the license is determined by the municipality on a case by case basis, taking the pesticide used and the specific area into consideration.
38. In Sweden, Natura 2000 sites are protected under the terms of the Swedish Environmental Code and are all classified as being of national interest. Natura 2000 sites are nature protection areas comprising Special Areas of Conservation under Council Directive 92/43/EEC and Special Protection Areas designated under Directive 2009/147/EC. Sweden has listed around 4 000 Natura 2000 sites, with a total area of around 6 million ha, or around 15% of the total area of Sweden. Under Swedish law, there are no specific regulations on the application or handling of pesticides in Natura

2000 areas, so the general provisions for environmentally hazardous activities in Natura 2000 areas apply meaning that a permit is required for all activities that may have a significant impact on the environment in Natura 2000 areas. Permits can only be issued if the proposed activity does not damage the natural habitat in the area to be protected or cause detriment to the species that are to be protected. These permits are granted by the relevant CAB, and SEPA, SwAM, SFA and the Swedish National Heritage Board all have the right to appeal such decisions. The CAs added that in practice, very little cultivated agricultural land is present, and very low volumes of pesticides are used, in Natura 2000 areas.

## **5.10 HANDLING AND STORAGE OF PESTICIDES**

### **Legal Requirements**

Article 13 of Directive 2009/128/EC on handling and storage of pesticides and treatment of their packaging and remnants

### **Findings**

39. The NAP states that one of the key objectives of previous action programmes was to improve pesticide handling practices, and reports that a number of projects were implemented with the aim of changing users' behaviour in this area. The CAs highlighted the 'Safe plant protection' information and training campaign which was launched in 1997 and continues in operation. Its objective is to improve the handling and application of pesticides in Swedish agriculture in order to reduce the risks to health and the environment. It is operated by the Federation of Swedish Farmers in collaboration with the SBA, SEPA, KEMI, Svenskt Växtskydd (the Swedish plant protection industry association) and a prominent agri-food company. A 2016 survey of professional users, conducted as part of the programme, showed that 70% of professional users were aware of this campaign, and 66% stated that their practices had improved as a result of the information in the campaign.
40. The NAP has a number of goals in this area. These are that all professional users must use the required personal protective equipment (PPE), at least 95% of all sprayers must be equipped with rinsing water tanks, all operators must have procedures to minimise the risks to health and the environment when filling sprayers and handling products, at least 70% of sprayers must be fitted with filling mechanisms and tank rinsing equipment and all professional users must store products in an appropriate way. The NAP indicates that the actions to achieve these goals are based around training and awareness-raising.
41. The CAs stated that the training of professional users covers the use of pesticides, the cleaning of PPE, the handling of remnants and empty packaging and the transport of hazardous waste. The training also provides information about how storage premises must be designed and constructed. In addition to specific training courses, the WEA <https://www.av.se/en/> provides information on the PPE to be used when applying pesticides. This includes leaflets and videos, many of which are used in training courses.

42. The CAs stated that all revoked pesticides, for which the use-up period under Article 46 of Regulation (EC) No 1107/2009 has elapsed, are considered to be hazardous waste under the Waste Regulation (SFS 2011:927), and must be destroyed as such, with the cost to be directly borne by the owner of the product. The Swedish pesticide industry has implemented a container recycling scheme where triple rinsed empty pesticide packaging can be recycled with other waste plastics. The system is funded by a levy incorporated into the sale price, so there is no direct cost at the time of disposal. The CAs have no information on the total volumes, or percentage of empty packaging and revoked products/remnants that are disposed of annually in Sweden.
43. KEMI categorise pesticides into three different classes, class 1, 2 and 3. All three classes can be used by trained professional users, but non-professional users are only permitted to use class 3 products. Products cannot be authorised under class 3, i.e. for use by non-professionals, if they pose certain hazards to human health or the environment based on their classification, if they contain an active substance which is a candidate for substitution under Regulation (EC) no 1107/2009, or if the product requires dilution before use, unless the product is of particularly low risk.
44. The CAs stated that all pesticide stores must be constructed of suitable material and banded so as to prevent leakages. They added that during routine controls on distributors and users, the storage conditions for pesticides are examined.

## **5.11 INTEGRATED PEST MANAGEMENT**

### **Legal Requirements**

Article 14 of Directive 2009/128/EC on IPM and Article 55 of Regulation (EC) No 1107/2009

### **Findings**

45. According to the NAP, Swedish farmers have applied the principles of IPM for several years. They have focused on preventive measures, forecasting, warning and decision support systems, tailored use of pesticides and employing alternative approaches or techniques. The CAs emphasised that pesticide use in Sweden is low at less than 1 kg/ha of UAA, considerably below the EU average of approximately 2.5kg/ha [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Pesticide\\_sales\\_by\\_UAA\\_by\\_country\\_2014\\_%28kilogram\\_per\\_hectare%29.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Pesticide_sales_by_UAA_by_country_2014_%28kilogram_per_hectare%29.png). They believe that factors which contribute to the low usage of pesticides include the relatively high level of organic agriculture and the promotion of IPM.
46. The CAs emphasised that for take-up of IPM, it must be economically viable and added that they see IPM as an on-going process of raising awareness and knowledge among farmers and advisors. They also underlined that they see IPM as a broader concept than pest control, and emphasised the importance of crop nutrition and tailoring nutrient inputs to crop needs.

47. The CAs gave examples of two farm level IPM initiatives. The “Farming in Balance” programme involves 17 farms. This programme promotes sustainable agriculture in a broad sense, and includes some pesticide-specific components. These farms receive no additional payments for participation and act as demonstration farms for other farmers in the region. The concept is that these farms voluntarily adopt innovative practices, and use very detailed record keeping to quantify the impacts at farm level, with a view to disseminating this information to other farmers. The mission team visited one such farm, which combined arable farming and intensive livestock production. The farmer had undertaken detailed soil mapping of the farm and all animal manures were applied to crops based on soil type and the crops needs. This system of nutrient recycling means that very little chemical fertiliser is used on the farm. The farmer employs a rotation of cereals, legumes and potatoes, combining both autumn and spring sown crops. He has moved from ploughing to a minimum cultivation system to protect soil structure. His detailed records showed that this had reduced his crop establishment costs by 40%. The farmer had established permanent buffer zones along water courses and plots for field birds to nest as part of an agri-environmental programme, for which he receives payments. Pesticides are used based on intensive crop monitoring and an evaluation of the outcome of control measures taken in previous cropping years.
48. Eight thousand farmers participate in the “Greppa naringen” (Grasping the Nutrients) scheme <http://www.greppa.nu/>, which started in 2001. The scheme is run jointly by the SBA, CABs, farmer organisations and advisory bodies. Participation is voluntary, and farmers can receive additional payments under Rural Development programmes for measures taken under the scheme. Participating farmers receive a series of visits to guide them in improving their practices and attend farmer-led group discussions on specific problem areas. While the primary focus is nutrient use efficiency, several aspects of IPM, including crop rotation, crop nutrition, plant protection and conserving biodiversity are incorporated into this scheme. A 2010 study of participating farms showed significant improvements relating to pesticides, such as washing down the sprayer in the field rather than the farmyard (increased from 60% to 95%), the use of PPE (increased from 55% to 75%) and recycling of empty pesticides packaging (increased from 65% to >95%). The CAs consider that this scheme has been very successful, and attribute its success to repeated visits from advisors, linking good environmental practices to increased profitability and the emphasis on education, demonstration and peer to peer learning, rather than enforcement.
49. An information and warning system is operated by the five Plant Protections Centres of the SBA (<http://www.jordbruksverket.se>). SBA staff monitor approximately 1 000 plots in commercial fields of cereals, legumes and vegetables every Monday between April and August. The monitored plots are generally not sprayed with pesticides except for high value crops, in relation to which the CAs stated that the absence of chemical treatments would cause significant yield losses. SBA staff analyse this monitoring data on Tuesdays and discuss the results with commercial advisors by telephone every Wednesday. SBA then produce weekly regional bulletins for advisors and growers

based on the monitoring data and provide information on pest thresholds and crop protection recommendations, where relevant. These weekly bulletins are available online and via mobile applications. Decision support systems are not widely used in advisory services in Sweden. They are used to complement existing monitoring systems by the SBA, and for evaluation purposes.

50. The SBA issued IPM guidelines for 10 crops. There are 26 demonstration farms whose activities involve supporting the implementation of the IPM principles in Sweden. In addition, there are five research farms which carry out research trials and which also support the implementation of IPM. Some 150 private advisors provide tailor-made advice to farmers regarding IPM. Most are employed by advisory service companies owned by the Rural Economy of Agricultural Societies.
51. The SBA provides guidelines and a checklist to municipalities to assess the implementation of IPM principles. The municipality visited included some IPM related questions in their controls on pesticide users. These included questions on the prevention of pests, diseases and weeds, ensuring good growing conditions for the crop to prevent pesticide use and the use of alternative controls. However, the eight IPM principles listed in Annex III of SUD are not systematically assessed.
52. SBA stated that they concluded that the large majority of farmers visited as part of joint SBA/KEMI projects in 2015 and 2016 were IPM compliant. In 2015, 791 on-the-spot visits were carried out by 100 municipalities on arable farmers. The inspectors concluded, based on their visits, that over 85% of farmers were IPM compliant. In 2016, 44 municipalities carried out 141 inspections in greenhouses and nurseries. The inspectors concluded, based on their visits that over 90% of these establishments were IPM compliant. In all cases, some, but not all, of the eight IPM principles listed in Annex III of SUD were assessed. The topics addressed included preventative measures, pest monitoring and whether non-chemical controls were used.
53. The mission team met representatives of a private integrated production certification system in Sweden. There are some 4 000 members and the representatives of the scheme stated that most fresh fruit and vegetables sold in Sweden are produced under their scheme. Membership of the scheme involves compliance with some aspects of IPM.
54. In Sweden, some 15% of UAA is under organic agriculture compared to the EU average of 6%. The authorities attribute this high level of participation in organic agriculture to both consumer demand and the relatively low pest and disease pressure, and the consequent lower requirement for controls, due to the severe winters, which greatly reduce pest carryover between seasons.
55. Both the CAs and other interested parties met during the mission stated that the following issues could be identified as obstacles to implementation of IPM:
  - The lack of pesticides authorised for minor crops, such as fruit and vegetable crops and less widely grown field crops such as beans. They attributed this to the

MS specific authorisation system under Regulation (EC) No 1107/2009 and the relatively small size of the Swedish market, which means that the financial rewards for pesticide companies in seeking authorisation for these pesticides in Sweden is limited. This lack of pesticides acts as a disincentive to grow crops such as beans, which are important in the context of rotation, and limits growers ability to implement good resistance management practices.

- The lack of alternatives to cereal crops, or poorer financial returns from these alternative crops, leading to an over-reliance on cereals, and a sub-optimal rotation on some farms. The lack of alternative crops is particularly an issue in more northerly parts of Sweden due to climatic constraints e.g. sugar beet growing is confined to southern parts of Sweden. There is no market for some alternative crops e.g. the only large scale buyer of peas in Sweden recently closed their Swedish operations, meaning farmers no longer grow this crop.
- Pest thresholds which may be outdated and/or not tailored to Swedish conditions. Many of the thresholds on which agronomic advice is based have not been established based on Swedish research, but on research conducted in other countries, so may not be appropriate to Swedish conditions. In addition, the thresholds currently in use are based on research conducted over 20 years ago in some cases. These may no longer be appropriate as in the intervening years many factors have changed, such as climatic conditions, the yield potential of crops, the resistance status of the pest population and the range of pesticides to control pests.
- The lack of crop breeding programmes to develop new varieties for Swedish conditions. The climatic conditions in Sweden are not typical of the main European grain growing regions e.g. the growing season is considerably shorter at more northern latitudes. Plant breeders focus on developing new varieties for the most intensive production regions, in order to maximise their potential sales and profits. This means that the varieties grown by Swedish farmers have not been developed specifically for their conditions, and therefore are less likely to have the optimum agronomic qualities for Swedish conditions. This is particularly relevant in the case of winter hardiness for autumn sown crops.
- Difficulties in developing, and gaining widespread adoption of, alternative control methods and techniques in field crops. This was attributed to a lack of research into finding alternative controls, resulting in a situation where there are very limited alternatives to pesticides in some cases. Secondly and more critically, there are insufficient applied research and dedicated advisory services to show farmers in a practical way, that some of the alternative control techniques that are available, could be incorporated into their farming practices to a greater extent, thereby reducing their dependence on chemical pesticides.

## **Conclusions**

56. The extensive pest monitoring system provides reliable information to guide professional users in IPM and could be considered as a good practice.
57. There is no system of monitoring or controls at individual grower level to determine compliance with the eight principles of IPM as described in Annex III of the SUD.

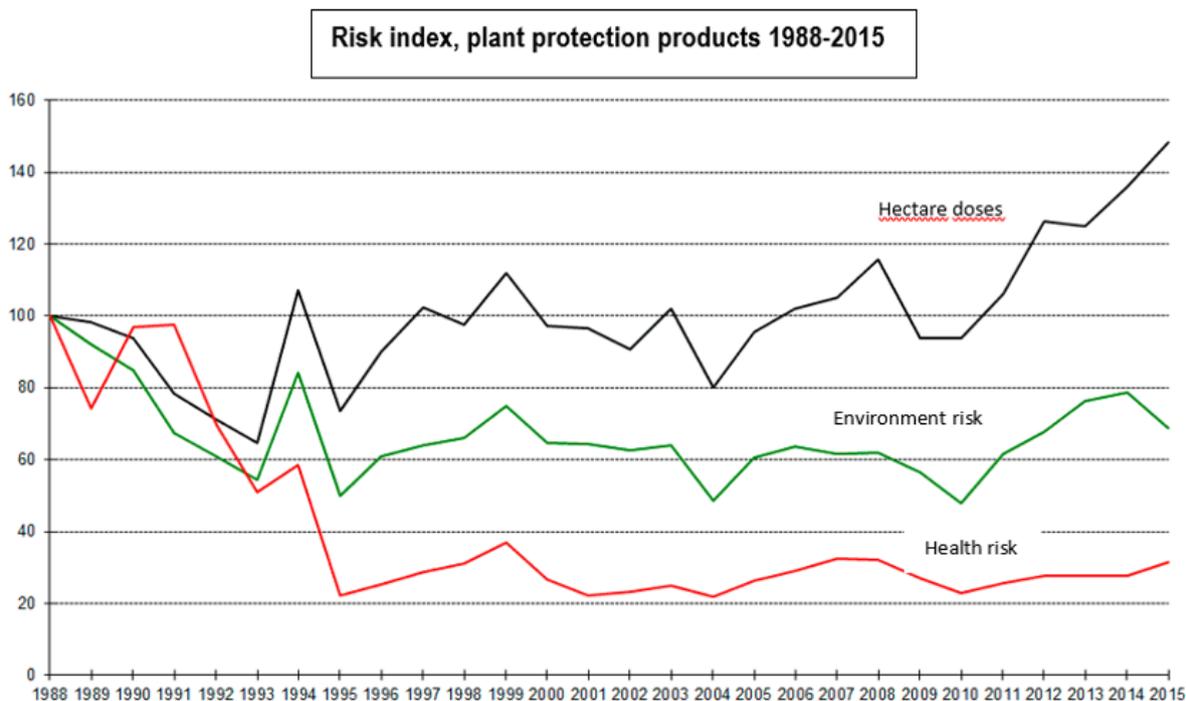
## **5.12 RISK INDICATORS**

### **Legal Requirements**

Article 15 of Directive 2009/128/EC on risk indicators

### **Findings**

58. Sweden uses two main indicators to quantify changes in risks associated with pesticides over time. These are the national risk index for health and the environment and the toxicity index. They are both calculated annually by KEMI and the results published on their website. These indexes are part of a wider suite of indicators, which enable the 'Non-toxic environment' environmental quality objective to be monitored. Both indexes show trends in risks over time, rather than quantifying risks. Both indicators are used to monitor progress under the NAP, however no targets linked to these indicators have been established.
59. Sweden has used the national risk index for health and the environment since 1997. The baseline year is 1988. The value for each year is largely determined based on pesticide sales and the intrinsic properties of the products sold. The index shows the trend in the number of hectare doses sold each year (black line), the risk to human health (red line) and the risk to the environment (green line). Hectare doses are calculated based on sales volumes, recommended rates of use and the area of relevant crops, and quantify the number of hectares which could be treated based on pesticide sales data.
60. The index shows that the health and environmental risks associated with pesticides declined significantly in the period from 1988 to 1995. The risks have remained at this lower level, so that in 2015, the health and environmental risks were 69% and 31% below the 1988 baseline. This reduced level of risk has remained over the last six years, even though pesticide use, measured using hectare doses, has increased by 40%.



**Figure 1:** Trends in the number of hectare doses sold each year (black line), the risk to human health (red line) and the risk to the environment (green line).

61. The toxicity index shows the incidence of pesticides detected in aquatic environments, and is a measure of the risks of potential harm to aquatic organisms. It has been used since 2002, with 2002 as the baseline year. The CAs reported that due to the nature of this indicator, results can vary significantly between years, but that the overall trend in this indicator has remained broadly unchanged since its introduction.
62. In addition to these two high level indicators, the NAP identified certain active substances under Article 15 (2)(b) of the SUD, and the CAs monitor trends in their use. These substances are *pendimethalin*, because of its bio-accumulative and persistent properties, *bentazone*, because of the frequency of its detection in Swedish groundwater at levels above 0.1µg/l and *pyrethroid* insecticides, due to findings in surface water monitoring in 2010. Sales of pesticides containing these active substances have remained broadly unchanged over the last eight years, except for *pendimethalin* containing products, which are no longer authorised.
63. The NAP also identifies three priority areas under Article 15 (2)(c) of the SUD. These are the post-harvest treatment with pesticides of fruit and ware potatoes, the use of pesticides for soil disinfection, with the exception of ornamental plants and use in nurseries, and the use of pesticides in aquatic areas. The NAP reports that pesticide use in these cases had been reduced to zero under previous action programmes. This is due to climate controlled storage as an alternative to post-harvest treatment, crop rotation and variety choice instead of soil disinfection and mechanical methods, such as dredging and reed clearance, in the place of pesticide use in aquatic areas. The NAP states that in

all three cases, the objective is that pesticide use will not be re-introduced in these areas, and to this end, under the Regulation on Pesticides 2014/425, an exemption from the SBA is required for any pesticide use in these cases. No exemptions have been granted during the period of the NAP, and the CAs stated that no pesticides are currently authorised for these uses in Sweden.

64. There are a range of sector-specific indicators to measure the achievement of goals in the NAP. These include:
- The proportion of agricultural land under organic cultivation.
  - The number of companies with protected areas and the total size of the protected areas.
  - The proportion of conifer saplings protected using non-chemical methods.
  - The proportion of non-chemically treated seed.
  - The use of growth regulators in crops other than rye.
  - The use of pesticides in cereal crops pre harvest.
  - Pesticide levels in surface water, groundwater and drinking water.
  - Intake of pesticide residues from domestically grown vegetables including cereals.
  - Use of PPE by professional users
  - Percentage of sprayers equipped with rinsing water tanks.
  - Percentage of sprayers fitted with preparation filling mechanisms and tank rinsing equipment.
  - Reports from supervisory projects on the application of rules on IPM.
65. As the review of the NAP has not yet being completed, the CAs were not able to provide information on trends in these indicators over the life of the NAP.

## **6 MAIN OBSTACLES AND DIFFICULTIES ENCOUNTERED IN SUD IMPLEMENTATION**

66. In the course of the mission, a number of difficulties in implementing the SUD were identified by interested parties. These are summarised in paragraph 51 of this report.
67. In addition, the CAs stated that they find it difficult to assess compliance with the principles of IPM at individual grower level.

## **7 GOOD PRACTICES AND SUGGESTIONS FOR IMPROVEMENT OF IMPLEMENTATION**

68. In the course of the mission, a number of good practices were identified. These are summarised below, with more detailed description in the relevant sections of this report:
- The obligation for distributors selling pesticides for amateur use to have a trained person available as described in paragraph 15.
  - The extensive pest monitoring system as described in paragraph 49.

## **8 OVERALL CONCLUSION**

Sweden has had action programmes to reduce the use of chemical pesticides since the 1980s. The current National Action Plan focuses on reducing the risks associated with, and dependency on, pesticides. It establishes clear objectives, with specific targets in some cases. The first formal review of the current plan is on-going, and is expected to be concluded by the end of 2017. Therefore, it cannot yet be determined whether the objectives of the plan have been achieved. Nevertheless, the risks to human health and the environment associated with pesticides in Sweden are low by historic standards, and remain stable against a backdrop of increasing use in recent years.

The Competent Authorities have taken a range of measures to implement the Directive. These include systems for training professional users and distributors, and for testing pesticide application equipment. Aerial spraying has been prohibited, and no derogations have been granted to date. Measures have been put in place to protect the aquatic environment and drinking water, and data from the monitoring of municipal water supplies demonstrates high levels of compliance with drinking water quality standards.

The Swedish approach to Integrated Pest Management is based around training and education, with a focus on sustainable agriculture in general, rather than on plant protection in particular. There is independent, publicly-funded information available to guide professional users in Integrated Pest Management. The Competent Authorities believe that the vast majority of professional users implement the principles of Integrated Pest Management, however there is no systematic assessment of implementation of the eight principles of IPM as described in Annex III of the SUD.

The report highlights a number of good practices identified in the course of the mission, such as an extensive pest monitoring system. In addition, both the Competent Authorities and other interested parties identified potential obstacles to the sustainable use of pesticides such as the lack of applied research under Swedish conditions to facilitate professional users in the implementation of Integrated Pest Management and difficulties in assessing the implementation of Integrated Pest Management.

## **9 CLOSING MEETING**

A closing meeting was held in Stockholm on 16 June 2017 with representatives of the CAs listed in chapter 5.2. At this meeting, the mission team presented the findings and preliminary conclusions of the mission and CAs provided initial comments on these findings and conclusions.

## ANNEX 1 – LEGAL REFERENCES

<b>Legal Reference</b>	<b>Official Journal</b>	<b>Title</b>
Dir. 2009/128/EC	OJ L 309, 24.11.2009, p. 71-86	Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides
Reg. 1107/2009	OJ L 309, 24.11.2009, p. 1-50	Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC
Dir. 2000/60/EC	OJ L 327, 22.12.2000, p. 1-73	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
Dir. 98/83/EC	OJ L 330, 5.12.1998, p. 32-54	Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption
Dir. 2008/105/EC	OJ L 348, 24.12.2008, p. 84-97	Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council
Dir. 92/43/EEC	OJ L 206, 22.7.1992, p. 7–50	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
Dir. 2006/118/EC	OJ L 372, 27.12.2006, p. 19–31	Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration

Dir. 2009/147/EC	OJ L 20, 26.1.2010, p. 7–25	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
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