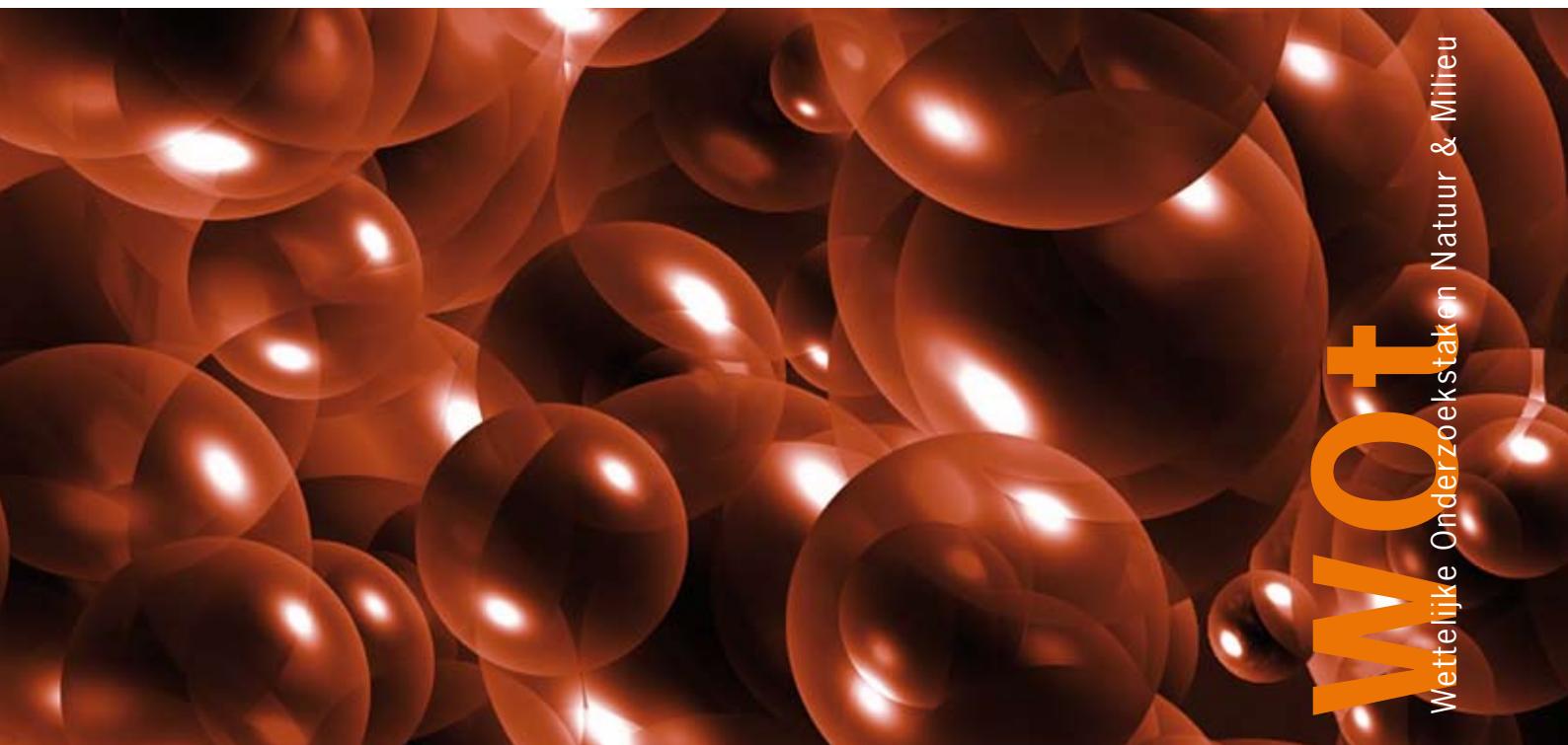# Documentation update for GeoPEARL_3.3.3

F. van den Berg
A. Tiktak
J.G. Groenwold
D.W.G. van Kraalingen
A.M.A. van der Linden
J.J.T.I. Boesten

werkdocumenten

WOt

Wettelijke Onderzoekstaken Natuur & Milieu

WAGENINGEN UR

For quality of life

Documentation update for GeoPEARL_3.3.3

Documentation update for GeoPEARL_3.3.3

F. van den Berg

A. Tiktak

J.G. Groenwold

D.W.G. van Kraalingen

A.M.A. van der Linden

J.J.T.I. Boesten

The Working Documents series is published by the Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), part of Wageningen UR. This document is available from the secretary's office, and can be downloaded from www.wotnatuurenmilieu.wur.nl.

Statutory Research Tasks Unit for Nature & the Environment, P.O. Box 47, NL-6700 AA Wageningen, The Netherlands Phone: +31 317 48 54 71; Fax: +31 317 41 90 00; e-mail: info.wnm@wur.nl; nternet: www.wotnatuurenmilieu.wur.nl

Inhoud

1 New features in GeoPEARL_3.3.3

The new GeoPEARL_3.3.3 contains an option to assess the persistence of compounds in the top layer of the soil at 2 or 7 years after the last application.

The new version also contains an option to select soils with a property within a range specified by the user. Only the soils for which the parameter values fall in the specified ranges are included in the assessment. The soil properties for which a range can be specified are:
- pH
- soil organic matter
- clay content
- silt content
- sand content
- sesqui-oxide content.

The new GeoPEARL version also considers ploughing practises in the cultivation of crops. For most crops, ploughing of the top 0.2 m of the soil occurs once a year. Moreover, the timing of the ploughing depends on soil category: sand, loam, clay or peat. Based on expert judgment, ploughing dates have been specified. The ploughing dates have been included in a separate schematization file, i.e. the .plg file. This file is shown in Appendix 1.

2   Bugs GeoPEARL_2.2.2 solved in GeoPEARL_3.3.3

The bugs that were found in GeoPEARL_2.2.2 have been solved in GeoPEARL_3.3.3. These were:

- For runs with a parent compound with a complex transformation scheme, sometimes duplicate output for a substance was generated. This error was due to duplicate entries in the table FraPrtDau. This bug has been eliminated by including a check on the substances in the transformation scheme (parent and metabolites) before writing the table FraPrtDau to the .cmp file of GeoPEARL.

- Runs for a compound with more than 4 metabolites gave an error message. This has been solved by increasing the maximum number of compounds in a single assessment from 5 to 20.

Compatibility
GeoPEARL_3.3.3 is fully compatible with GeoPEARL_2.2.2. There will be no loss of data in your database created by GeoPEARL_2.2.2, as GeoPEARL_3.3.3 will upgrade your database automatically when you open it for the first time with GeoPEARL_3.3.3.

GeoPEARL_3.3.3 can be used on VISTA platforms.

3 Additions and Changes to User'guide of GeoPEARL_2.2.2

This section describes the changes and the additions for the update of the GeoPEARL_2.2.2 user manual (Tiktak *et al.*, 2006) to be used in combination with GeoPEARL_3.3.3.

3.1 User's Guide of the GeoPEARL User Interface

See report GeoPEARL_2.2.2 – Chapter 2

3.1.1 Installation of the GeoPEARL User Interface

See report GeoPEARL_2.2.2 – Section 2.2

- Before using GeoPEARL, you have to install the model. The model comes in a self-extracting archive, called geopearl_3_3_3.exe. This archive is available at the download page of the PEARL website, which is at the address http://www.geopearl.pesticidemodels.eu.
- Figure 3, first step: Download geopearl_3_3_3.exe from the address http://www.geopearl.pesticidemodels.eu.

3.1.2 Getting started with the GeoPEARL User Interface

See report GeoPEARL_2.2.2 – Section 2.3

In GeoPEARL_3.3.3 two additional features have been added. These features can be used in the step 'Select plots and/or persistency option', which is introduced after the step to generate assessments as described in section 2.3 of the User's guide of GeoPEARL_2.2.2.

The additional features are:
- Select plots on the basis of a range of values for the soil property selected by the user;
- Select the option to obtain output on pore water concentrations and concentrations in soil at predefined endpoints after the last application.

The steps in a GeoPEARL assessment including the new features are shown in Figure 1.
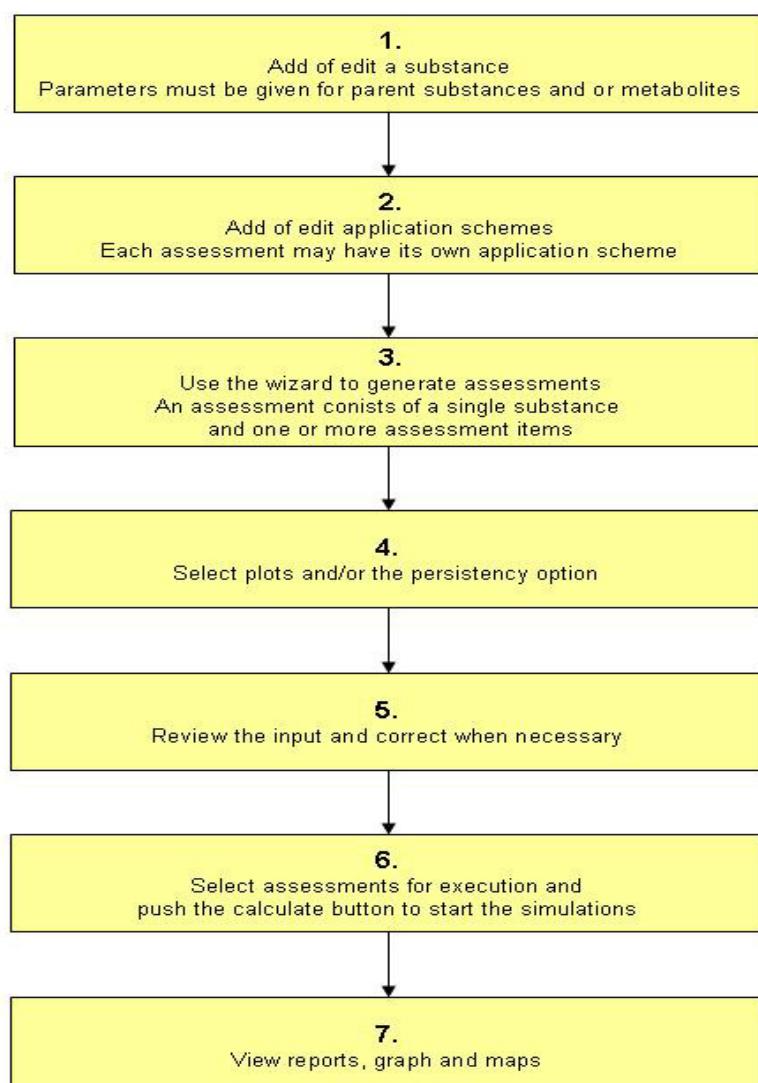
Figure 1. Major steps of a GeoPEARL assessment including the new option to select plots and the option to assess the persistency of the substance in the soil.

Figure 5 in the manual GeoPEARL_2.2.2 is replaced by Figure 2. The new main screen includes the option to select soils (the 'Plot selection' button) as well as the option to obtain additional output on pore water concentrations and soil contents at predefined endpoints as required for the persistency assessment according to the new Dutch decision scheme (the checkbox 'Persistence output'). On top of the screen a new button 'Plots Info' has been added to view the results of the selection of a range of values for a soil property on the number of available plots.
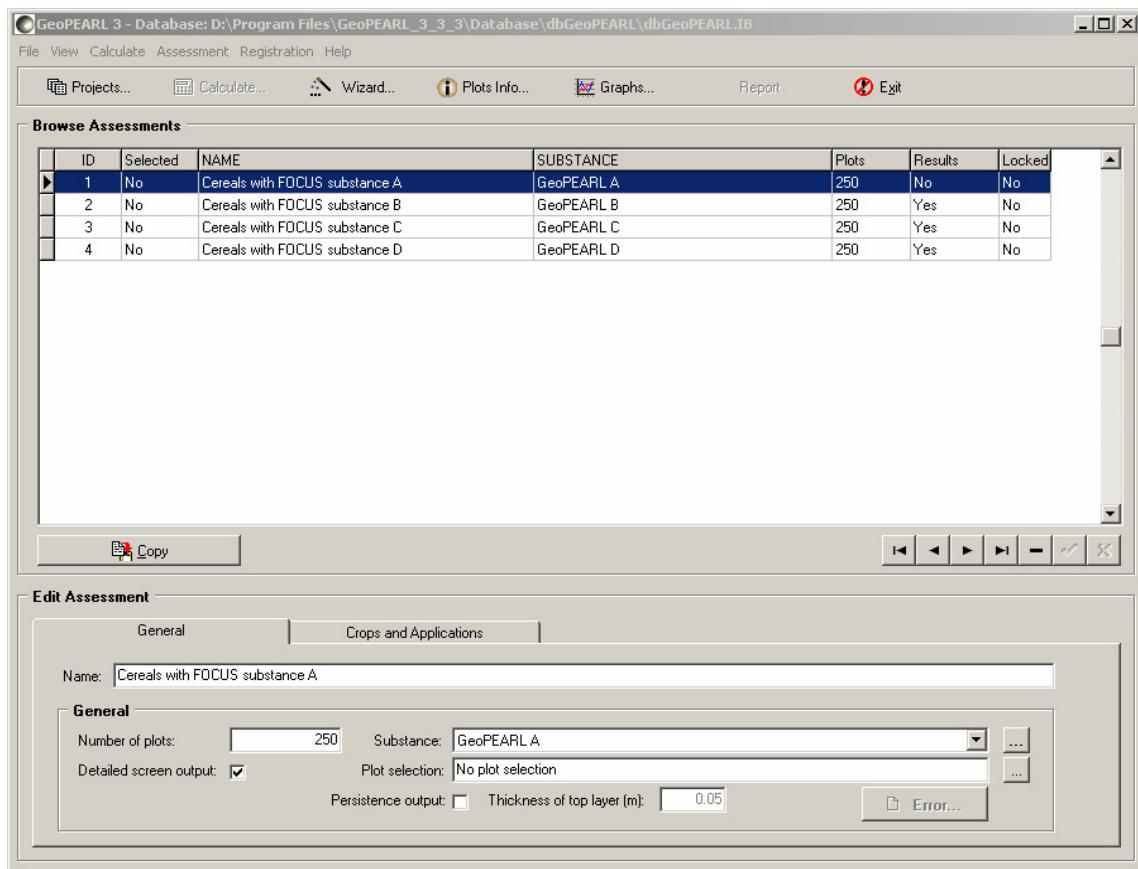
Figure 2. The main form of the GeoPEARL_3_3_3 User Interface.

After clicking on the 'Plot selection' button, the soil property of interest can be selected and the user has to specify the range of values for this property (See Figure 3). The soil properties that can be selected are::

- pH
- Organic matter
- Clay fraction
- Silt fraction
- Sand fraction
- Sesqui-oxide

After selection of a property and specification of the range, click on 'Close'. Next a message appears on the screen showing the number of plots in the selection.

The results of the plot selection are also shown after clicking on the button 'Plots Info'. An example of the report on the plot selection is shown in Figure 4. Only those plots are included in the selection that are relevant for the crop(s) included in the assessment. If the number of plots remaining for the assessment is insufficient then the user has to adjust the range of values for the soil property.
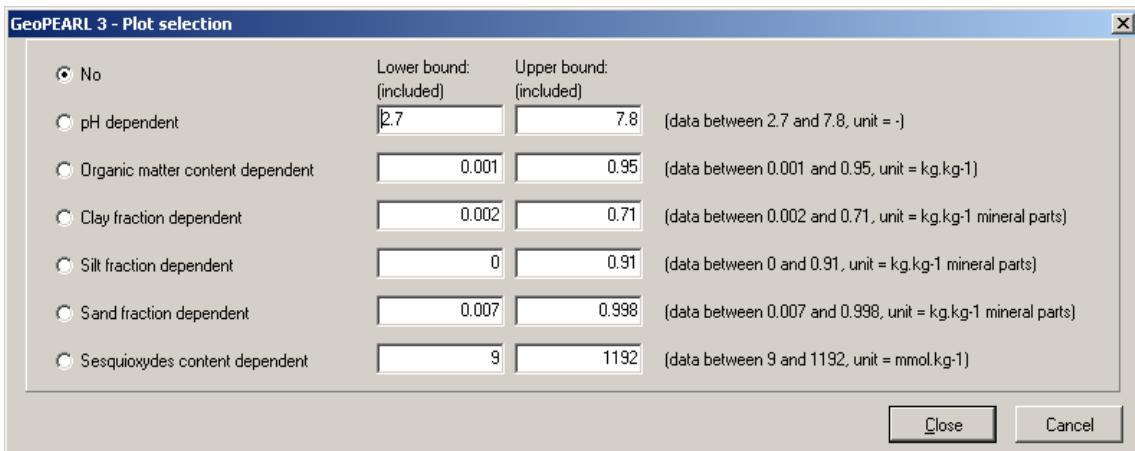
Figure 3. The plot selection form.

GeoPEARL 3.3.3 Plots Info: "Assessment14"

Date: 02/07/2007

"pH dependent" plot selection was chosen with:
lower limit   : 5.5000
upper limit   : 6.6000
selected plots : 1272

Plots selected : 1272

Crop name	Number of plots for crop
Potatoes	1043
Legumes	920
Fallow	1256
Cereals	1089
LeafVegetables	771
Floriculture	1009

Figure 4. The report on the number of selected plots for the crops in the assessment using the 'Plots Info' button.

The persistency option can be selected by clicking on the check box on the right-hand side of 'Persistency output'. Next the user has to specify the thickness of the top layer for which the pesticide content and pore water concentration is calculated. After completion of the assessment, a section with the persistency output is included in the GeoPEARL report. An example of the information added is shown in Figure 5.

```
GeoPEARL_3.3.3 REPORT: "Assessment 10"

Summary for persistence

For the assessment of persistence in the Dutch pesticide registration
procedure the following quantities are reported below:
- average total content of substance in the top layer used for
  evaluation of persistence
- average pore water concentration of substance in the top layer used
  for evaluation of persistence.

The report below describes these two quantities for different time
windows for averaging as indicated and for three moments in time that
are linked to two protection goals as follows:
- the quantity as calculated 2 years after the last application of the
  pesticide, linked to the Community Recovery Principle (called 'CRP')
- the quantity as calculated 7 years after the last application of the
  pesticide, linked to the Ecological Threshold Principle (called 'ETP')

See for background of the protection goals:
Linden AMA van der, JJTI Boesten, TCM Brock, GMA van Eekelen, FMW de
Jong, M Leistra, MHMM Montforts & JW Pol, 2006. Persistence of plant
protection products in soil; a proposal for risk assessment. RIVM Report
601506008/2006, Bilthoven, Netherlands, 105 pp. available at:

http://www.rivm.nl/bibliotheek/rapporten/601506008.html

Persistence output was based on a thickness layer of 0.05 meter

Overall persistence results:

Time weighted average content (mg/kg) in top layer
```

Time window	CRP (mg/kg)	ETP (mg/kg)
0 days	7.7035934	6.5161340
7 days	7.7013944	6.5139219
14 days	7.6986284	6.5108949
21 days	7.6957843	6.5078690
28 days	7.6928763	6.5050522
56 days	7.6797412	6.4932554
180 days	7.6159809	6.4354921
365 days	7.5523712	6.3750764

```
Time weighted average pore water concentration (ug/L) in top layer
```

Time window	CRP (ug/L)	ETP (ug/L)
0 days	0.0008109	0.0006729
7 days	0.0008088	0.0006708
14 days	0.0008088	0.0006708
21 days	0.0008099	0.0006719
28 days	0.0008078	0.0006698
56 days	0.0008068	0.0006688
180 days	0.0007988	0.0006618
365 days	0.0007913	0.0006553

Figure 5: The output on the persistency of the substance at the predefined end points as included in the GeoPEARL report.

3.1.3 Viewing maps and graphs

See report GeoPEARL_2.2.2 – Section 2.12.2

After running the assessment, additional graphs can be shown using the persistency output. These new graphs are related to the 'Area of Use' as well as to the 'Area of Crop' (Figs. 6 and 7).
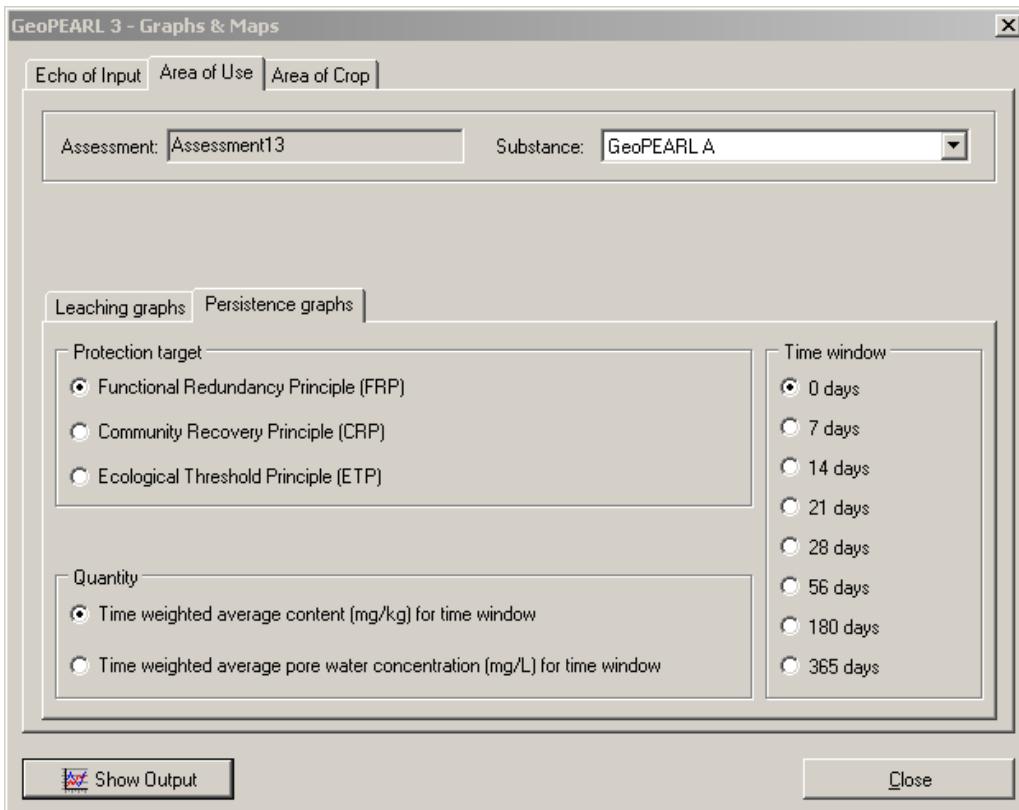
Figure 6. The new persistence graphs for the area of use.
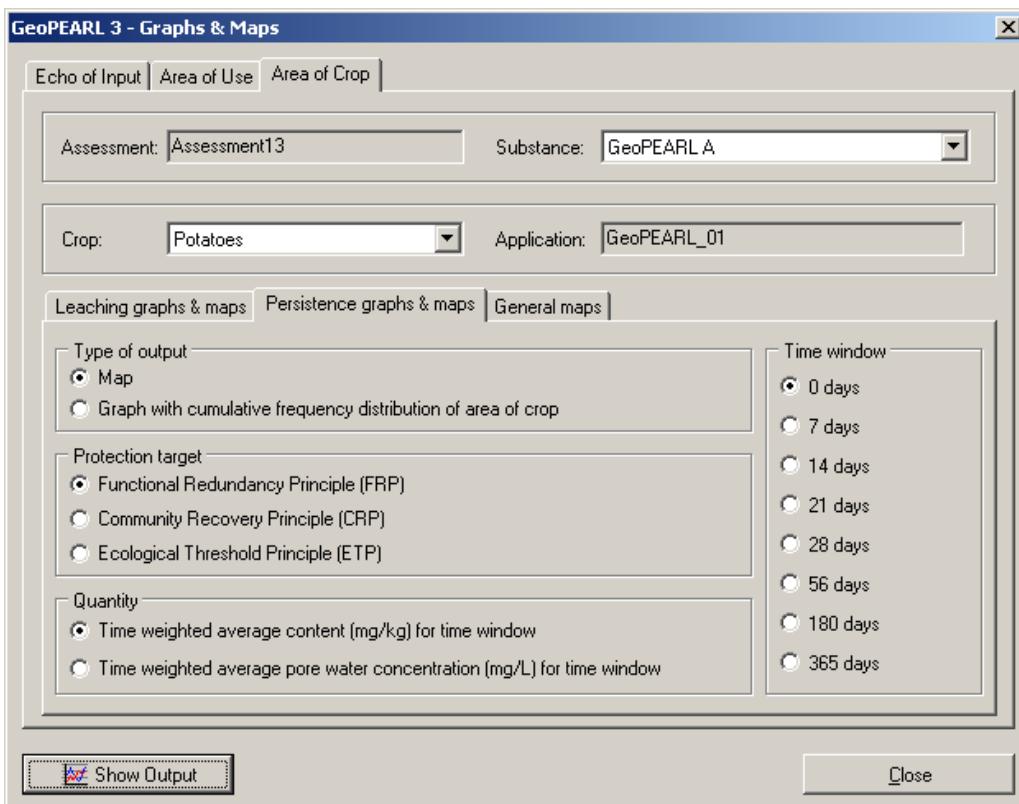
Figure 7. The new persistence graphs for the area of crop

3.2   User's Guide of the command-line version of GeoPEARL

See report GeoPEARL_2.2.2 – Chapter 3

3.2.1 Performing an assessment with the stand-alone version

See report GeoPEARL_2.2.2 – Section 3.1

Download the 'geopearl_3_3_3_ascii.exe' self-extracting archive from the PEARL website to get the input files for the stand-alone version of GeoPEARL. Put the files preferably into a directory *without spaces.*

3.2.2 File structure

See report GeoPEARL_2.2.2 – Section 3.2

GeoPEARL generates an input file, i.e. 'PlotsIncludes.inc', listing the included plots for the assessment.

3.2.3 Editing the control file

See report GeoPEARL_2.2.2 – Section 3.6

An example of the new .geo file is presented in Appendix 2.

3.2.4 Example for the platformTM LSF system

See report GeoPEARL_2.2.2 – Section 3.11.1

Reference to 'GeoPEARL_2_2_2' should be replaced by 'GeoPEARL_3_3_3'

Literature

Tiktak, A., Van der Linden, A.M.A., Boesten, J.J.T.I., Kruijne, R., Kraalingen, D. and F. van den Berg, 2006. The GeoPEARL model, version_2.2.2. Part II: User guide and model description update. RIVM report 716601008/2004-2006

Appendix 1 Ploughing data file for crop-soil combinations in the Netherlands (plg file):

```
*------------------------------------------------------------------------------
*
*      File containing        the ploughing parameters for the Netherlands.
*
*------------------------------------------------------------------------------

* table CTB_Crops
* 1  Potatoes
* 2  Strawberries
* 3  Asparagus
* 4  SugarBeets
* 5  LeafVegetables
* 6  plants_for_commercial_purposes
* 7  Floriculture
* 8  FlowerBulbs
* 9  TreeNursery
* 10 Fallow
* 11 FruitCulture
* 12 Cereals
* 13 Grass
* 14 GrassSeed
* 15 GreenManuring
* 16 Vegetables
* 17 Cannabis
* 18 Silviculture
* 19 Cabbage
* 20 Maize
* 21 RemainingAgriculturalCrops
* 22 Legumes
* 23 Leek
* 24 Onions
* 25 TotalAgriculturalArea

* 26 TotalNonUrbanArea
* end_table



*------------------------------------------------------------------------------
* Column 1: Crop Number
* Column 2: Ploughing date for culture on sandy soil (dd-mm)
* Column 3: Ploughing date for culture on clayey soil (dd-mm)
* Column 4: Ploughing date for culture on loamy soil (dd-mm)
* Column 5: Ploughing date for culture on peaty soil (dd-mm)

table PloughingData
1      15-Mar  15-Nov  15-Feb  None
2      31-Jul  15-Nov  15-Feb  None
3      01-Mar  15-Dec  15-Feb  None
4      31-Mar  15-Nov  15-Feb  None
5      31-Mar  15-Nov  15-Feb  None
6      28-Feb  15-Nov  15-Feb  None
7      31-Mar  15-Nov  15-Feb  None
8      15-Oct  15-Dec  15-Feb  None
9      None    None    None    None
10     None    None    None    None
11     None    None    None    None
12     15-Oct  15-Nov  15-Feb  None
13     31-Aug  None    None    None
14     31-Aug  None    None    None
15     15-Oct  15-Dec  15-Feb  None
16     31-Mar  15-Dec  15-Feb  None
17     15-Oct  15-Nov  15-Feb  None
18     None    None    None    None
19     31-Mar  15-Nov  15-Feb  None
```

```
20      15-Apr  15-Nov  15-Feb  None
21      31-Mar  15-Nov  15-Feb  None
22      01-Mar  15-Dec  15-Feb  None
23      15-Aug  15-Nov  15-Feb  None
24      31-Mar  15-Nov  15-Feb  None
25      31-Mar  15-Nov  15-Feb  None
26      31-Mar  15-Nov  15-Feb  None
end_table
```

Appendix 2 The GeoPEARL_3.3.3 input file – Expert users

This appendix gives a listing of the GEOPEARL_3.3.3 input file. This file is intended to be used by expert users. Differences in the input file of GeoPEARL_3.3.3 compared with GeoPEARL_2.2.2 are set in bold face.

```
*------------------------------------------------------------------------------
* GeoPEARL input file, generated by GeoPEARLGui
*
3 ModelVersion  Model version
3 GUIVersion    GUI version
3 DBVersion     Database version
*------------------------------------------------------------------------------

*------------------------------------------------------------------------------
* GeoPEARL control
*------------------------------------------------------------------------------

* Directory structure
* The input directory is obtained from the model call.
Output                  OutputDir            Output directory
..\..\SCHEMA~1          SchematisationDir    Spatial schematisation directory
..\..\Temp              PearlDir             Tmp directory for PEARLMODEL

* General control
IOMode_Full             IOMode               Screen output control
Low                     PriorityClass        Priority class
SkipErrors              OptAppend            Append results (Yes|No|New)?
Yes                     OptDelPloFiles       Should other files be removed (Yes|No)?
Yes                     OptIrrigation        Simulate irrigation (Yes|No)?

* Timers - TimStart and TimEnd must be in range with dates in .met files
01-Jan-1901             TimStart             Start time of the simulation
31-Dec-1934             TimEnd               End time of simulation
6                       InitYears            Number of years for initialization (0|10)

* Number of CPUs available for grid computing
1                       NumCPU               Number of CPUs (1|-)
1                       CPUID                Number of the current CPU (1|NumCPU)

*------------------------------------------------------------------------------
* Reference to plot file and plots included in model run
* The plot files must be stored in the schematisation directory
*------------------------------------------------------------------------------
Schematisation          Plots                Plot file (plo file - in plots dir)
Automatic               OptPlotList          Option: (Automatic|Manual|Generate_Only)

*------------------------------------------------------------------------------
* If OptPlotList = Automatic
* Crop area database (unc file) must be stored in the schematisation directory
* For guidelines with respect to the selection of the number of zones:
* please read the manual
Schematisation          CropAreaDatabase     File with crop area per UC (unc file)
0.01                    ThresholdArea (ha)   Threshold area (0|-)
250                     NumZone              Number of zones
Rank                    OptPlotSelection     Option: (Neighbour|Rank)

* Crops for which a registration is submitted. The model takes the sum of the
* crop areas of the individual crops. Make sure that the name is exactly equal
* to one of the names in the crop area database.

table Crops
11  FruitCulture
end_table
```

```
*-------------------------------------------------------------------------------
* File with included plots - file must be in schematisation directory
PlotsIncluded           IncludedPlots           File with plots to be included
*-------------------------------------------------------------------------------


*-------------------------------------------------------------------------------
* SWAP missers - file must be put in schematisation directory
PlotsExcluded           ExcludedPlots           File with SWAP missers


*-------------------------------------------------------------------------------
* Compound and application information
*-------------------------------------------------------------------------------


Substances              CompoundProperties      Compound properties
Applications            ApplicationSchemes      Application schemes


*-------------------------------------------------------------------------------
* Substances and application scheme. A run is made for each substance included
* Column 1  : Pesticide code - must be included in CompoundProperties file
* Column 2  : Application code - must be included in Applications file
* Column 3+ : Compound codes included in run (first = the daughter)

table Runs
CMPCPF4 Persistentie_chlorpyrifos CPF4 TCP4
end_table



*-------------------------------------------------------------------------------
* Soil information (files must be stored in soil directory)
* The soil file must be placed in the schematisation directory

Schematisation          SoilDatabase            Soil database (sol file)

*-------------------------------------------------------------------------------
* Crop information
* The crop file must be placed in the schematisation directory

Schematisation          CropDatabase            File with crop properties (crp file)
Schematisation          PloughingData           File with ploughing dates (plg file)

*-------------------------------------------------------------------------------
* Information about meteo stations
* The meteo files must be stored in the schematisation directory
* Column 1: ID
* Column 2: Latitude
* Column 3: Altitude (m)
* Column 4: Initial temperature (C)
* Column 5: Option for potential evapotranspiration
* ...      Input           : Reference evapotranspiration provided by user
* ...      Penman          : Penman reference evapotranspiration
* ...      Makkink         : Makkink reference evapotranspiration
* ...      PenmanMonteith  : Penman Monteith evapotranspiration
* Column 6: Reference to the meteo file (met file)

table MeteoStations
1       52      10      9.97    Input   DeKooy
2       52      10      9.97    Input   Leeuwarden
3       52      10      9.97    Input   Eelde
4       52      10      9.97    Input   Hoorn
5       52      10      9.97    Input   Lelystad
6       52      10      9.97    Input   Dedemsvaart
7       52      10      9.97    Input   Naaldwijk
8       52      10      9.97    Input   DeBilt
9       52      10      9.97    Input   Winterswijk
10      52      10      9.97    Input   Andel
11      52      10      9.97    Input   Vlissingen
12      52      10      9.97    Input   Oudenbosch
13      52      10      9.97    Input   Gemert
14      52      10      9.97    Input   Venlo
15      52      10      9.97    Input   Beek
end_table
```

```
*-------------------------------------------------------------------------
* Local and regional groundwater system
* These files must be stored in the schematisation directory
Schematisation          GroundwaterSystem      Groundwater system (lbo file)
schematisation          DrainageSystem         Local drainage system (dra file)

*-------------------------------------------------------------------------
* Output control data

Yes                         OptScreen             Screen option (No|Swap_Only|Yes)
..\..\SCHEMA~1\Schematisation OutputControl       File with output data (ctr file)
Yes                         PrintCumulatives      Print fluxes cumulative (Yes|No)
Fixed                       OptZFoc               Option for ZFOC (Fixed|Variable)
1                           ZFoc        (m)       Depth of layer for balances (0.1|-)
0.05                        ThiLayPer   (m)       Evaluation depth for persistence
                                                  (0.01|-)
DaysFromSta                 DateFormat            Format of dates in the output file
                                                  (DaysFromSta|DaysFrom1900|Years)
G12.4                       RealFormat            Format of reals in the output file
Decade                      OptDelTimPrn          Option for time step
                                                  (Day|Decade|Month|Year|Calculated|Other)
1                           DelTimPrn   (d)       Print time step - only if option
                                                  is input (1.0|-)
Automatic                   OptHyd                 SWAP mode: (Automatic|OnLine|Only)
GeoPEARL                    OptReport             (FOCUS|DutchRegistration|GeoPEARL) report
Yes                         OptPersistency        Calculate persistency (Yes or No)

*-------------------------------------------------------------------------
* SWAP control parameters

No                          OptHysteresis         Simulate hysteresis (No|Yes)
1000000                     MaxItSwa              Maximum number of iterations
                                                  (2|1000000)
0.005                       ThetaTol    (m3.m-3)  Tolerance for SWAP (1e-5|1e-2)
1E-5                        DelTimSwaMin  (d)     Minimum time step for SWAP
                                                  (1.e-8|0.1)
0.2                         DelTimSwaMax  (d)     Maximum time step for SWAP
                                                  (0.01|0.5)
1                           GWLTol      (m)       Tolerance for groundwater level
                                                  (1e-7|1e2)

*-------------------------------------------------------------------------
* End of file
```

WOt-onderzoek

Verschenen documenten in de reeks Werkdocumenten van de Wettelijke Onderzoekstaken Natuur & Milieu vanaf 2006

Werkdocumenten zijn verkrijgbaar bij het secretariaat van Unit Wettelijke Onderzoekstaken Natuur & Milieu, te Wageningen. T 0317 – 48 54 71; F 0317 – 41 90 00; E info.wnm@wur.nl

De werkdocumenten zijn ook te downloaden via de WOt-website www.wotnatuurenmilieu.wur.nl

2006

21 *Rienks, W.A., I. Terluin & P.H. Vereijken.* Towards sustainable agriculture and rural areas in Europe. An assessment of four EU regions

22 *Knegt, B. de, H.W.B. Bredenoord, J. Wiertz & M.E. Sanders.* Monitoringsgegevens voor het natuurbeheer anno 2005. Ecologische effectiviteit regelingen natuurbeheer: Achtergrondrapport 1

23 *Jaarrapportage 2005.* WOT-04-001 – Monitor- en Evaluatiesysteem Agenda Vitaal Platteland

24 *Jaarrapportage 2005.* WOT-04-002 – Onderbouwend Onderzoek Natuurplanbureaufunctie

25 *Jaarrapportage 2005.* WOT-04-385 - Milieuplanbureaufunctie

26 *Jaarrapportage 2005.* WOT-04-394 – Natuurplanbureaufunctie

27 *Jaarrapportage 2005.* WOT-04 - Kennisbasis

28 *Verboom, J., R. Pouwels, J. Wiertz & M. Vonk.* Strategisch Plan LARCH. Van strategische visie naar plan van aanpak

29 *Velthof, G.L. en J.J.M. van Grinsven (eds.)* Inzet van modellen voor evaluatie van de meststoffenwet. Advies van de CDM-werkgroep Harmonisatie modellen

30 *Hinssen, M.A.G., R. van Oostenbrugge & K.M. Sollart.* Draaiboek Natuurbalans. Herziene versie

31 *Swaay, C.A.M. van, V. Mensing & M.F. Wallis de Vries.* Hotspots dagvlinder biodiversiteit

32 *Goossen, C.M. & F. Langers.* Recreatie en groen in en om de stad. Achtergronddocument bij Natuurbalans 2006

33 *Turnhout, Chr. Van, W.-B. Loos, R.P.B. Foppen & M.J.S.M. Reijnen.* Hotspots van biodiversiteit in Nederland op basis van broedvogelgegevens

34 *Didderen, K en P.F.M. Verdonschot.* Graadmeter Natuurwaarde aquatisch. Typen, indicatoren en monitoring van regionale wateren

35 *Wamelink, G.W.W., G.J Reinds, J.P. Mol-Dijkstra, J. Kros & H.J.J. Wieggers.* Verbeteringen voor de Natuurplanner

36 *Groeneveld, R.A. & R.A.M. Schrijver.* FIONA 1.0; Technical description

37 *Luesink, H.H., M.J.C. de Bode, P.W.G. Groot Koerkamp, H. Klinker, H.A.C. Verkerk & O.Oenema.* Protocol voor monitoring landelijke mestmarkt onder een stelsel van gebruiksnormen

38 *Bakker-Verdurmen, M.R.L., J.W. Eimers, M.A.G. Hinssen-Haanen, T.J. van der Zwaag-van Hoorn.* Handboek secretariaat WOT Natuur & Milieu

39 *Pleijte, M. & M.A.H.J. van Bavel.* Europees en gebiedsgericht beleid: natuur tussen hamer en aambeeld? Een verkennend onderzoek naar de relatie tussen Europees en gebiedsgericht beleid

40 *Kramer, H., G.W. Hazeu & J. Clement.* Basiskaart Natuur 2004; vervaardiging van een landsdekkend basisbestand terrestrische natuur in Nederland

41 *Koomen, A.J.M., W. Nieuwenhuizen, J. Roos-Klein Lankhorst, D.J. Brus & P.F.G. Vereijken.* Monitoring landschap; gebruik van steekproeven en landsdekkende bestanden

42 *Selnes, T.A., M.A.H.J. van Bavel & T. van Rheenen.* Governance of biodiversity

43 *Vries, S. de. (2007)* Veranderende landschappen en hun beleving

44 *Broekmeijer, M.E.A. & F.H. Kistenkas.* Bouwen en natuur: Europese natuurwaarden op het ruimtelijk ordeningsspoor. Achtergronddocument bij Natuurbalans 2006

45 *Sollart, K.M. & F.J.P. van den Bosch.* De provincies aan het werk; Praktijkervaringen van provincies met natuur- en landschapsbeleid in de periode 1990-2005. Achtergronddocument bij Natuurbalans 2006

46 *Sollart, K.M.& R. de Niet met bijdragen van M.M.M. Overbeek.* Natuur en mens. Achtergronddocument bij de Natuurbalans 2006

2007

47 *Ten Berge, H.F.M., A.M. van Dam, B.H. Janssen & G.L. Velthof.* Mestbeleid en bodemvruchtbaarheid in de Duin- en Bollenstreek; Advies van de CDM-werkgroep Mestbeleid en Bodemvruchtbaarheid in de Duin- en Bollenstreek

48 *Kruit, J. & I.E. Salverda.* Spiegeltje, spiegeltje aan de muur, valt er iets te leren van een andere plannings-cultuur?

49 *Rijk, P.J., E.J. Bos & E.S. van Leeuwen.* Nieuwe activiteiten in het landelijk gebied. Een verkennende studie naar natuur en landschap als vestigingsfactor

50 *Ligthart, S.S.H.* Natuurbeleid met kwaliteit. Het Milieu- en Natuurplanbureau en natuurbeleidsevaluatie in de periode 1998-2006

51 *Kennismarkt 22 maart 2007; van onderbouwend onderzoek Wageningen UR naar producten MNP in 27 posters*

52 *Kuindersma, W., R.I. van Dam & J. Vreke.* Sturen op niveau. Perversies tussen nationaal natuurbeleid en besluitvorming op gebiedsniveau

53.1 *Reijnen, M.J.S.M.* Indicators for the 'Convention on Biodiversity 2010'. National Capital Index version 2.0

53.3 *Windig, J.J., M.G.P. van Veller & S.J. Hiemstra.* Indicatoren voor 'Convention on Biodiversity 2010'. Biodiversiteit Nederlandse landbouwhuisdieren en gewassen

53.4 *Melman, Th.C.P. & J.P.M. Willemen.* Indicators for the 'Convention on Biodiversity 2010'. Coverage protected areas.

53.6 *Weijden, W.J. van der, R. Leewis & P. Bol.* Indicatoren voor 'Convention on Biodiversity 2010'. Indicatoren voor het invasieproces van exotische organismen in Nederland

53.7a *Nijhof, B.S.J., C.C. Vos & A.J. van Strien.* Indicators for the 'Convention on Biodiversity 2010'. Influence of climate change on biodiversity.

53.7b *Moraal, L.G.* Indicatoren voor 'Convention on Biodiversity 2010'. Effecten van klimaatverandering op insectenplagen bij bomen.

53.8 *Fey-Hofstede, F.E. & H.W.G. Meesters.* Indicators for the 'Convention on Biodiversity 2010'. Exploration of the usefulness of the Marine Trophic Index (MTI) as an indicator for sustainability of marine fisheries in the Dutch part of the North Sea.

53.9 *Reijnen, M.J.S.M.* Indicators for the 'Convention on Biodiversity 2010'. Connectivity/fragmentation of ecosystems: spatial conditions for sustainable biodiversity

53.11 *Gaaff, A. & R.W. Verburg.* Indicators for the 'Convention on Biodiversity 2010' Government expenditure on land acquisition and nature development for the National Ecological Network (EHS) and expenditure for international biodiversity projects

53.12 *Elands, B.H.M. & C.S.A. van Koppen.* Indicators for the 'Convention on Biodiversity 2010'. Public awareness and participation

54 *Broekmeyer, M.E.A. & E.P.A.G. Schouwenberg & M.E. Sanders & R. Pouwels.* Synergie Ecologische Hoofdstructuur en Natura 2000-gebieden. Wat stuurt het beheer?

55 *Bosch, F.J.P. van den.* Draagvlak voor het Natura 2000 gebiedenbeleid. Onder relevante betrokkenen op regionaal niveau

56 *Jong, J.J. & M.N. van Wijk, I.M. Bouwma.* Beheerskosten van Natura 2000 gebieden

57 *Pouwels, R. & M.J.S.M. Reijnen & M. van Adrichem & H. Kuipers.* Ruimtelijke condities voor VHR-soorten

58 *Bouwma, I.M.* Quickscan Natura 2000 en Programma Beheer.

59 *Schouwenberg, E.P.A.G.* Huidige en toekomstige stikstofbelasting op Natura 2000 gebieden

60 *Hoogeveen. M.* Herberekening Ammoniak 1998 *(werktitel)*

61 *Jaarrapportage 2006.* WOT-04-001 – ME-AVP

62 *Jaarrapportage 2006.* WOT-04-002 – Onderbouwend Onderzoek

63 *Jaarrapportage 2006.* WOT-04-003 – Advisering Natuur & Milieu

64 *Jaarrapportage 2006.* WOT-04-385 – Milieuplanbureaufunctie

65 *Jaarrapportage 2006.* WOT-04-394 – Natuurplanbureaufunctie

66 *Brasser E.A., M.F. van de Kerkhof, A.M.E. Groot, L. Bos-Gorter, M.H. Borgstein, H. Leneman* Verslag van de Dialogen over Duurzame Landbouw in 2006

67 *Hinssen, P.J.W.* Wettelijke Onderzoekstaken Natuur & Milieu. Werkplan 2007

68 *Nieuwenhuizen, W. & J. Roos Klein Lankhorst.* Landschap in Natuurbalans 2006; Landschap in verandering tussen 1990 en 2005; Achtergronddocument bij Natuurbalans 2006.

69 *Geelen, J. & H. Leneman.* Belangstelling, motieven en knelpunten van natuuraanleg door grondeigenaren. Uitkomsten van een marktonderzoek.

70 *Didderen, K., P.F.M. Verdonschot, M. Bleeker.* Basiskaart Natuur aquatisch. Deel 1: Beleidskaarten en prototype

71 *Boesten, J.J.T.I, A. Tiktak & R.C. van Leerdam.* Manual of PEARLNEQ v4

72 *Grashof-Bokdam, C.J., J. Frissel, H.A.M. Meeuwsen & M.J.S.M. Reijnen.* Aanpassing graadmeter natuurwaarde voor het agrarisch gebied

73 *Bosch, F.J.P. van den.* Functionele agrobiodiversiteit. Inventarisatie van nut, noodzaak en haalbaarheid van het ontwikkelen van een indicator voor het MNP

74 *Kistenkas, F.H. en M.E.A. Broekmeyer.* Natuur, landschap en de Wet algemene bepalingen omgevingsrecht

75 *Luttik, J., F.R. Veeneklaas, J. Vreke, T.A. de Boer, L.M. van den Berg & P. Luttik.* Investeren in landschapskwaliteit; De toekomstige vraag naar landschappen om in te wonen, te werken en te ontspannen

76 *Vreke, J.* Evaluatie van natuurbeleidsprocessen

77 *Apeldoorn, R.C. van,* Working with biodiversity goals in European directives. A comparison of the implementation of the Birds and Habitats Directives and the Water Framework Directive in the Netherlands, Belgium, France and Germany

78 *Hinssen, P.J.W.* Werkprogramma 2008; Unit Wettelijke Onderzoekstaken Natuur & Milieu (WOT-04). Onderdeel Planbureaufuncties Natuur en Milieu.

79 *Custers, M.H.G.* Betekenissen van Landschap in onderzoek voor het Milieu- en Natuurplanbureau; een bibliografisch overzicht

80 *Vreke,J., J.L.M. Donders, B.H.M. Elands, C.M. Goossen, F. Langers, R. de Niet & S. de Vries.* Natuur en landschap voor mensen Achtergronddocument bij Natuurbalans 2007

81 *Bakel, P.J.T. van, T. Kroon, J.G. Kroes, J. Hoogewoud, R. Pastoors, H.Th.L. Massop, D.J.J. Walvoort.* Reparatie Hydrologie voor STONE 2.1. Beschrijving reparatie-acties, analyse resultaten en beoordeling plausibiliteit.

2008

82 *Kistenkas, F.H. & W. Kuindersma..* Jurisprudentie-monitor natuur 2005-2007; Rechtsontwikkelingen Natura 2000 en Ecologische Hoofdstructuur

83 *Berg, F. van den, P.I. Adriaanse, J. A. te Roller, V.C. Vulto & J.G. Groenwold..* SWASH Manual 2.1; User's Guide version 2

84 *Smits, M.J., M.J. Bogaardt, D. Eaton, P. Roza & T. Selnes..* Tussen de bomen het geld zien. Programma Beheer en vergelijkbare regelingen in het buitenland (een quick-scan)

85 *Dijk, T.A. van, J.J.M. Driessen, P.A.I. Ehlert, P.H. Hotsma, M.H.M.M. Montforts, S.F. Plessius & O. Oenema..* Protocol beoordeling stoffen Meststoffenwet; versie 1.0

86 *Goossen, C.M., H.A.M. Meeuwsen, G.J. Franke & M.C. Kuyper.* Verkenning Europese versie van de website www.daarmoetikzijn.nl.

87 *Helming, J.F.M. & R.A.M. Schrijver.* Economische effecten van inzet van landbouwsubsidies voor milieu, natuur en landschap in Nederland; Achtergrond bij het MNP-rapport 'Opties voor Europese landbouw-subsidies

88 *Hinssen, P.J.W.* Werkprogramma 2008; Unit Wettelijke Onderzoekstaken Natuur & Milieu (WOT-04). Programma 001/003/005

90 *Kramer, H.* Geografisch Informatiesysteem Bestaande Natuur; Beschrijving IBN1990t en pilot ontwikkeling BN2004

92 *Jaarrapportage 2007.* WOT-04-001 – Koepel

93 *Jaarrapportage 2007.* WOT-04-002 – Onderbouwend Onderzoek

94 *Jaarrapportage 2007.* WOT-04-003 – Advisering Natuur & Milieu

95 *Jaarrapportage 2007.* WOT-04-005 – M-AVP

96 *Jaarrapportage 2007.* WOT-04-006 – Natuurplanbureaufunctie

97 *Jaarrapportage 2007.* WOT-04-007 – Milieuplanbureaufunctie

98 *Wamelink, G.W.W.* Gevoeligheids- en onzekerheids-analyse van SUMO

99 *Hoogeveen, M.W., H.H. Luesink, L.J. Mokveld & J.H. Wisman.* Ammoniakemissies uit de landbouw in Milieubalans 2006: uitgangspunten en berekeningen

100 *Kennismarkt 3 april 2008; Van onderbouwend onderzoek Wageningen UR naar producten MNP*

101 *Mansfeld, M.J.M. van & J.A. Klijn,* " Balansen op de weegschaal". Terugblik op acht jaar Natuurbalansen (1996-2005)

102 *Sollart, K.M. & J. Vreke.* Het faciliteren van natuur- en milieueducatie in het basisonderwijs; MNE-ondersteuning in de provincies

103 *Berg, F. van den, A. Tiktak, J.G. Groenwold, D.W.G. van Kraalingen, A.M.A. van der Linden & J.J.T.I. Boesten* Documentation update for GeoPEARL_3.3.3

104 *Wijk, M.N., van (redactie).* Aansturing en kosten van het natuurbeheer. Ecologische effectiviteit regelingen natuurbeheer

105 *Selnes, T. & P. van der Wielen.* Tot elkaar veroordeeld? Het belang van gebiedsprocessen voor de natuur

106 *Annual reports for 2007; Programme WOT-04*

107 *Pouwels, R., J.G.M. van der Greft, M.H.C. van Adrichem, H. Kuiper, R. Jochem & M.J.S.M. Reijnen,* LARCH Status A

108 *G.W.W. Wamelink* Technical Documentation for SUMO2 v. 3.2.1

109 *Wamelink, G.W.W., J.P. Mol-Dijkstra & G.J. Reinds,* Herprogrammeren van SUMO2. Verbetering in het kader van de modelkwaliteitsslag

110 *Salm, van der C., T. Hoogland & D.J.J. Walvoort,* Verkenning van de mogelijkheden voor de ontwikkeling van een metamodel voor de uitspoeling van stikstof uit landbouwgronden

111 *Dobben van, H.F. & R.M.A. Wegman,* Relatie tussen bodem, atmosfeer en vegetatie in het Landelijk Meetnet Flora (LMF)

112 *Smits, M.J.H. & M.J. Bogaardt.* Kennis over de effecten van EU-beleid op natuur en landschap

113 *Maas, G.J. & H. van Reuler.* Boomkwekerij en aardkunde in Nederland

114 *Lindeboom, H.J., R. Witbaard, O.G. Bos & H.W.G. Meesters.* Gebiedsbescherming Noordzee, habitattypen, instandhoudingdoelen en beheermaatregelen

115 *Leneman, H., J. Vader, L.H.G. Slangen, K.H.M. Bommel, N.B.P. Polman, M.W.M. van der Elst & C. Mijnders.* Groene diensten in Nationale Landschappen; Potenties bij een veranderende landbouw

116 *Groeneveld, R.A. & D.P. Rudrum.* Habitat Allocation to Maximize BiOdiversity, A technical description of the HAMBO model R.A.