SIXTH FRAMEWORK PROGRAMME

FOOTPRINT

Functional Tools for Pesticide Risk Assessment and Management

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Igor G. Dubus, FOOTPRINT co-ordinator
AgChemforum, 23-24 September 2006
Amsterdam, The Netherlands

Talk outline

- Aims and objectives
- The 3 FOOT tools
- Selected outputs of the project
- FOOTPRINT & the potential use to those involved in pesticide registration

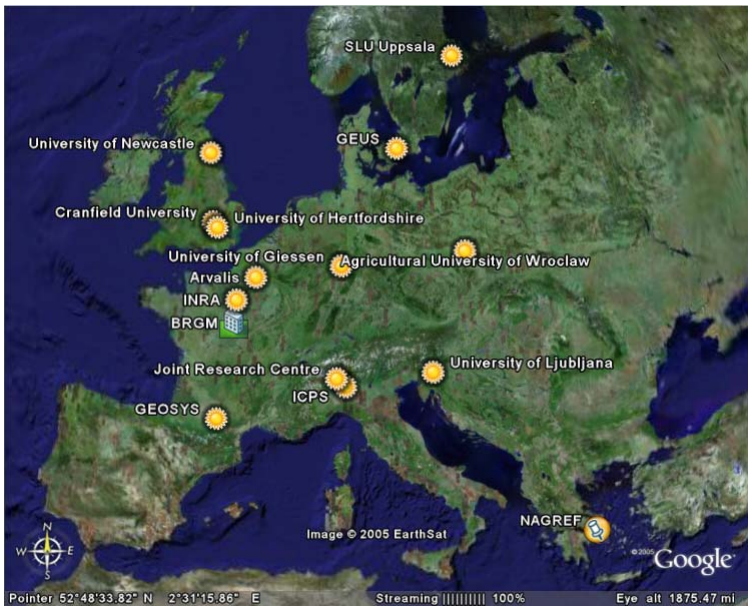
The FOOTPRINT project

- 3-year EU-funded research project as part of FP6
- Priority 8: Scientific Support to Policies
- Started in January 2006

The FOOTPRINT partnership

- 15 partners from 9 European countries
- Pesticide fate specialists, modellers, hydrologists, hydrogeologists, agronomists, data and GIS specialists, soil scientists, climatologists, ecotoxicologists, and tool developers
- Key features of the partnership:
  - Complementary profiles
  - Experience at the local, regional and national scale
  - Experience in the development or use of computerised tools

The FOOTPRINT partners



Project objectives

> Overall objective: to develop a set of computer tools that will allow users to:

- i) identify the dominant pathways and sources of pesticide contamination in the agricultural landscape.
- ii) estimate levels of pesticide concentrations in surface water and groundwater.
- iii) make scientifically-based assessments of how the implementation of risk reduction strategies is likely to reduce pesticide contamination of water resources.

Project goals

> 1) to develop a suite of three pesticide risk assessment and management tools, for use by three different user communities:
  - Farmers and extension advisors at the local (farm) scale
  - Water managers at the catchment scale
  - Policy makers/registration authorities at the national/EU scale.

> 2) to evaluate the usability and performance of the FOOT tools through piloting and evaluation studies at their various scales of application.

The three FOOT tools

	FS	CRS	NES
End-users	Farmers Extension advisers	Water managers	Policy & decision makers
Scale	Local (farm)	Catchment	National / EU

> All three tools will share the same philosophy and underlying science.

The FOOT-FS tool

> To be used at the farm level by extension advisers and farmers

> Emphasis on:
1. Identifying the pathways and areas most contributing to contamination of water resources by pesticides
2. Providing site-specific recommendations to limit transfers of pesticides in the local agricultural landscape

> Stand-alone application & web portal

FS

www.eu-footprint.org

The FOOT-CRS tool

> To be used at catchment level by local authorities, stewardship managers and water managers

> Emphasis on:
1. Identifying the areas most contributing to the contamination of water resources by pesticides
2. Defining and/or optimising action plans at the scale of the catchment

> Add-on in ArcGIS

CRS

www.eu-footprint.org

The FOOT-NES tool

> To be used at the large scale by EU and member states policy and decision-makers, agchems and pesticide registration authorities

> Emphasis on:

1. Identifying the areas most at risk from pesticide contamination
2. Assess the probability of pesticide concentrations exceeding legal or ecotoxicologically-based thresholds

> Add-on in ArcGIS

NES

www.eu-footprint.org

Involving stakeholders and end-users

> The relevance of the tools developed to stakeholders and end-users is key

> Advisory Committee set up for those with a strong interest in the project and its associated tools

- Level-1 members: 10 senior individuals
- Level-2 members: 24+ individuals
- Communities represented: regulators, researchers, water managers, the industry, extension advisers, consultancies

www.eu-footprint.org

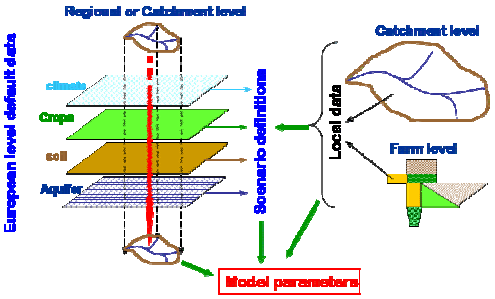
Going operational

> 3 years

> 8 Work Packages

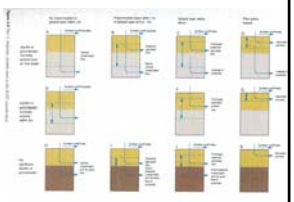
- WP0: project launching and coordination
- WP1: literature reviews
- WP2: high-resolution scenario-based spatial zonation
- WP3: identification of landscape features and contamination pathways
- WP4: model parameterisation, (meta)modelling and risk assessment
- WP5: development of functional tools
- WP6: piloting and evaluation of tools
- WP7: communication and dissemination

Developing agro-environmental scenarios for the whole of the EU25



ca. 15 climate scenarios
ca. 100 soil scenarios
ca. 30 crop scenarios

ca. 50,000 agro-environmental scenarios?



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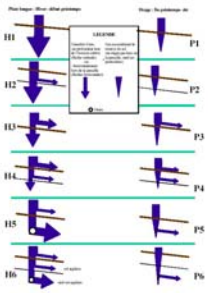
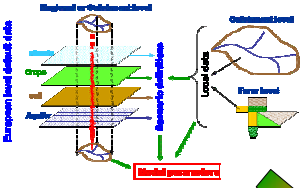
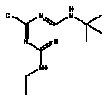


CORPEN

Estimating pesticide losses for agro-environmental scenarios





Koc, DT50

MACRO  PRZM

'Pesticide loss'
(different expressions in the various tools)

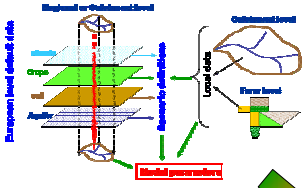
The waiting game

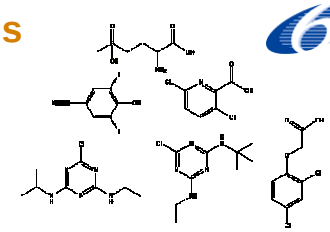
> The user does not want to wait for hours to get his/her results back

> There is thus a need:

- to simulate the fate of a large number of pesticides in the scenarios beforehand
- to develop emulators ('metamodels') of MACRO and PRZM running in seconds

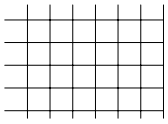
Developing meta-models





Multiple combinations of Koc, DT50

Look-up tables



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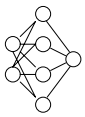


ANNs

'Pesticide loss'
(different expressions in the various tools)

Modelling (super)effort

> Running MACRO and PRZM for millions of times requires ENORMOUS computing power (and storage!)

> FOOTPRINT@work: development of a dedicated IT architecture which uses corporate computers which are not being used (at night, at weekends, during holidays) for running pesticide fate models

> Latest estimate: >500 machines for ca. 2 years

Selected deliverables (1/2)

- 46 deliverables in total
- Free download at:
  www.eu-footprint.org/deliverables.html
- DL3 to DL7: literature reviews ✓
  - Environmental risk assessment for pesticides
  - Pesticide fate models and environmental indicators
  - Bound residues
  - Preferential flow
  - Effectiveness of mitigation strategies
- DL14: complete set of agro-environmental scenarios covering the whole of Europe Feb. 07

Selected deliverables (2/2)

- D24: Database holding environmental fate and ecotoxicology data ✓
- D26-D28: Beta versions of the 3 FOOT tools
- D40-D42: Training in the use of the tools

The FOOTPRINT PPDB
What is it?

- *FOOTPRINT Pesticide Properties Database*
- Database put together by the AERU team at the University of Hertfordshire within the context of FOOTPRINT
- Holds environmental fate and ecotoxicological data
- for all ca. 650 compounds registered in the EU and 250 metabolites
- The database will be integrated into the FOOT tools and other AERU applications

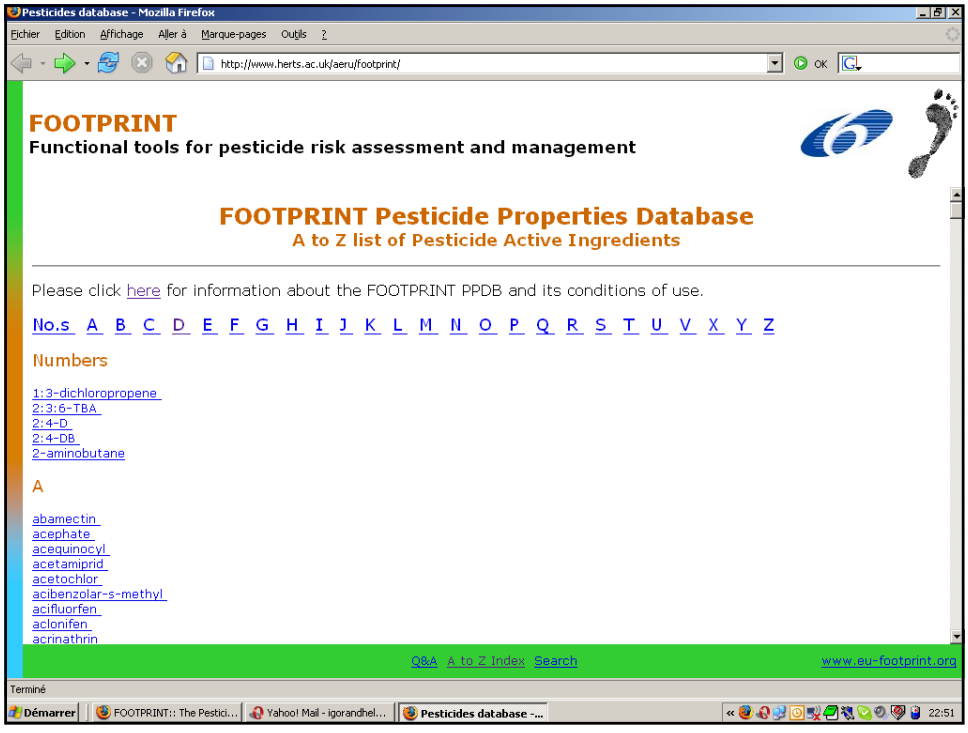
The FOOTPRINT PPDB
Where do the data originate from?

- A range of sources is used (from EU monographies to online databases)
- The source of all data can be traced back
- A scoring system reflecting the quality of the data - from 1 (low quality data) to 5 - is used
- Numerous cross-checks are being made with other existing databases

The FOOTPRINT PPDB
How can I access the data?

http://www.eu-footprint.org/ppdb.html

www.eu-footprint.org



FOOTPRINT & those involved in pesticide registration (1/2)

> Although the project wasn't designed specifically for pesticide registration, FOOT-NES is expected to be of potential value in this area

> EU and nationwide assessments for any compound

- Identification of countries (and zones within individual countries) with potential problems (e.g. through the probability of exceeding legal thresholds at the large scale)
- Evaluation of the zonal approach
- Major interest from countries 'not covered' by the FOCUS scenarios

FOOTPRINT & those involved in pesticide registration (2/2)

> Risk assessment

- Generation of daily time series of pesticide concentrations in leaching, drainage and runoff in any place in Europe for any compound
- These data will be available for combination with ecotox data

> Comparative assessments?

- The system will produce in seconds maps and statistics regarding the potential contamination of water resources in MS and the EU for any compound based on its application rate, Koc and DT50
- Availability of the FOOTPRINT PPDB or user input values
- Tool hence potentially suited to comparative assessments

Keeping up-to-date

- Project web site: **www.eu-footprint.org**
- FOOTPRINT announcement list
- Talks at workshops and conferences
- Annual newsletter
- Papers in the literature

- Annual meeting: 23-24 Nov 2006, Copenhagen, DK
  - Presentations of results
  - Feedback sessions

Conclusions

- An ambitious project, a highly-motivated team
- Potential value as complementary information for those involved in pesticide registration

- Project results will be made available on the project web site as they become available
- The present presentation will be available for download from the project web site

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