The Development and Status of the FOCUS Surface Water Scenarios within Directive 91/414/EEC

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on behalf of the FOCUS working group on Surface Water Scenarios,

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Acknowledgement

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Introduction

- Up to now
- Tiered Approach
- Steps 1 and 2 in FOCUS
- Scenario Development
- Models involved
  - drift
  - MACRO in FOCUS
  - PRZM in FOCUS
  - TOXSWA in FOCUS
- Conclusions

FOCUS

- EU DGVI-initiative
- Support: Commission and ECPA
- Participation:
  - Registration Authorities
  - Academia & Research
  - Industry
- Organisation

FOCUS Organisation

FOCUS Surface Water
Surface Water Modelling

1-1-1997

FOCUS Surface Water
Surface Water Scenarios

Objectives of FOCUS SWS

- Produce a limited number of ‘realistic worst-case’ scenarios (maximum of 10).
- Take into account all relevant entry routes, target crops, surface water bodies, topography, soil and climate.
- Scenarios should reflect realistic combinations of run-off and drainage (different processes dominate in different areas).
- Wherever possible, scenarios should be represented by a specific field site with monitoring data (allows validation).

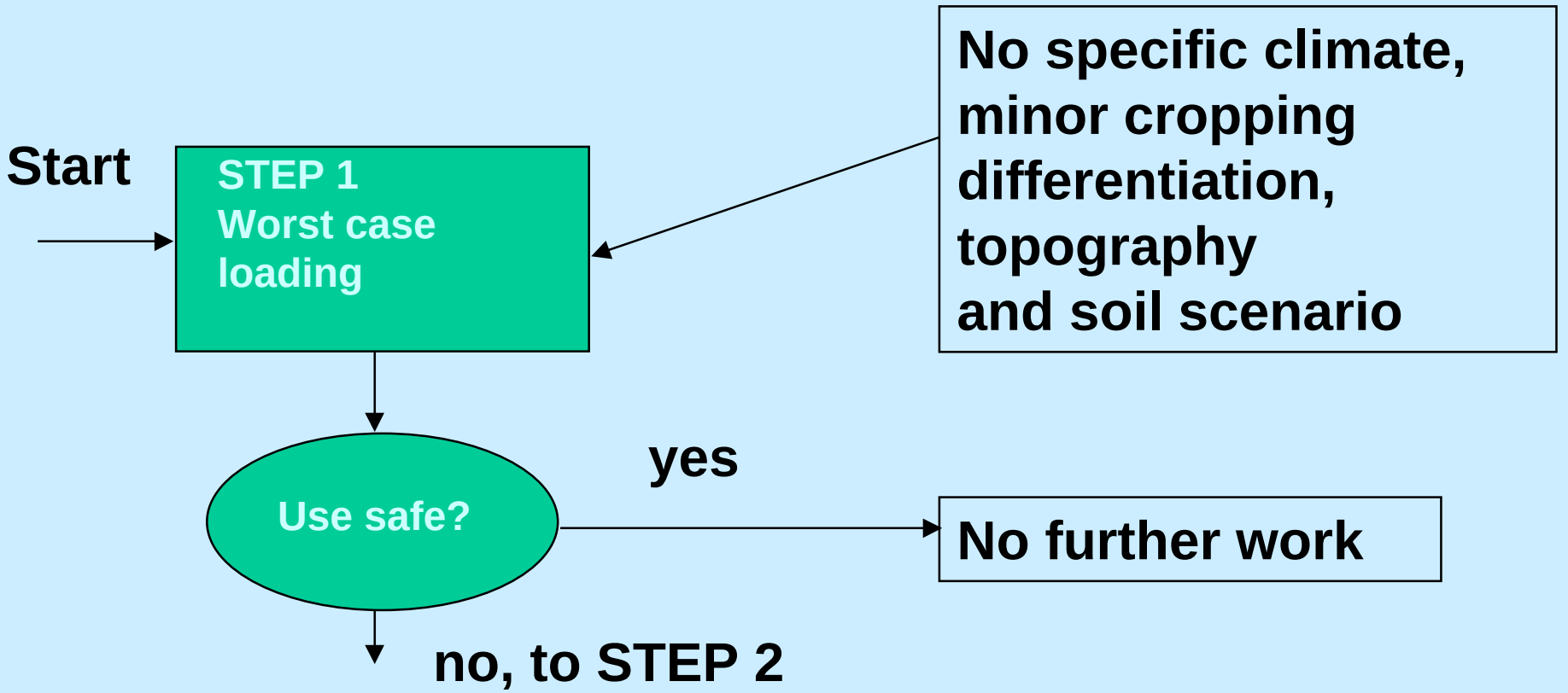
Up to now

- FOCUS SG: Remit in January 1997
- Start working group: June 1997
- 12 meetings
- 1 EU information meeting (Sept. 2000)
- Release of Steps 1 and 2 in FOCUS
- Status: DRAFT for Step 3 scenarios
- Close to finalisation (Dec. 2001)

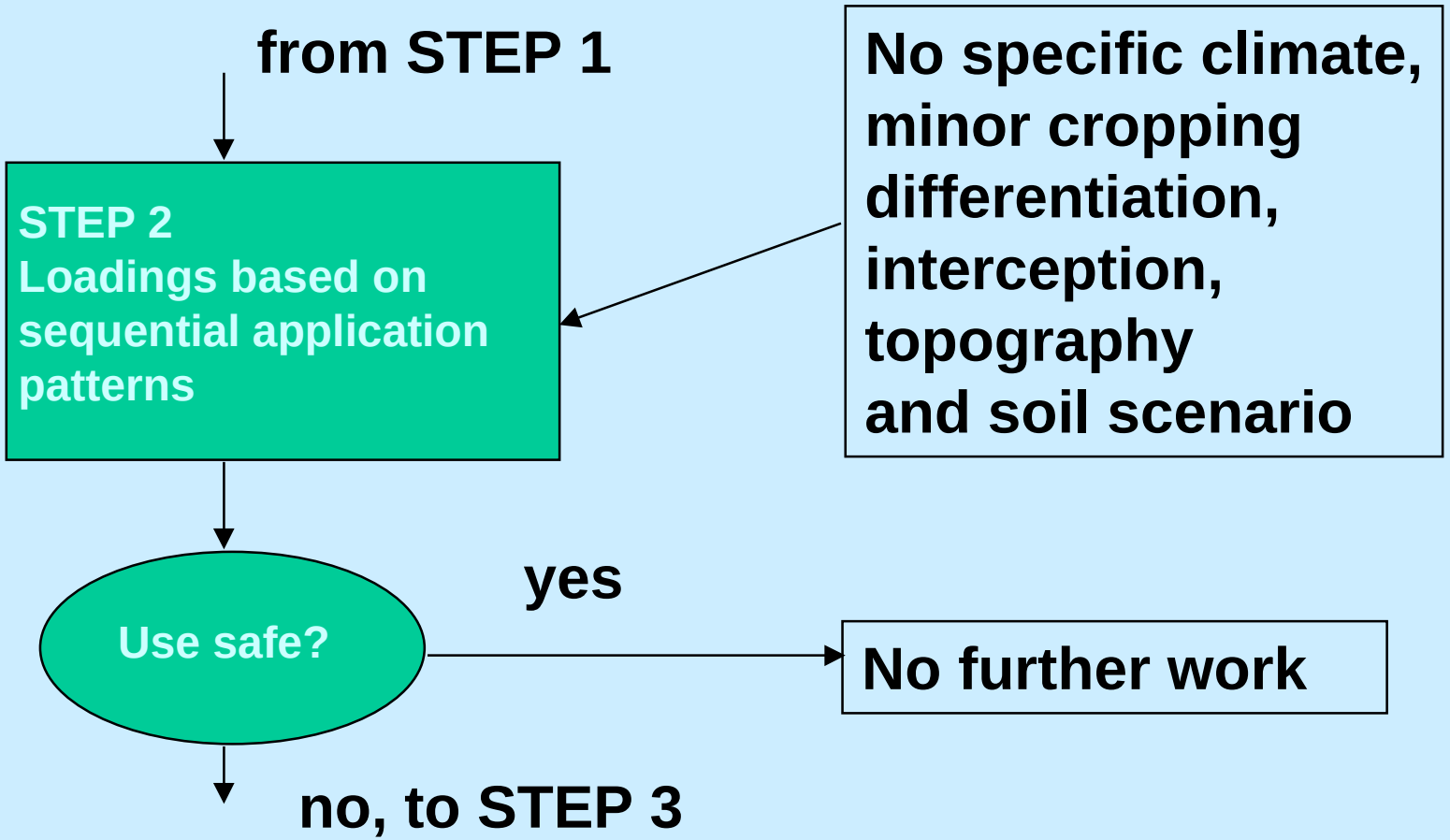
Tiered Approach

- **STEP 1: single application, fixed scenario**
- **STEP 2: multiple application, regional variation in Europe**
- **STEP 3: advanced modelling, specific European scenarios**
- **STEP 4: site specific calculation**

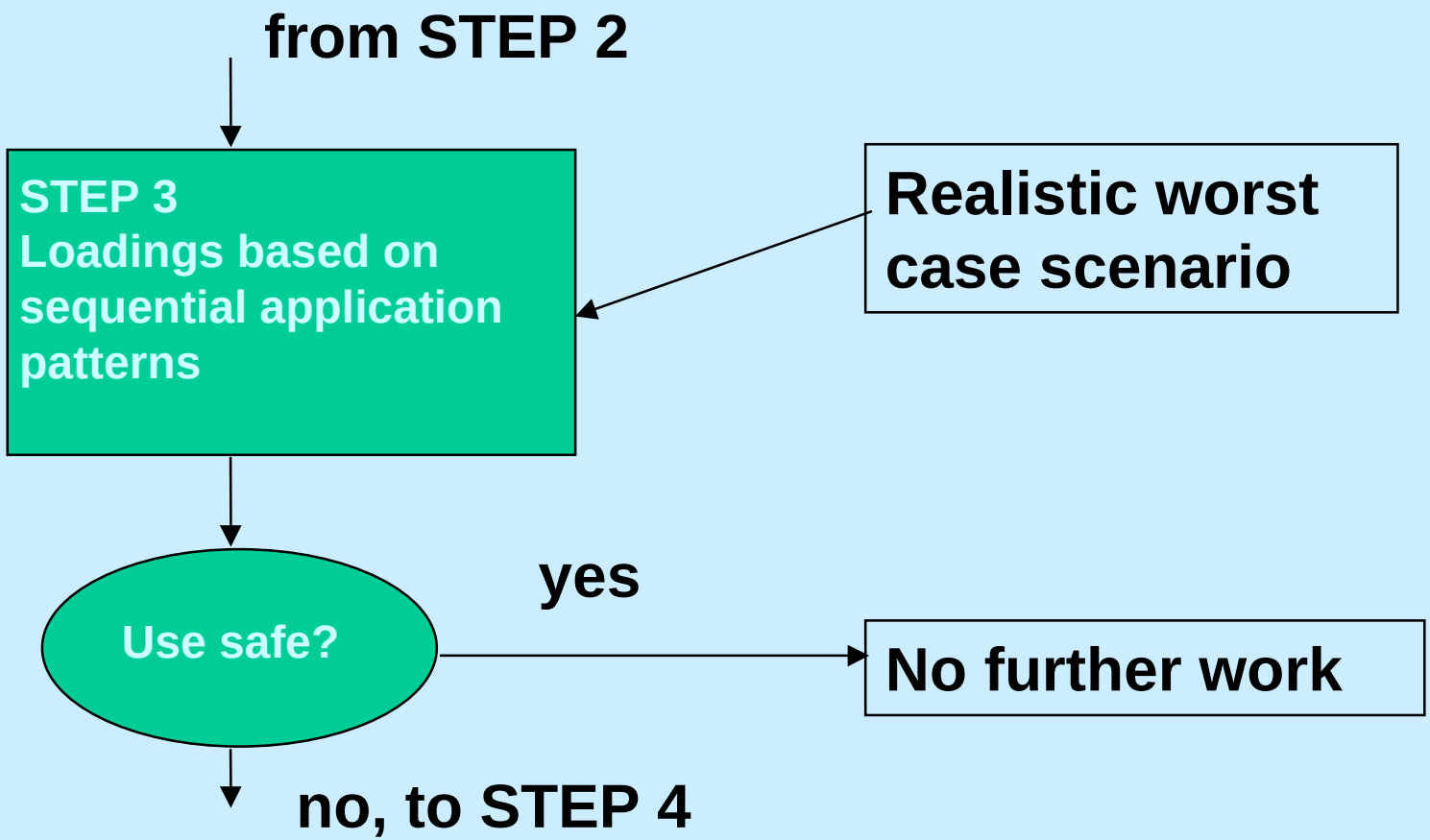
Step 1


Start
STEP 1
Worst case
loading
No specific climate,
minor cropping
differentiation,
topography
and soil scenario
Use safe?
yes
No further work
no, to STEP 2

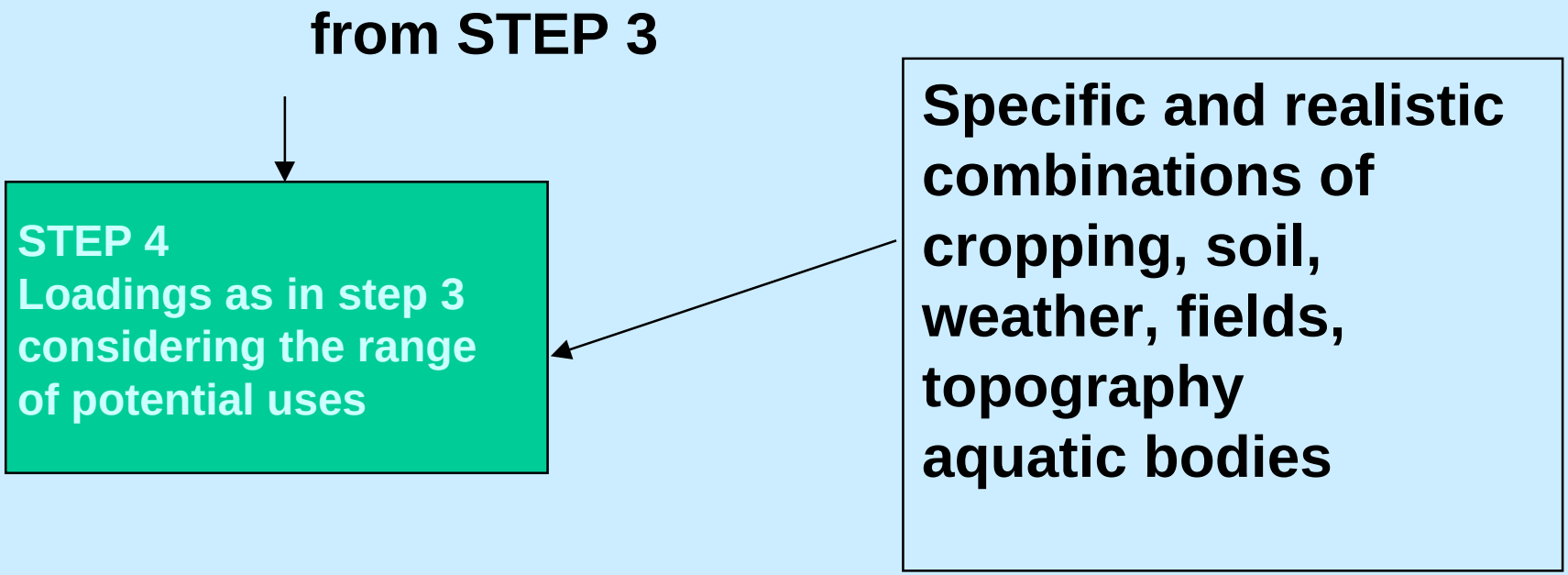
Step 2


from STEP 1
STEP 2
Loadings based on sequential application patterns
No specific climate, minor cropping differentiation, interception, topography and soil scenario
Use safe?
yes
No further work
no, to STEP 3

Step 3


from STEP 2
STEP 3
Loadings based on sequential application patterns
Realistic worst case scenario
Use safe?
yes
No further work
no, to STEP 4

Step 4


from STEP 3
STEP 4
Loadings as in step 3 considering the range of potential uses
Specific and realistic combinations of cropping, soil, weather, fields, topography aquatic bodies

Scenario development

STEP 3 Scenarios

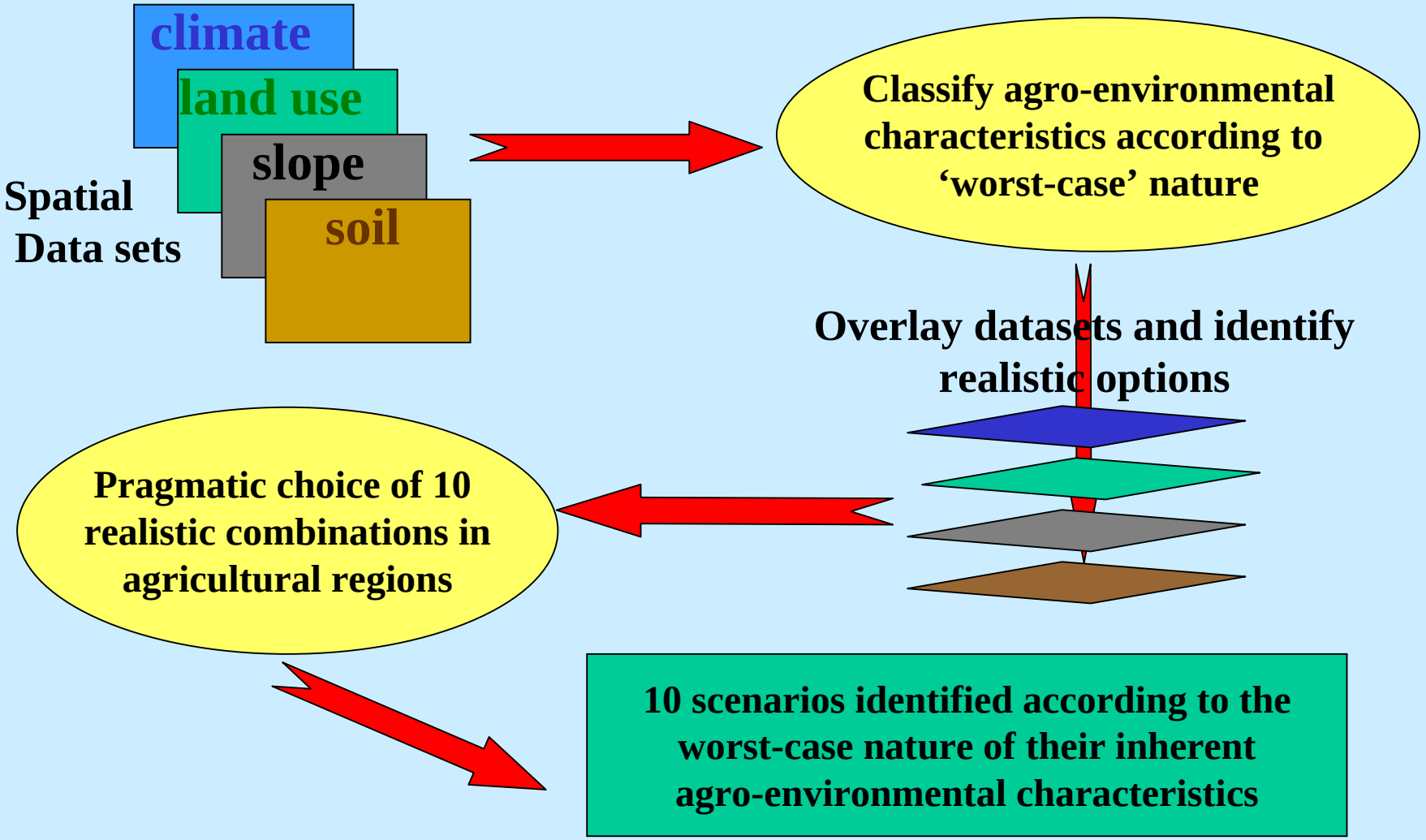
General Approach

- Comprehensive databases characterising all the agro-environmental characteristics for Europe are not available.
- Not possible to select representative worst-case scenarios on a rigorous statistical basis.
- Pragmatic approach adopted using basic data sources in combination with expert judgement.

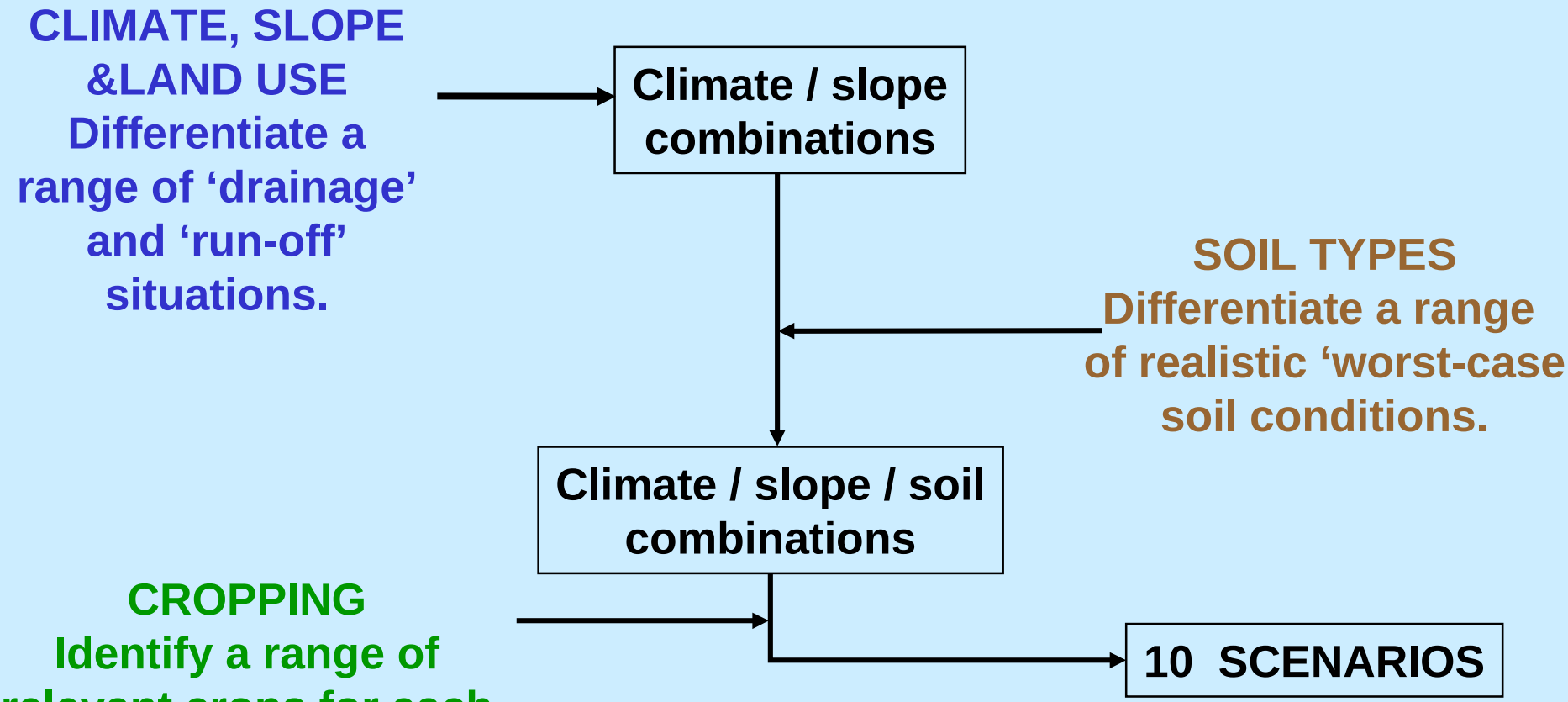
Data Sources

- **CLIMATE (AAP, daily max. Spring rainfall, mean autumn & spring temperature): GISCO, EC); NCDC, Ashville, USA; CRU, University of E. Anglia, UK.**
- **LANDSCAPE (slope, land cover, cropping statistics): USGS EROS data centre, US; REGIO databases, EuroStat.**
- **SOIL (type, field drainage system): 1:1,000,000 Soil Geographic Database Europe (v. 3.2), ESB, JRC.**

Developing Step 3 Scenarios



Methods


CLIMATE, SLOPE &LAND USE
Differentiate a range of 'drainage' and 'run-off' situations.
Climate / slope combinations
SOIL TYPES
Differentiate a range of realistic 'worst-case soil conditions.
Climate / slope / soil combinations
CROPPING
Identify a range of relevant crops for each combination
10 SCENARIOS

Overlay of Spatial Datasets

- Cropped land has a wide range of average Autumn and Spring temperature. < 6.6°C in N. to >12.5°C in S.
- Cropped land occurs mainly in areas with <1,000mm average annual rainfall, but in marginal areas can have up to 1500mm.
- Cropped land with drainage is mainly in areas with < 250mm average annual recharge, but in marginal areas can have up to 500mm.
- Cropped land does not occur in areas with average slopes >15%.
- Cropped land with drainage occurs predominantly on areas with slopes of 4% or less.

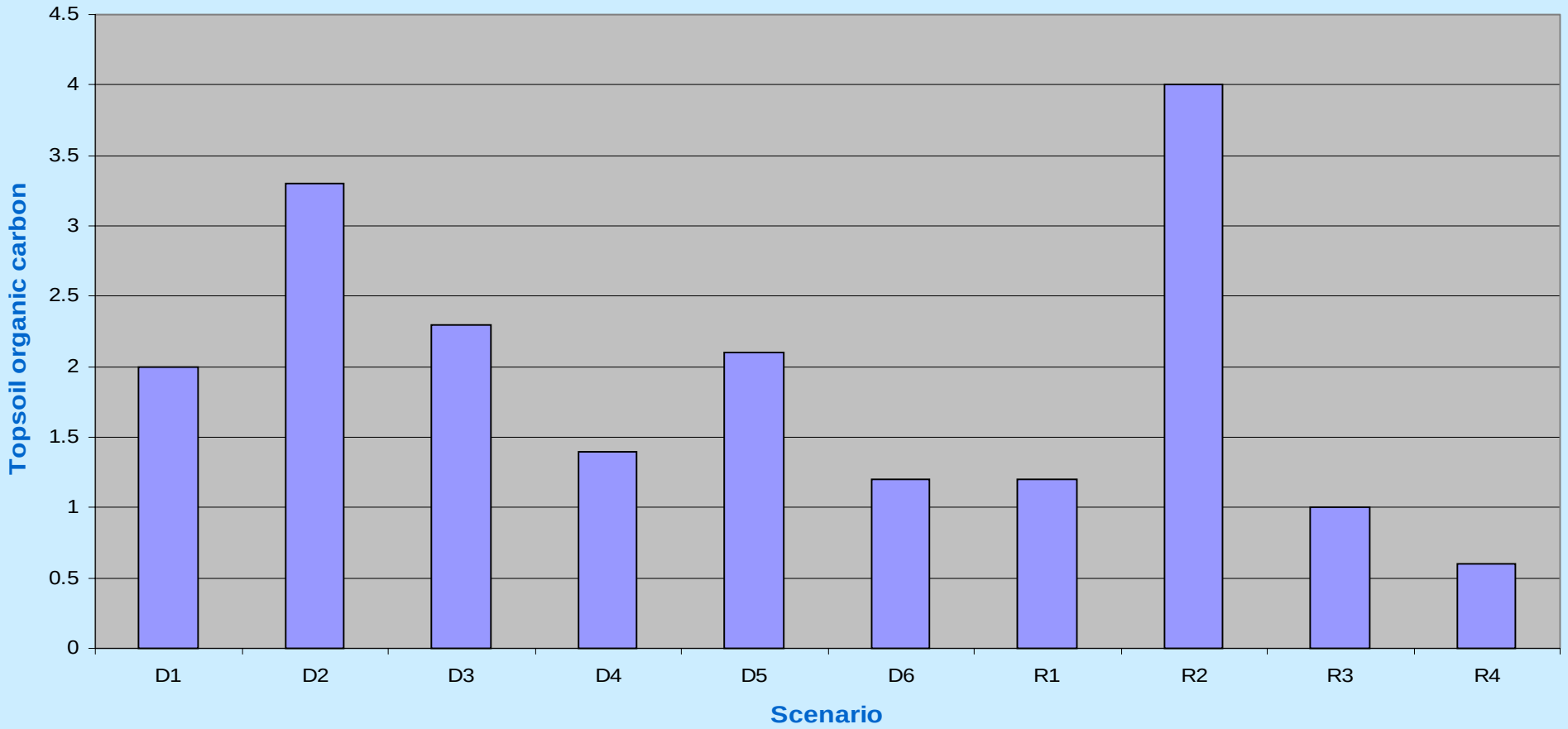
Agro-environmental characteristics

Scenario	Mean spring & autumn temp. °C	Mean annual rainfall mm	Mean annual recharge mm	Slope	Soil
D1	<6.6	600 – 800	100 - 200	0 – 0.5	Clay over impermeable substrate
D2	6.6 – 10	600 – 800	200 - 300	0.5 – 2	Clay with shallow groundwater
D3	6.6 – 10	600 – 800	200 - 300	0 – 0.5	Sand with shallow groundwater
D4	6.6 – 10	600 – 800	100 - 200	0.5 – 2	Light loam over slowly permeable substrate
D5	10 – 12.5	600 – 800	100 - 200	2 – 4	Heavy loam with shallow groundwater
D6	>12.5	600 – 800	200 - 300	0 – 0.5	Heavy loam with shallow groundwater
R1	6.6 – 10	600 - 800	100 – 200	2 – 4	Light silt with small organic matter
R2	10 – 12.5	>1000	>300	10 – 15	Organic-rich medium loam
R3	10 – 12.5	800 - 1000	>300	4 – 10	Medium loam with small organic matter
R4	>12.5	600 - 800	100 - 200	4 - 10	Medium loam with small organic matter

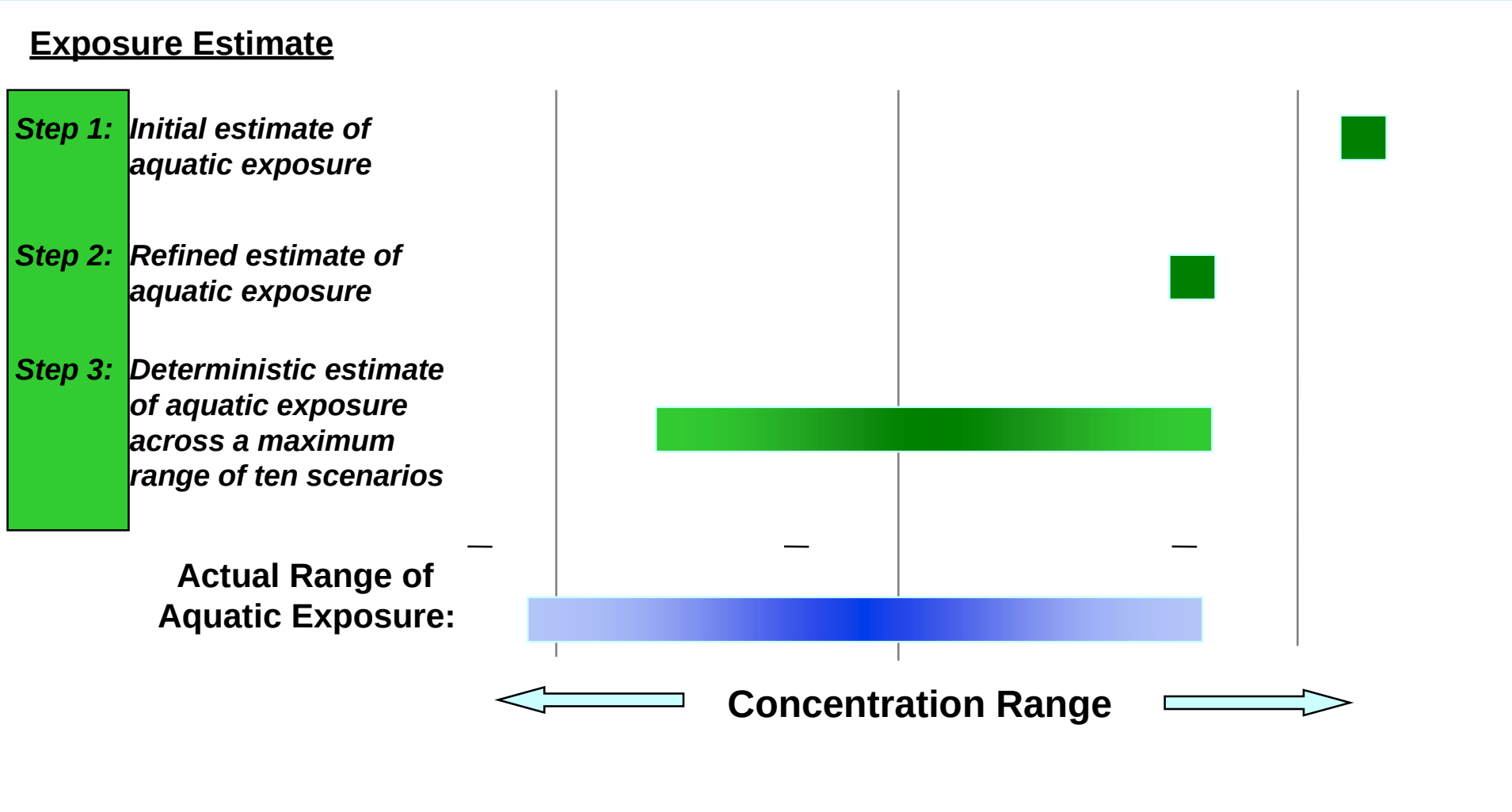
Scenario naming

Scenario	Characteristics	Weather Station
D1	Scandinavian, cool, moderate precipitation	Lanna
D2	North-west European, temperate, moderate precipitation	Brimstone
D3	North-west European, maritime, temperate, moderate precipitation	Vreedepeel
D4	North European, maritime, moderate precipitation	Skousbo
D5	West European, temperate, moderate precipitation	La Jailliere
D6	Eastern Mediterranean, warm, moderate precipitation	Thebes
R1	Central European, land , warm, wet, summer water deficit	Weiherbach
R2	South-west European, warm, very wet, summer water deficit	Porto
R3	South European, warm, wet, summer water deficit	Bologna
R4	South European Mediterranean, warm, moderate, summer water deficit	Roujan

Organic Carbon content (%) in topsoils



Relationship Between Modelling Steps



Conclusions

- FOCUS objectives achieved
- 10 European surface water scenarios
  - 6 drainage
  - 4 runoff
- NOT intended as national scenarios
- Useful tool for Annex I listing
  - by authorities
  - by industry
- GUI available

Recommendations

- EU-model Development
- Validation
  - Models
  - Scenarios
- Uncertainty Analysis
- Incorporation of New Developments
  - Drift
  - Science
- Public Relations