

**ESF Exploratory Workshop on**

**Interdisciplinary water management  
in European agricultural landscapes  
(IDEAL)**

**Birmingham, United Kingdom, 9-11 September 2009**

**Convened by:**

**Gilles Pinay and Julian Clark**

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**SCIENTIFIC REPORT**

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## 1. Executive summary

High political priority is now attached in the European Research Area (ERA) to water resource management (quality and quantity) in rural regions. This priority responds to uncertainties over water demand arising from climate change, agriculture's importance across Europe, and the sector's likely increasing water consumption in future in response to new imperatives to raise commodity production and European commitment to and investment in measures to attain high ecological quality of waters by 2015, through the Water Framework Directive.

An Exploratory Workshop on Interdisciplinary water management in European agricultural landscapes (IDEAL) sought to examine these challenges, and was held in Birmingham, United Kingdom, from September 9<sup>th</sup> -11<sup>th</sup> 2009. It was convened by Professor Gilles Pinay and Dr. Julian Clark from the School of Geography, Earth and Environmental Sciences of the University of Birmingham, U.K. Twenty experts from 13 countries actively participated to the workshop.

Workshop activities were structured around formal presentation of papers, plenary sessions and smaller break-out group discussions. Key workshop themes were identified through six key note papers on 'Disciplinary perspectives on water management in agricultural landscapes – approaches, opportunities, challenges', delivered on the first morning and prepared in advance by leading academic practitioners. Each paper aimed to address the underlying question: How is water management in agricultural landscapes conceptualised from the author's disciplinary perspective? The papers provided the workshop audience with overviews of state-of-the-art research in the different disciplinary fields clearly and accessibly. In each case, authors reflected upon the underlying question by discussing each disciplinary assumptions and concepts in water management; disciplinary approaches to problem formulation; key informing theories and methodologies; and identified areas where there is a need for interdisciplinary thinking and interdisciplinary exchange. This enabled the following two and a half days of the Workshop to tackle more precise fine-grained analyses and identification of interdisciplinary bridging concepts in break-out groups, with plenary sessions reserved for the formulation of main findings and recommendations.

### *Scientific impact*

The workshop has made a major contribution to the development of interdisciplinary approaches needed for integrated water resource management analyses in the ERA. The presentation of disciplinary positions has shown the range of different, though highly compatible, data collection and analytical methods, including catchment studies, experimental modelling, up-and downscaling, scenario building and stakeholder consultation, and the possibilities for their integration. Similarly, detailed longitudinal data sets have been identified for a representative range of European catchments with which to categorise and clarify positive couplings and the potential that natural dilution, dispersion, accumulation and decomposition processes might play in water resource management in future.

### *Outcomes*

Following the workshop, the group prepared and submitted a proposal for an ESF research networking programme for collaboration which will build a multidisciplinary network of applied and social scientists and policy practitioners, drawn from across the ERA, representative of the full range of Europe's climatic, hydrological, socio-economic and political-administrative conditions. The aim will be to facilitate interdisciplinary research dialogues and collaborations between networked partners both in the ERA and globally, particularly among early career researchers. The network will provide the collaborative focus for a European Small Catchment Observatory (ESCO) that will collate existing work and focus new interdisciplinary efforts on identifying positive couplings between biophysical and socio-economic processes within small catchments and larger watersheds. By doing so, it is anticipated that novel water management strategies can be developed that capitalise on locally-specific couplings and drivers, with the aim of advancing more sustainable management of water resources; and assessment made of the scope for developing new landscape-scale, community science-based approaches to water resource management across the ERA in future.

## **2. Scientific content of the event**

This three day exploratory workshop took the first steps towards integrating hitherto disparate disciplinary dialogues on water-agricultural landscape interactions to assess the opportunities and challenges confronting European policy practitioners in the 21<sup>st</sup> century. Using organizing concepts drawn from different disciplinary fields, the workshop addressed three key interlinked research objectives:

***Objective 1:*** what are the natural, social-economic and political capacities of agricultural catchments to respond to the challenges posed by headline climate change projections?

***Objective 2:*** how do contemporary water resource functions and processes 'map on' to current socio-economic practices and political contexts in agricultural catchments?

***Objective 3:*** based upon objectives 1 and 2, how can interdisciplinary analyses assist policy practitioners in foresighting water resource dilemmas and in identifying new policy criteria that yield multiple policy benefits for water resource management?

The workshop addressed these objectives through an innovative methodological approach, aimed at developing interdisciplinary understanding. This was based on three principles: (1) ensuring discussion on the three objectives was grounded in disciplinary research expertise of the participants; (2) focusing discussion to identify *bridging concepts* between these disciplinary domains (for example, how different scaled concepts of natural and cultural landscapes interrelate) on which to build genuine interdisciplinary dialogues; and (3) using these *bridging concepts* to integrate debate so as to leverage new policy understandings.

### Day 1 - Building interdisciplinary exchanges

Following the presentation of the six key note position papers, workshop participants met in the afternoon in groups of 6-7, mixing disciplinary perspectives. Through informal discussion, participants addressed three main issues critical to progressing interdisciplinary understandings of water management, as follows. First was to become more familiar with each others' disciplinary perspectives as these relate to European agricultural landscapes (EALs). Second was to identify ways of bridging these understandings, and to scope whether a collective conceptual approach on EALs was possible. Finally, the break-out groups considered the extent to which such an approach might act as a springboard to creative problem solving on current and future water management issues.

Discussions were highly productive, and a range of potential *bridging concepts* were identified between disciplines that address water-landscape interactions in EALs, drawing on the research experience of participants. These bridging concepts took a variety of forms and included: conceptions and assumptions; methods of inquiry; and approaches to problem framing. Concepts which emerged in all groups were 'catchments' as a focus of integrated inquiry, and 'landscape' as a construct, while approaches to addressing water-land management included resilience, ecosystem services, and agro-ecology. There was consensus among groups that, potentially, bridging concepts might assist understandings of how water resource functions and processes 'map on' to socio-economic practices and political contexts within EALs, and *vice versa*.

Participants engaged positively with the task set, and there was effective sharing of knowledge within and among participants. There was some consideration of whether an integrative multidisciplinary approach or a genuinely interdisciplinary language was needed, i.e. whether existing disciplinary perspectives could be 'stretched' to incorporate new perspectives, or whether new frameworks were required, that built on existing ones.

Subsequent group discussion explored whether and how these *concepts* might provide an integrative focus for water resources debates in future; and considered how these concepts might leverage new policy understandings and/or provide tools to inform debates, dialogues and deliberation. This was followed up in the morning session of Day 2.

#### Day 2 - Identifying critical thresholds and interfaces

After a valuable plenary session in the morning, where break-out groups reported back from Wednesday's session, Thursday afternoon saw small mixed groups of 6-7 participants reconvening for informal discussions, this time focusing on the issue of disciplinary perspectives on critical thresholds and interfaces to the management of EALs in the 21<sup>st</sup> century.

Across Europe, agricultural landscapes are characterized by layers of physical and social complexity and multiple drivers, interacting at different scales and over different time-frames. Both physical (hydrological, ecological, geological) systems and organizational and institutional systems show complex arrangements of global scale drivers (such as climate change, international agricultural policies and global trade), regional contexts

(e.g. landscapes, local population dynamics and local government structures), and diverse local adaptive strategies and responses (e.g. ecosystem ‘health’, sustainable communities and local governance). Considering the likely challenges EALs will face in the 21<sup>st</sup> century, groups were asked whether critical thresholds for change could be identified.

A wide range of critical drivers and thresholds for water management in EALs were specified from participants’ own perspectives, based on socio-economic trends; sustainability agendas; current climate projections; and changing water-agricultural landscape interactions in the thirteen different countries represented in IDEAL. Group discussions then moved on to explore and assess possible linkages between the *critical thresholds*, and the *capacities* (natural, socio-economic, cultural, political etc.) in EALs to respond/adapt to these thresholds – now, and in the short- and medium terms (i.e. 10-50 years). A fundamental challenge identified was the difficulty of meshing strategic and broader scale environmental drivers in the 21<sup>st</sup> century together with regional and local governance capacities.

### Day 3 - Conclusions

Workshop sessions on Wednesday and Thursday allowed useful collective activities to be carried out, which stretched conventional disciplinary and policy practitioner boundaries and patterns of thought. Friday’s session enabled participants to scope the possibilities of further interdisciplinary collaborative action. Specifically the following goals were agreed:

1. To develop a shared research statement of intent;
2. To develop a proposal for a ESF Research Support Network, to consolidate and build upon the Workshop findings and synergies among participants;
3. To compile a literature review on water land management interactions from disciplinary perspectives represented at IDEAL, as the basis for an article to be submitted to an internationally-peer reviewed journal

The workshop identified five key areas which were necessary to address in order to tackle the challenge posed by sustainable water management in agricultural catchments across Europe, which would provide the platform for these collaborative activities. These five key areas, encompassing different spatio-temporal scales, were:

- *Biophysical processes and environmental indicators*

Biogeochemists have identified ‘hot spots’ within catchments where hydrological flow paths converge with substrates containing complementary or missing reactants. These hot spots exhibit disproportionately high reaction rates relative to the surrounding matrix. It follows that study of catchment habitat functions needs to integrate hydrological, ecological and biogeochemical approaches.

- *Modeling water interactions between landscape components across multiple scales*

The impact of different hydrological regimes upon both nutrient transformations and delivery pathways is the critical challenge for modeling interactions between landscape components and at-a-point processes of nutrient cycling. Consequently, there is now a need to develop new modeling frameworks that focus upon up-scaling *and* down-scaling processes across multiple scales, from small to large watersheds.

- *Socio-economic drivers of change*

At a higher geographical scale, socio-economic drivers of water quality and quantity assume importance, in particular land use management practices that can mitigate or exacerbate impacts on water quality *and* quantity. Thus, to develop cost-effective water resource management options, a variety of land-management scenarios and associated policy instruments must be examined.

- *Policy drivers of change*

Achieving sustainable water-land management interactions in European rural areas foresees pivotal roles played by the WFD, Flood Directive and Common Agricultural Policy (CAP) as coordinating policy instruments. These policies must work harmoniously, which requires overcoming a number of manifest challenges.

- *Positive couplings and scales of resolution in water-land management interactions*

There are therefore benefits in using small catchments/agricultural landscapes as an organizing concept for integrating policy-land management influences on water management with modeling and quantification of positive couplings between hydro-ecological, biogeochemical and socio-economic processes.

The strong complementarities between these still largely disparate approaches were highlighted by developing a common template framework, which constitutes the core of a new integrative focus for research networking.

### **3. Assessment of the results, contribution to the future direction of the field**

The Exploratory Workshop provided an initial transnational networking forum among academics and policy practitioners for discussing water-land management interactions. It was acknowledged by all participants that there is now a pressing need to systematically broaden and deepen scientific and practitioner understandings on water-land management issues in areas representative of the full range of European physiographic, hydrological, ecological and socio-economic conditions. Participants at the Exploratory Workshop pledged to explore the extent to which these critically important issues might be better integrated in future through collaborative research and dissemination activities. A more complete understanding at the territorial scale could thus be attained of the interrelations between hydroecological and biogeochemical processes and change pathways, catchment

land use patterns, global policy drivers and the consequences for water quantity and quality.

Based on this Exploratory Workshop, a European Science Foundation research networking programme called **EUropean network for Conceptualizing water-Landscape process Interactions and Dynamics (EUCLID)** was prepared and submitted in October 2009. It will provide a transnational networking arena for broadening and deepening understandings on water-land management interactions in areas representative of the full range of European physiographic, hydrological, ecological and socio-economic conditions. If funded, participants within the network will explore the extent to which these critically important issues can be approached in an interdisciplinary and policy-relevant way at the small catchment scale. It is anticipated that this spatially explicit approach will furnish a crucial platform for integrating historical and new data collection; for identifying key biophysical and socio-economic drivers, indicators and thresholds; and for developing capacity for modeling water-land management interactions across catchments. EUCLID will therefore be well placed to inform contemporary policy approaches to water management in rural Europe, and to shape future research needs.

By identifying disciplinary thresholds and interdisciplinary bridging concepts and their interrelations and interfaces, greater interdisciplinary understanding will be attained and new insights made into the fundamental dynamics shaping hydrological systems, land management and local systems of livelihood in each catchment under conditions of climate change in the 21<sup>st</sup> century. In turn, this will establish practical dialogues between disciplines as well as enabling potential policy difficulties to be foresighted, while also contributing to the refinement of contemporary policy instruments such as the EU WFD.

#### **4. Final programme**

##### **Wednesday 9<sup>th</sup> September 2009**

- 08.30 - 08.50 Welcome From Prof. Judith I. Petts Pro-Vice-Chancellor, UoB
- 08.50 - 09.10 Presentation of the European Science Foundation (ESF) Aslihan Kerc
- 09.10 -13.00 Morning Session: Disciplinary views
- 09.10 - 09.40 Hydrological Modelling Richard Alexander (USGS, Virginia, USA)
- 09.40 -10.10 Hydro-Ecology Michael McClain (UNESCO IHE, Delft, The Netherlands)
- 10.10 - 10.30 *Coffee / Tea Break*
- 10.30 - 11.00 Stream Restoration  
Nicholas Haycock (Haycock Associates, United Kingdom)
- 11.00 - 11.30 Environmental Policy Geoffrey Gooch (Linkopings University, Sweden)
- 11.30 - 12.00 Environmental Sociology Viola Schetula (Dialogic, Stuttgart, Germany)
- 12.00 - 12.30 Water Protection within the Water framework Directive Tomasz Okruszko  
(Warsaw University, Poland)
- 12.30 - 14.00 *Lunch*
- 14.00 – 18.00 Afternoon Session: Building Interdisciplinary exchanges
- 14.00 - 16.00 Breakout groups
- 16.00 - 16.30 *Coffee / Tea break*
- 16.30 - 18.00 Breakout groups
- 19.00 *Dinner*

##### **Thursday 10<sup>th</sup> September 2009**

- 09.00 - 12.30 Morning Session: Plenary session
- 09.00 - 10.30 Reporting back from Breakout groups
- 10.30 - 11.00 *Coffee / Tea Break*
- 11.00 - 12.30 Discussion on Developing interdisciplinary thinking
- 12.30 - 14.00 *Lunch*
- 14.00 – 18.00 Afternoon Session: Identifying critical thresholds and interfaces
- 14.00 - 16.00 Breakout groups
- 16.00 - 16.30 *Coffee / Tea Break*
- 16.30 - 18.00 Breakout groups



19.00 *Dinner*

**Friday September 11<sup>th</sup> 2009**

09.00 - 12.30 Morning Session: Plenary session

09.00 - 10.30 Reporting back from Breakout group

10.30 - 11.00 *Coffee / Tea Break*

11.00 - 12.30 Taking IDEAL Forward Discussion on follow up activities/networking/collaboration

12.30 - 14.00 *Lunch*

14.00 *End of Workshop and departure*

## 5. Statistical information on participants

Age bracket	Number	Percentage
Junior scientist	6	30 %
Senior scientist	14	70 %

  

Country of origin	Number	Percentage
Austria	2	10 %
Estonia	1	5 %
France	3	15 %
Germany	1	5 %
Ireland	1	5 %
Poland	1	5 %
Romania	1	5 %
Spain	1	5 %
Sweden	1	5 %
The Netherlands	1	5 %
Turkey	1	5 %
United Kingdom	5	25 %
USA	1	5 %

## 6. List of participants

1. Alexander Richard U.S. Geological Survey, USA
2. Bouleau Gabrielle, CEMAGREF Montpellier, France
3. Bullock Craig, University College Dublin, Ireland
4. Burt Tim, Durham University, United Kingdom
5. Clark Julian, University of Birmingham, United Kingdom
6. Gooch Geoffrey, Linkopings University, Sweden
7. Haycock Nicholas, Haycock Associates Limited, United Kingdom
8. Hein Thomas, WasserKluster Lunz, Austria
9. Ichikawa Marina, Umweltbundesamt, Austria
10. Kerc Aslihan, Marmara University, Turkey
11. Mander Ulo, University of Tartu, Estonia
12. McClain Michael, UNESCO-IHE Institute for Water Education, The Netherlands
13. Okrusko Tomasz, Warsaw Agricultural University, Poland
14. Pinay Gilles, University of Birmingham, United Kingdom
15. Sabater Sergi, University of Girona, Spain
16. Schetula Viola, DIALOGIK, Germany
17. Sebastien Treyer Sebastien, ENGREF, France
18. Talks Lawrence, Environment Agency, United Kingdom
19. Tournebize Julien, CEMAGREF Paris, France
20. Vadineanu Angheluta, University of Bucharest, Romania