UFZ Centre for Environmental Research
Leipzig-Halle
in the Helmholtz Association

Division
Computational Environmental Systems

Departments

Computational
Landscape Ecology

Computational
Hydrosystems

Annual Report 2005

1. Prologue ... 3
2. The Division Computational Environmental Systems ... 4
2.1. The Department Computational Landscape Ecology ... 4
2.2. The Department Computational Hydrological Systems ... 5
3. Staff ... 5
3.1. Research Staff ... 5
3.2. Technical & Administrative Staff ... 7
3.3. PhD Theses ... 7
3.4. Diploma Thesis ... 7
3.5. Habilitations ... 8
4. Projects ... 8
4.1. Participation in Helmholtz-Programme 5 ... 8
4.2. Externally Funded Projects ... 10
5. Publications ... 11
5.1. International Journals (ISI referenced) ... 11
5.2. Other Journals ... 12
5.3. Monographs, Miscelleneous ... 12
5.4. Talks and Presentations ... 12
5.5. Workshops and Symposia ... 13
5.6. Participation in Conferences ... 13
5.7. Participation in Advanced Training Sessions ... 14
6. International Cooperation ... 14
6.1. Visiting Scientists ... 14
6.2. Participation on exchange programmes ... 14
7. Memberships in Committees, Review Activities ... 15
8. Teaching Activities ... 16
8.1. University of Leipzig ... 16
8.2. Jena ... 16
8.3. Martin-Luther University of Halle-Wittenberg ... 16
8.4. Technical University of Braunschweig ... 16
8.5. International ... 16

1. Prologue

The move to the new building (No. 7.1) on the campus of the Centre for Environmental Research (UFZ) of the Departments for Computational Hydrosystems (CHS) and Computational Landscape Ecology (CLE) together with the formation of the new Division ("Fachbereich") Computational Environmental Systems have been the most distinctive events of the last year. Probably these events prescind all the other bits and pieces that were important and probably got forgotten during this busy year. Thus, this annual report summarises most of the activities in the Division with respect to research within Program 5 "Sustainable use of Landscapes", externally funded projects, publications and teaching activities of the staff.

As a logical consequence, from now on the annual report will be a joined one, summarizing the activities of all departments in the division.

Sabine Attinger &

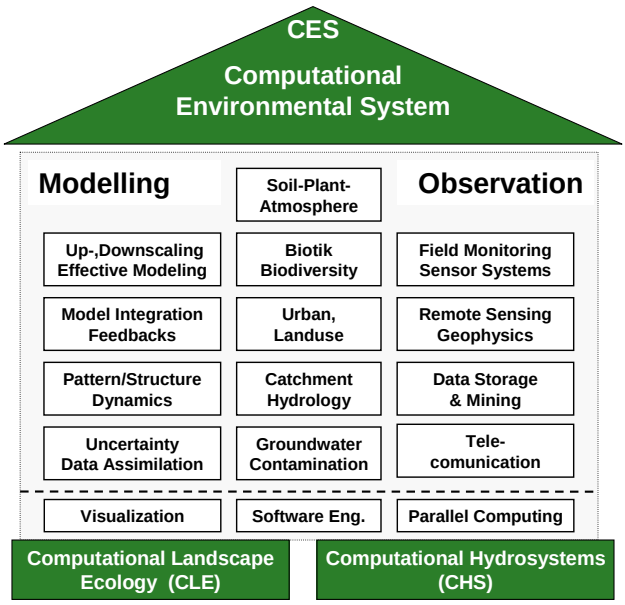
Ralf Seppelt

This years milestones

January	February	March	April
		• New in CHS: Björn Zehner from Schlumberger, UK	• New in CLE: Sven Lautenbach from University of Osnabrück
May	**June**	**July**	**August**
• New in CLE: Thilo Weichel, Carsten Bohn and Stefan Liersch. • New in CHS: Luis Samaniego from Stuttgart University, Christoph Schneider	• New in CHS: Anke Hildebrandt from MIT, USA	• New in CLE: Thomas Schnicke	• New in CLE: Justin Calabrese from University of Maryland, USA • Gerd Schmidt leaves the UFZ and starts at the Martin-Luther University Halle-Wittenberg
September	**October**	**November**	**December**
• Move to the new building 7.1 on UFZ campus	• Ellen Banzhaf, Annegret Kindler and Heike Hartman leave CLE and join the team Urban Ecology, Environmental Planning & Transport	• Visitor at the Division: The new President of the Helmholtz-Association, Prof. Dr. Mlynik	• Visitors at the Division: University Kassel, Wissenschaftszentrum III

2. The Division *Computational Environmental Systems*

Being an interdisciplinary division with a strong emphasis on the methodological advancements in modelling and simulation of environmental systems, a structure that supports collaboration and communication between groups, project teams and departments is required and this – an important constraint – by limiting the number of meetings for organization and administration.



This sets the framework for the "house" of the division, which is built upon two Departments. The working groups mentioned have different interests with respect to modelling (left column), scientific research fields (middle column) and different requirements in observation, data collection and measurements.

Important within this concept is (i) to have or build up competence in different research fields, increase expertise in modelling and be experienced in data acquisition. This easily allows the exchange with other scientists within the UFZ, and other Helmholtz centres and supports international collaborations. As the question of integration of research gains more and more importance, this structure allows the scientist (ii) to investigate environmental systems in an integrative manner with the necessary competence from every field, for instance land use development and the drivers from socio-demographic change. And finally (iii) we hope to benefit from this structure by exchanging methods across different disciplines of environmental research.

2.1. The Department Computational Landscape Ecology

Landscape ecology puts ecology into a spatial context. Our approaches are therefore interdisciplinary and base on a fundamental understanding of physical, biological, chemical and anthropogenic processes. Research activities focus on

- the identification and quantification of environmental processes (ecosystem services) at different spatial scales using different modelling methodologies, and
- the development of strategies for a sustainable use of landscapes including natural landscapes as well as anthropogenic impacted and rural areas.

Current research - although interdisciplinary and in close collaboration with other departments and external partners - can be divided into the following categories: Thematically we distinguish between the main research areas of abiotic und biotic processes; within these areas we focus on the development of new methods in environmental modelling and in the use and assimilation of remote sensing information focussing on a regional scale.

2.2. The Department Computational Hydrosystems

Water is a vital resource for human needs and natural ecosystems. Growing human needs include for example water for agriculture and food production, municipal and industrial supply. The objective of the Department Computational Hydrological Systems is to gain a better understanding of environmental systems by establishing and computing process-based models for

- the prediction of subsurface and surface water fluxes at different spatial and temporal scales,
- the description of water fluxes at the soil-plant-atmosphere interface

and to develop strategies for the sustainable management of the natural resource water. The core of our approach are physically based, distributed models which portray the behavior of the different natural subsystems. This requires

- the identification and description of the relevant physical, chemical and biological processes within the interactive system,
- the ability to translate these processes taking into account inherent uncertainty into conceptual and computational models
- the development of computational algorithms to efficiently solve them (by complexity reduction, multi-scale codes etc.)

The development of management and optimization tools is based on fully integrated, low-order, parameter efficient simulation models to find robust strategies for water management.

3. Staff

3.1. Research Staff

Prof. Dr. Sabine Attinger (CHS) Theoretical physicist, doctorate degree in physics, professor for hydrogeology at Jena University. Major research focus: modelling and simulation of hydrological systems, development of multi-scale methods, stochastic modelling,

Carsten Bohn Landscape Ecologist. Research interests: Development of a phytosociological based assessment approach for floodplains concerning the requirements and targets of the EU WFD and nature protection (FFH-Directive). PhD under supervision of Prof. Dr. G. Schulte (Westfalian Wilhelms-University, Münster)

Dr. Justin Calabrese (CLE) Theoretical ecologist, Ph.D. in Community Ecology/Theoretical Ecology (University of Maryland, USA), postdoctoral researcher, main research interests: 1) Neutral community theory and its application to empirical data, 2) Developing practical methods to extract information about underlying movement processes from spatially explicit population-level data, 3) The influence of the timing of individual life-history events on population-, community- and landscape-level processes.

Dr. Carsten Dormann (CLE), Biologist, PhD in Plant Ecology (University of Aberdeen, Scotland) ; Postdoc: main projects 1. Biotic Ecosystem Services (Young Investigators Group funded by the Helmholtz Association and the UFZ); 2. Statistical aspects of

species distribution analyses; 3. experimental investigation into the mechanisms behind the competition intensity-species diversity-relationship; current and previous associations to EU-projects ALARM (1 PhD student) and Greenveins.

Dr. Dagmar Haase (CLE), geographer and landscape ecologist (PhD), senior post-doctoral researcher, main research interest: (urban) land use dynamics and population modelling, urban water balance and flood rsik, flood vulnerability, integration and operationalisation of socio-economic data.

Dr. Anke Hildebrandt (CHS), water resources engineer (Dipl. Ing.) and PhD in hydrology. Postdoctoral researcher with scientific interest in soil-vegetation-atmosphere interaction on various spatial scales. Particular interest in modelling transpiration and root water uptake.

Dr. Angela Lausch (CLE), biologist and landscape ecologist (PhD), senior scientist, Major research focus: Spatial explicit modelling of habitat and landscape changes, investigations of relationships between pattern and functions of changing landscapes and their influence on existence and distribution of species.

Dr. Sven Lautenbach (CLE), Master in Geography and Applied system Science, PhD in Applied System Science, main research areas: environmental and hydrological modelling, integrated modelling, spatial explicit modelling, environmental management, envionmental impact assessment, scaling issues, uncertainty in integrated models, ecosystem services

Dr. Gerd Schmidt (CLE), Geographer, worked in the projects "FLUMAGIS" and "Weiße Elster" (BMBF funded focal point River Basin Management), Main research focus: Water balance and nutrient transport in river basins, monitoring and modelling, quantification of soil functions, loss of soil functions by surface sealing.

PD Dr. Karsten Schulz (CLE), Tool Maker; Master, PhD and Habilitation in "Geoecology-Hydrology"; Main Research Areas: Modelling of Soil-Vegetation-Atmosphere Transfer processes, Uncertainty Analysis, Remote Sensing and Data-Assimilation

Dr.-Ing. Luis Eduardo Samaniego Eguiguren (CHS), Civil Engineer, Master of Infrastructure Planning and PhD in Hydrology. Main research areas: multi-objective optimization, integrated catchment management and risk assessment, scale issues and uncertainty analysis in hydrology, hydroinformatics, stochastic processes and geostatistics.

Prof. Dr. Ralf Seppelt (CLE) Applied mathematician, doctorate degree in geoecology, full professor for applied landscape ecology at Martin Luther Universiät Halle Wittenberg. Major research focus: modelling and simulation of landscape ecological systems, with respect to man-environment interrelation, urban-rural-systems, processes of abiotic-biotic interactions; methodological developments,

Dr. Martin Volk (CLE), Geographer, Dr. rer. nat., Major research focus: GIS-based landscape analysis; Meso- to macro-scale modelling of hydrology and nutrients as a base to quantify landscape functions; Landscape-related controls (PCDs) on hydrology (especially baseflow and storage) in landscape units of medium to large river basins

Dr. Björn Zehner (CHS), Geoscientist, Dr. rer. nat. (Friedrich-Wilhelms University Bonn and Fraunhofer Institute for Media Communication). Major research areas: Visualization and Virtual Reality in Geosciences

3.2. Technical & Administrative Staff

Steffi Erfurth (CLE) GEO-Database management and maintanence, GIS

Christine Geyer (IT) Workstation management, OS Support, IT-Infrastructure coordination

Karin Große (CLE, CHS) Office, Departments and Division

Steffen Lehmann (CLE) GIS, Remote Sensing Software, Field Technician Land Surface Characteristics

Thomas Schnicke (IT) Workstation management, OS Support, IT-infrastructure coordination, Cluster maintenance

Gudrun Schuhmann (CLE) Field Technician Land Surface Hydrology

Gundula Schulz (CLE) GIS, Remote Sensing Software, Field Technician Land Surface Characteristics

3.3. PhD Theses

In Progress

Annelie Holzkämper (CLE) Landscape ecologist. Research interests: spatial optimization of land use patterns; habitat suitability modelling. PhD under the supervision of R. Seppelt.

Antje Ullrich (CLE) Geographer. Research interests: Sensitivity of SWAT to the variation of input variables. PhD under the supervision of R. Seppelt and M. Volk.

Stefan Liersch Geoecologist. Research interests: Improvement of environmental monitoring strategies using additional sources of information (empirical knowledge). PhD under the supervision of M. Volk and R. Seppelt.

Vanessa Stauch (CLE) Geoecolostist. Research interests: Augmentation of Eddy Covariance flux time series using data based methods. PhD under the supervision of Karsten Schulz and Andrew Jarvis (Lancaster University).

Thilo Weichel (CLE) Geographer. Research interests: Uncertainty analysis of input data sets in the 2D – Hydrodynamic Modelling. PhD under the supervision of Karsten Schulz and Dagmar Haase.

3.4. Diploma Thesis

Submitted

Stefan Liersch, Geoecology (Univ. Potsdam): Impact of land use changes and environmentally sound management practices on water and nutrient balance of the Upper Ems River Basin in North Rhine Westfalia. Supervisors: Prof. Bronstert, Dr. M. Volk.

Karen Lübkemann, Geography (Univ. Leipzig): Functionality and potentials of regional planning cooperatives, exemplified at the “Green Ring of Leipzig”. Supervisor: Prof. U. Weiland, Dr. D. Haase.

Franziska Schmidt, Geography (Univ. Halle): Flood risk and damage potentials of the Unified Mulde and Saale rivers. A cross-comparison of flood risk concepts. Supervisors: Prof. M. Frühauf, Dr. D. Haase.

Christoph Schneider, Computer Sciences – System Theory (TU Ilmenau): Coarse Graining for Well Flow. Supervisor: Prof. Dr. H. Puta, Prof. Dr. S. Attinger.

Jens Weinert, Geographie (Uni Leipzig): A GIS-based spatially explicit approach to conceptualise urban accessibility. Supervisor: Prof. M. Lanzendorf, Dr. D. Haase.

In Progress

Marion Pause, Photogrametry and Remote Sensing (Uni Dresden): The quantification of soil moisture pattern using time series of ENVISAT ASAR data. Supervisor: Dr. K. Schulz

Katrin Hanneman, Geography (Uni Bochum), Fuzzy-rule-based methods for the classification of land surface characteristics in the Schnellbach-Catchment using Landsat TM remote sensing data. Supervisors: Dr. K. Schulz, Dr. L. Samaniego.

Martin Steinert, Geography (Univ. Leipzig): A review of methods for the assessment of the landscape retention function on the example of the Upper Ems River Basin. Supervisor: Prof. Kirstein, Dr. M. Volk.

Sophie Schetke, Geography (Univ. Leipzig): Multi-criteria assessment of the urban green network development in a shrinking city using the URGE-ICC and the FLAG model. Supervisor: Prof. U. Weiland, Dr. D. Haase.

Tobias Finke, Geography (Univ. Leipzig): Land use transition model fort he Tisza river basin: a top-down approach to apply global scenarios at regional scale. Supervisor: Prof. W. Kirstein, Dr. D. Haase, C. Bohn.

3.5. Habilitations

In Progress

Dagmar Haase, (Univ. Halle): Dynamic urban spaces, book proposal in preparation.

Martin Volk, Analysis of catchment-related control of baseflow and storage in medium to large river basins.

4. Projects

4.1. Participation in Helmholtz-Programme 5

Coordination

Urban Monitoring and Modelling (5.1.1.5)

The aims of the research work in this field are to reach conclusions about the development of urban areas and to make available and develop the methods required for this in the areas of integrated modelling and remote sensing. Particularly the effects of changes in land use on people's quality of life, as well as biotic and abiotic resources, under various current

conditions and driving forces are investigated: growth, stagnation, negative growth and demographic change.

Scientists involved: Ralf Seppelt, Dagmar Haase

URLs:

- Research Theme: http://www.ufz.de/index.php?en=4925
- Cluster: http://www.ufz.de/index.php?en=4925&pof_nr=p5010105

Integrated Modelling (5.2.4.2)

The scale at which natural processes and human activities converge is the regional or landscape scale. Traditionally, processes at landscape scales are in the focus of landscape ecologists. However, landscape ecology is still lacking a generally accepted conceptual and theoretical basis (Wu & Hobbs, 2002). Our research aims at the development of systematic multi-scale and integrative modelling schemes for aggregating hydro- and ecosystem processes, the synthesis of hydro- and ecosystem processes, model parametrization on different scales.

Scientists involved: Sabine Attinger (coordination), Justin Calabrese, Carsten Dormann, Anke Hildebrandt, Annelie Holzkämper, Angela Lausch, Sven Lautenbach, Marion Pause, Luis Eduardo Samaniego Eguiguren, Karsten Schulz, Ralf Seppelt, Vanessa Stauch, Martin Volk

URLs:

- Research Theme: http://www.ufz.de/index.php?en=4953
- Cluster: http://www.ufz.de/index.php?en=4953&pof_nr=p5020402

Participation in Research Themes

Biodiversity, ecosystem function and ecosystem stability (5.2.1)

Biological diversity (or biodiversity) and its interaction with land use and landscape structure, is at the core of the research theme (RT). Biodiversity is endangered worldwide by biological invasions, changes of land use, climatic extreme events and pollution. Thereby, it is important to know, which role anthropogenic impacts play and which effects the decrease of biological diversity have on the stability and function of ecosystems. These important themes are examined in European cultural landscapes, in semiarid areas, and in tropical forests. In all of these landscapes there is a need to manage the biological diversity in a sustainable way. Therefore, we are developing integrative concepts, which comprise natural as well as social (including economics, law, and philosophy) sciences.

URL Research Theme: http://www.ufz.de/index.php?en=4950

Scientists of the division take part within the following research clusters:

- Land use, landscape structure, and biodiversity (URL http://www.ufz.de/index.php?en=4950&pof_nr=p5020101)
- Biological invasions, dispersal processes and biodiversity (URL http://www.ufz.de/index.php?en=4950&pof_nr=p5020102)

Scientists involved: Carsten Dormann, Annelie Holzkämper, Angela Lausch

Integrated management of water resources in river basins (5.2.2)

River basin management requires a comprehensive understanding of i) runoff generation and associated matter transport ii) environmental stresses on aquatic ecosystems and iii) the relationship between land-use changes and water quantity and quality. The integration of the various research activities proceeds from sector-specific approaches up to a catchment-level decision support system (DSS) that allows alternative management options to be explored and compared. In this context, a particularly innovative step will be the upscaling of results from detailed mechanistic studies to the catchment level. Integrated ecological, economic and social assessment methods, in which stakeholders from the areas of politics, economy and administration are involved will be developed and used to support the selection of efficient management strategies.

URL Research Theme: http://www.ufz.de/index.php?en=4951

Scientists involved: Dagmar Haase, Martin Volk.

4.2. Externally Funded Projects

ELCAI: European Landscape Character Assessment Initiative (EU-IP, 2/2003-1/2005, 25 T€)

FLUMAGIS, Interdisciplinary development of methods and tools for the planning process and measurement control for river basin management with geoinformationsystems (funded by BMBF; 1 PostDoc, 2002 to 2005; Responsible: Dr. M. Volk, Dr. G. Schmidt).

ALARM: (EU-IP, 1 Doktorand: Effects of Landscape composition and configuration on pollinator diversity and pollination efficiency)

AMLaTUR: Analysis and Management of Landscape Transition in the Urban-Rural Gradient, Ralf Seppelt (PI), 2004-2005, DAAD, Travel Budget 10 T€

FLOOD*site*: Integrated Flood Risk Analysis and Management Methodologies (EU-IP, associated at the Department for Economy; Travel budget)

3ZM-GRIMEX: Development of a coupled model for integrated flood risk management of surface and groundwater flow in urban areas (German BMBF, 1 PhD student)

HYBRID: Development of hybrid stochastic-mechanistic models for the partitioning and extrapolation of land surface to atmosphere water, energy and carbon fluxes. PI: Dr. K. Schulz, (DFG: Schu1271/4-1, 1PhD student)

NeWater: New approaches to adaptive water management under uncertainty (EU-IP, 1 PhD student, 1 Postdoc)

Statistical Analysis of Spatial Ecological Data: Workshop on statistical techniques to deal with spatial autocorrelation in species distribution data (German Science Foundation DFG; travel and subsistence for 20 participants)

BESS: Biotic Ecosystem Services: quantifying the ecosystem services pollination and biocontrol in dependence of the landscape setting; Young Investigator's Group awarded to Carsten Dormann together with the Agroecology Group at the University of Göttingen, Germany (Helmholtz-Association; 2 PhDs, 1 Postdoc, 2006-2010)

Decision Support for Integrated River Basin Management - Conflict Assessment and Possible Solutions Using the Example of the River Weisse Elster. (funded by BMBF; 0,5 PostDoc, 2002 to 2005; Responsible: Dr. M. Volk, Dr. U. Hirt).

5. Publications

5.1. International Journals (ISI referenced)

Research Articles

Bárdossy, A., Pegram G., **Samaniego L**. (2005). Modeling Data Relationships with a Local-Variance Reducing Technique: Applications in Hydrology, *Water Resour. Res.*, 41, W08404, doi:10.1029/2004WR003851.

Dormann C.F. & Roxburgh S.H. (2005) Experimental evidence rejects classical modelling approach to coexistence in plant communities. *Proceedings of the Royal Society of London Series B*, 272, 1279-1285

Haase, D., Frotscher, K. (2005). Topography data harmonisation and uncertainties applying SRTM, laser scanner and cartographic elevation models. *Advances in Geosciences* 5, 65-73.

Held, R., S**. Attinger** and W. Kinzelbach (2005). Homogenization of the Henry Problem in Hetereogeneous Formations, *Water Resour. Res.*, Vol. 41, No. 11, W11420 10.1029/2004WR003674.

Hirt, U., Meyer, B. C., Hammann, T. (2005). Proportions of subsurface drainages in large areas – methodological study in the Middle Mulde catchment (Germany). *J. Plant Nutr. Soil Sc.* 168 (3), 375-385.

Hirt, U. Hammann, T., Meyer, B .C. (2005). Mesoscalic estimation of nitrogen discharge via drainage systems. *Limnologica* 35 (3), 206-219.

Jensen, O.P. , **R. Seppelt**, T. J. Miller, Laurie J. Bauer (2005). Winter distribution of blue crab *Callinectes sapidus* in Chesapeake Bay: application and cross-validation of a two-stage generalized additive model. *Marine Ecology Series.* 299: 239-255.

Kuhnert, M., Voinov, A., & **R. Seppelt** (2005). Comparing Raster Map Comparison Algorithms for Spatial Modeling and Analysis. *Photogrammetric Engineering & Remote Sensing*. 71(8), pp. 975–984.

Samaniego, L., Bardossy, A. (2005) Robust parametric models of runoff characteristics at the mesoscale *J. Hydrol*. 303 (1-4), 136-151.

Schweiger, O., Maelfait, J. P., van Wingerden, W., Hendrickx, F., Billeter, R., Speelmans, M., **Augenstein, I**., Aukema, B., Aviron, S., Bailey, D., Bukacek, R., Burel, F., Diekötter, T.,Dirksen, J., Frenzel, M., Herzog, F., Liira, J., Roubalova, M., Bugter, R. (2005). Quantifying the impact of environmental factors on arthropod communities in agricultural landscapes across organizational levels and spatial scales. *J. Appl. Ecol.* 42 (6), 1129-1139.

Seppelt, R. (2005): Simulating invasions in fragmented habitats: theoretical considerations, a simple example and some general implications. *Ecological Complexity*. 2(3): 219-231

Seppelt, R. & O. Richter (2005). It was an artefact not the Results – A note on system dynamic model development. *Environmental Modelling and Software*. 20: 1543-1548.

5.2. Other Journals

Attinger, **S.** (2005): Coarse Grained Mixing Parameters for Solute Transport, Mathematisches Forschungsinstitut Oberwolfach, *Report No. 20/2005*, pp 10-12.

Bohn, C.; Machalica, S. & J. Fries (2005): Bewuchs an der Luftseite von Staudämmen. – *Dresdner Wasserbauliche Mitteilungen* Heft 29, 75-86.

Machalica, S., **Bohn, C.** & J. Fries (2005): Vegetation of Dams – Ecology and Bank Safety – the Bever Dam as an Example. – *GWF Wasser Abwasser* 146 (2005) Nr. 11, 852 – 856.

Möltgen, J., **Bohn, C.,** Borchert, R., Gretzschel, O., Pöpperl, R., May, M. & J. Hirschfeld (2005): Interdisziplinäre Methoden und Werkzeuge zur Planung und Entscheidungsunterstützung im Flusseinzugsgebietsmanagement – Flumagis. – *Limnologie Aktuell* Band 11, 177-193.

Lorz, C., G. Schmidt & **M. Volk** (2005): Perspektiven der Bewirtschaftung von bewaldeten Einzugsgebieten nach Europäischer Wasserrahmenrichtlinie. – *Forst und Holz* 8/2005: 320-324.

Mehnert, D., **Haase, D.**, Lausch, A., Auhagen, A., Dormann, C.F., Seppelt, R. (2005): Bewertung der Habitateignung von Stadtstrukturen unter besonderer Berücksichtigung von Grün- und Brachflächen am Beispiel der Stadt Leipzig. *Naturschutz und Landschaftsplanung* 2: 54-64.

Jüpner, R., **T. Weichel** & J. Franke (2005): Von der Hochwasserschutzstrategie zum Hochwassermanagementsystem - Ein Pilotprojekt aus Sachsen-Anhalt (Landkreis Stendal). In: *Die Wasserwirtschaft.* 10/2005.

5.3. Monographs, Miscellaneous

Haase, D. (2005): Land use and land cover change in the urban and peri-urban area of Leipzig, Eastern Germany, since 1870. Himiyama, Y., Mather, A., Bicik, I., Milanova, E.V. (eds) Land Use/Cover Changes in Selected Regions of the World, Vol. IV, pp. 33-42.

5.4. Talks and Presentations

Attinger, S. (2005) : Coarse Graining in Geohydrology or when asymptotic upscaling fails", mini-workshop on “Numerical Upscaling: Theory and Applications", Oberwolfach May 1-7, 2005

Banzhaf, E., Kindler, A. & D. Haase (2005): Research on Negative Urban Growth by Means of Remote Sensing and GIS Methods. Int. Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Vol. No. XXXVI-8/W27. ISSN 1682-1777. Proceedings of the ISPRS WG VII/1 “Human Settlements and Impact Analysis”. 3rd int. Symp. *Remote Sensing and Data Fusion over Urban Areas* (URBAN 2005). 5th int. Symp. *Remote Sensing of Urban Areas* (URS 2005). March 14-16, 2005. Tempe, AZ, USA.

Dormann, C. F. (2005): Confounded drivers of species diversity in temperate Europe, held at both the BES and GfÖ annual conferences in Hertford and Regensburg, respectively.

Haase, D. (2005): Derivation of robust predictor variables for modelling urban shrinkage and its effects at different scales, 45th Congress of the European Regional Science Association (ERSA), Session on modelling land use change, 23-27 August 2005, Amsterdam, NED.

Haase, D., Holzkämper, A., Seppelt, R. (2005): Modelling urban shrinkage and demolition due to demographic change in Eastern Germany. Pre-Proceedings of the Workshop on Modelling Urban Social Dynamics, Institute of Advanced Studies, University of Surrey, UK.

Holzkämper, A., Lausch, A, Seppelt, R. (2005): How do changes in land use pattern affect species diversity? – An approach for optimizing landscape configuration. – 45th Congress of the European Regional Science Association, 23-27 August 2005, Vrije Universiteit Amsterdam, 13 p.

J. Berlekamp, N. Graf, **S. Lautenbach**, M.Matthies (2005): A Decision Support System For Integrated River Basin Management Of The German Elbe. In Zerger, A. and Argent, R.M. (eds) MODSIM 2005 International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December 2005, pp. 1518-1524.

Volk, M., J.G. Arnold, P.M. Allen & P.-Y. Chen (2005): Towards a process-oriented HRU-concept in SWAT: Catchment-related control on base flow and storage of Landscape units in medium to large river basins. – In: Abbaspour, K. & R. Srinivasan (Eds., 2005): 3rd International SWAT Conference, July 11-15, Zürich. Book of Abstracts: 43.

Volk, M., G. Schmidt, **K. Schulz, R. Seppelt, D. Haase & A. Ullrich** (2005): The dilemma of modelling the environmental effects of land use in multifunctional river basins. - In: International Conference "Multifunctionality of Landscapes. Analysis, Evaluation, and Decision Support. 2005, May 18-19. Justus-Liebig-University Giessen, Germany. Abstracts: 74.

Schmidt, G. & **M. Volk** (2005): Effects of the spatial resolution of input data on SWAT simulations. - In: Abbaspour, K. & R. Srinivasan (Eds., 2005): 3rd International SWAT Conference, July 11-15, Zürich. Book of Abstracts: 52.

Samaniego, L. (2005). Integrative risikobasierte Allokation von räumlich und zeitlich verteilten Ressourcen. Seminar "Umweltentwicklung und Umweltplanung" at the University of Stuttgart, Stuttgart, 4.11.2005.

5.5. Workshops and Symposia

Workshop 'Conceptual Modeling' Leipzig, 6-8 of May 2005, organized by Jan Sendzimir, Piotr Magnuszewski (IIASA Laxenburg) and Maja Schlüter, **Dagmar Haase**

Workshop 'BRAVA Rapid Vulnerability Appraisal and Adaptive Capacity in River Basins' Leipzig, 12-14 of September, organized by Tom Downing (SEI Oxford), Jan Sendzimir, Piotr Magnuszewski (IIASA Laxenburg) and Maja Schlüter, **Dagmar Haase**

Workshop 'Analysing Spatial Ecological Data', 21 - 25 Nov. 2005, Kohren-Sahlis near Leipzig, organised by **Carsten Dormann**

5.6. Participation in Conferences

Annual Meeting of the British Ecological Society, Hertfield, U.K.: **Carsten Dormann** (Talk)

Jahrestagung der Gesellschaft für Ökologie, Regensburg: **Carsten Dormann** (Talk)

Symposium und Fachmesse für Angewandte GeoInformatik (AGIT), Salzburg, 6.-8. Juli, **Sven Lautenbach** (Poster presentation)

KoBio - Koordination Biologische Bewertung: Abschlusstagung "Ökologische Bewertung der Gewässer gemäß der Europäischen Wasserrahmenrichtlinie", Leipzig 27. April 2005 - 29. April, **Sven Lautenbach** (Talk)

BfG Workshop Decision Support for Integrated RBM, 16.06.-17.06., Koblenz, **Sven Lautenbach**

BfG Conference "Integriertesund nachhaltiges Flussgebietsmanagement– Beispiel Elbe – Herausforderungen für die Flusspolitik und Lösungsansätze aus der Flussforschung", 08.11.-09.11., Leipzig, **Sven Lautenbach**

Symposium umweltbezogene Elbeforschung, 10.11., Leipzig, **Sven Lautenbach**

Samaniego, L. A Generalization of the Local Estimator Technique. Poster H53F-0536. AGU Fall Meeting, San Francisco, Dec 2005. (Poster Presentation).

IEEE Virtual Reality 2005, 12.03-16.03, Bonn, Germany, **Björn Zehner**

6th Conference for Information Technologies in Landscape Architecture – Realtime Visualization and Participation, 26.05-28.05, Dessau, Germany, **Björn Zehner**

5.7. Participation in Advanced Training Sessions

Training Course 'Conceptual Modeling' (Training of trainers), 11-15 of June, Budapest, organized by Jan Sendzimir, Piotr Magnuszewski (IIASA Laxenburg), Zsuzsanna Flachner (RISSAC Budapest), participant: **Carsten Bohn**

Training Course 'Conceptual Modeling', 25-27 of November, Wroclaw, organized by Jan Sendzimir, Piotr Magnuszewski (IIASA Laxenburg), participants: **Dagmar Haase, Carsten Bohn, Stefan Liersch**

6. International Cooperation

6.1. Visiting Scientists

Dr. Jeff Arnold (18.-19.07.), USDA-ARS "Grassland, Soil and Water Research Laboratory", 808 East Blackland Road, Temple, TX 76502, USA. Email: jgarnold@spa.ars.usda.gov

Dr. Mike Vanliew (18.07.), USDA-ARS "Grazinglands Research Laboratory", 7207 W. Cheyenne St., El Reno, OK 73036. Email: mvanliew@grl.ars.usda.gov

6.2. Participation on exchange programmes

Project Based Personal Exchange "Analysis and Management of Landscape Transitions in the Urban-Rural-Gradient" (DAAD)

Central European landscapes are undergoing dramatic changes; the rural-urban gradient is affecting sensible areas on the urban fringe. Decreasing population density, both by lower

birth rates, and by migration is associated with an on-going increase of land consumption (urban sprawl) per capita. The underlying social and demographic processes, as well as the affected ecological processes are complex. Indicators that mostly aggregate several observed variables are appropriate to quantify the state of the system. Cause effect relationships however especially base on nonlinear interaction are difficult to analyse. Thus management strategies can hardly be identified based on static indicator systems.

The goals of the projects that are supported by this cooperation between the Centre for Environmental Research (UFZ) and the Gund Institute of Ecological Economics (GIEE) are two-fold. We will:

1. Integrate models for simulating land use change with the associated land consumption and land surfacing, growing traffic density as well as flows of matter through the landscape, and the assess ecosystem services provided by the dynamically changing landscape;
2. Use this model system within an optimization framework to estimate, assess and compare different strategies of landscape management.

By this, the integrated modelling framework will allow to study the complex interactions of landscape change with respect to selected indicators of ecosystem services. It explains the dynamics of the system and helps to assess and determine consequences of management strategies. As a result we will develop a tool that helps communicate system dynamics of landscapes. The integrated model will help to elaborate these system dynamics and makes interactions reproducible and thus can be communicated to planners or hopefully stakeholders.

In the first period of the project the aim was to identify appropriate modelling and simulation tools and strategies to describe landscape functioning in the urban-rural fringe. We focused on the identification of appropriate modelling concepts for *intensively used* (see part II) and in terms of the hydrological processes *disturbed systems* (see part I).

Part I: Eco-hydrological modelling in intensively used and disturbed landscapes, such as the peri urban frindge.

Doris Düthmann, period of visit 18.4.-20.5.2005

Sven Lautenbach, period of visit 04.12.-17.12.2005.

Part II: Optimization of landscape functions within in antropogenic influenced regions.

Annelie Holzkämper, period of visit: 12.-16.09.2005

7. Memberships in Committees, Review Activities

Sabine Attinger: Reviewer for Water Resources Research, Hydrological Sciences, Advances in Water Resources, Journal of Computational Physics.

Justin Calabrese: Reviewer for American Naturalist, Biological Conservation, and Ecological Modelling

Carsten F. Dormann: Reviewer for Schweizer Nationalfond (SNF), Journal of Applied Ecology, Journal of Ecology, Oecologia, Proceedings of the Royal Society of London B

Dagmar Haase: Member of the Board of the German Branch of the International Association of Landscape Ecology; Article Reviews for Landscape and Urban Planning (2),

Standort (1), Limnologica (1), Archives for Agronomy and Soil Sciences (2), Landscape Ecology (1), Catena (1).

Karsten Schulz: Project Reviews for the German Research Foundation DFG (1); Article Reviews for Hydrology and Earth Sciences (2), Ecological Modelling (1), Boundary Layer Meteorology (1) and Water Resources Research (1)

Ralf Seppelt: Associate Editor Environmental Modelling and Software, Elsevier, Reviews for Ecological Indicators (1), Environmental Modelling & Software (2), Ecography (1), Reviews for Ph.-D. Programm at Environmental Protection Agency, Ireland.

Martin Volk: Member of the "Executive Board" of the European Network "Landscape Europe", Member of the Scientific Commission of the International SWAT-Conferences, Review for a Danish Research Network on "Multifunctionality of Landscapes", Reviews for Ecological Indicators, Ecological Modelling, Environmental Modelling and Software, Hydrological Sciences Journal, Journal of Hydrology.

Luis Samaniego: Reviews for Water Resources Research (2).

8. Teaching Activities

8.1. University of Leipzig

Carsten Dormann: Practical Course "Statistical Analysis of Ecological Data" (MSc Ecology studies, Botanical Institute); Praktical Course "Ecological Field Methods" (with PD Dr. Martin Freiberg, Botanical Institute)

8.2. Jena

Sabine Attinger: Lecture on "Introduction into Modelling Groundwater", "Case Studies"

8.3. Martin-Luther University of Halle-Wittenberg

Dagmar Haase: Seminar on Physical Geography, Seminar on Ecosystem processes modeling (Martin-Luther-University Halle-Witterberg)

Ralf Seppelt: Lecture and Seminar on "Introduction in Modelling and Simulation of Ecosystem processes"

8.4. Technical University of Braunschweig

Karsten Schulz: Lectures: Soil Physics 1, Soil Physics 2

8.5. International

Lautenbach, Sven: Alexander von Humboldt Training Workshop in Geographic Information Systems –GIS for water and land use management, **Technical University of Tashkent & Institute of Water Problems, Uzbek Academy of Sciences, Tashkent Usbekistan**, in cooperation with Dr. Maja Schlüter (UFZ, ÖSA) and Dr. Jürgen Berlekamp (University of Osnabrück, Institute for Environmental Sytstem Research)

Volk, M. (2005): Seminar on "GIS in landscape assessment", GEO 5050 - Geology Technical Sessions, Geology Colloquium (5050), October 14, 2005, **Department of Geology, Baylor University Waco, TX, USA**.

Volk, M. (2005): Seminar on “Scale-specific simulation of water and nutrient fluxes for River Basin Management – The project FLUMAGIS”, Geo470/Geo570: Integrated Environmental Management - Case Studies from around the Globe, October 20, 2005, **Department of Geography, University at Buffalo, The State University of New York, NY, USA**.