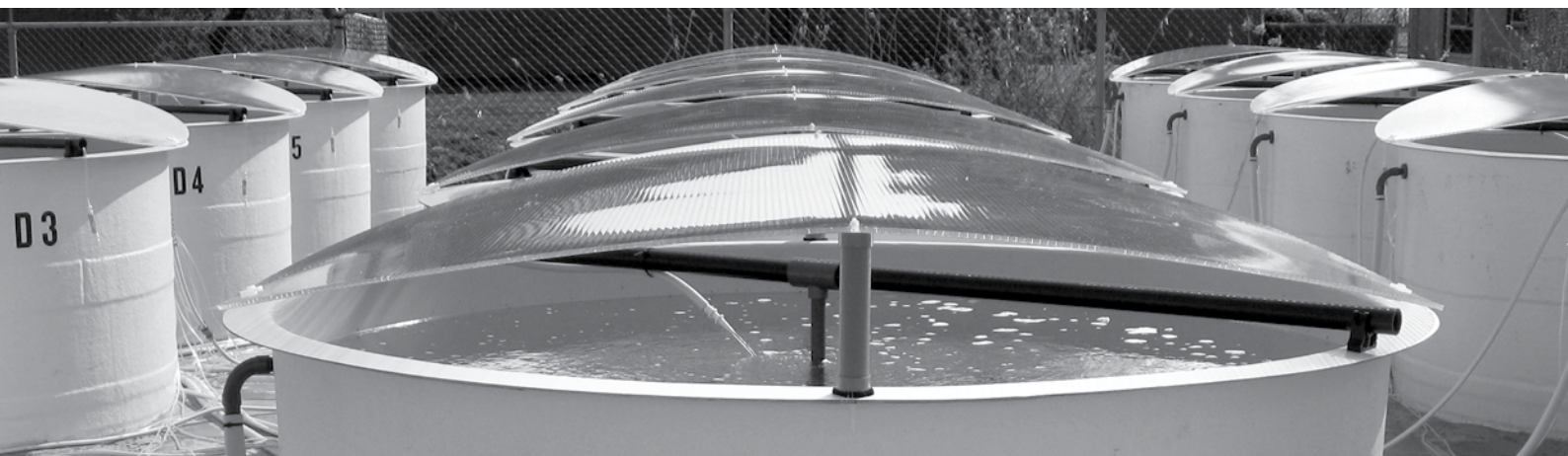
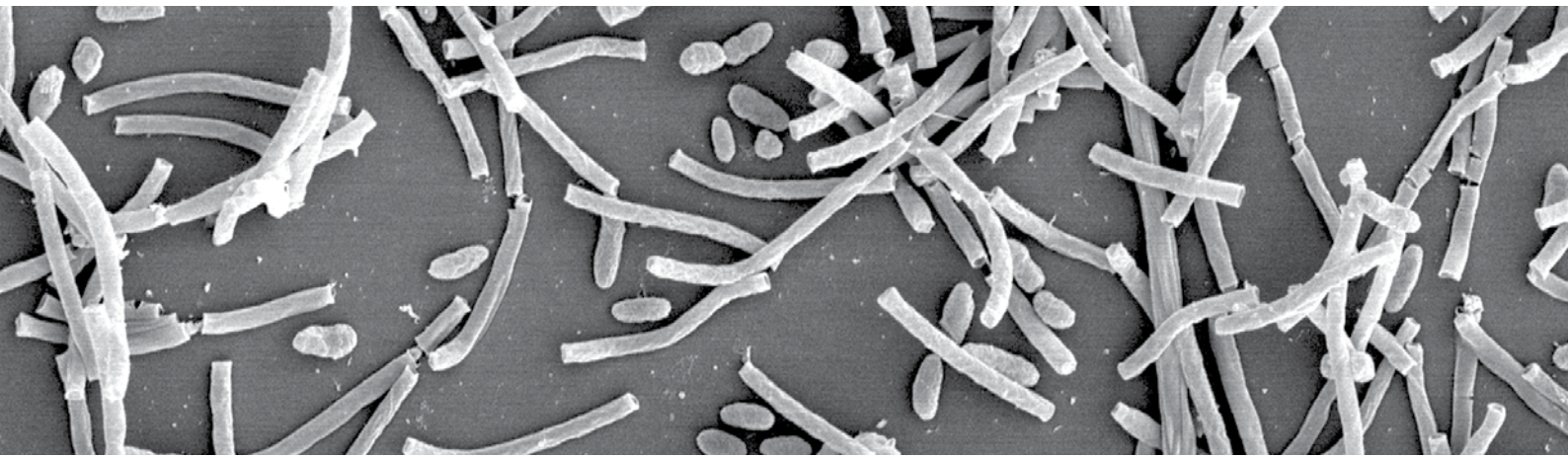


WAGENINGEN INSTITUTE FOR ENVIRONMENT AND CLIMATE RESEARCH

WIMMEK UPDATE

2008 * 2010



Our Position

The Wageningen Institute for Environment and Climate Research (WIMEK) is one of the seven Graduate Schools at Wageningen University (WU). WIMEK was founded in 1993 to coordinate the research activities and PhD education of the WU chair groups involved in this research field.

WIMEK aims to develop an integrated understanding of environmental change and its impact on the quality of life and sustainability, by (i) conducting innovative scientific research, (ii) offering PhD training and education, and (iii) dissemination of emerging insights and recent research results.

At present, twelve chair groups participate in WIMEK with their full research capacity or a significant part of their research capacity. Besides some other chair groups contribute to the WIMEK research programme with a few senior researchers, postdocs and PhD candidates (see annex 1).

Currently, about 240 PhD candidates have been enrolled in WIMEK, of which about 50% coming from abroad. We aim to support PhD candidates in their personal and scientific development by offering them a challenging scientific research environment, a national and international scientific network of environmental researchers and an advanced training and education programme.

To reach these goals WIMEK has also strongly supported the development of an inter-university network of environmental research groups at national level. This has resulted in the establishment of the Netherland Research School of the Socio-Economic and Natural Sciences of the Environment (SENSE) in 1994. Now, environmental research groups from ten Dutch universities and UNESCO-IHE collaborate in SENSE and WIMEK is by far the largest participating institute.

Since its foundation in 1993, the research quality and the PhD Education & Training Programme, offered by WIMEK and its research groups, the WIMEK Graduate School and the SENSE Research School have all been evaluated very positively by international peer review committees.

External review 2007

In the most recent evaluation (2007), the external review committee concluded that SENSE has become well recognized as a major international player in environmental science and in identifying emerging research needs in the fields of environmental science and global change. Regarding the PhD training and education programme, the committee emphasized it as one of the great successes of SENSE: "Through this programme SENSE makes a major contribution to the raining of the next generation of environmental researchers and professionals in the Netherlands and internationally".

WIMEK PhD Graduations 2008

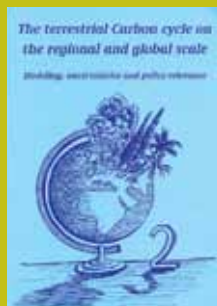
2



Sheffield, J.
Global drought in the 20th and 21st centuries: analysis of retrospective simulations and future projections of soil moisture.
| WUR | 15 | 01 | 08 |



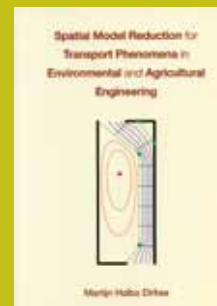
Talebi, A.
The relation between geometry, hydrology and stability of complex hillslopes examined using low-dimensional hydrological models.
| WUR | 17 | 01 | 08 |



Minnen, J.G. van
The terrestrial carbon cycle on the regional and global scale: modeling, uncertainties and policy relevance.
| WUR | 18 | 01 | 08 |



Franken, R.J.M.
Habitat variation and life history strategies of benthic invertebrates.
| WUR | 29 | 01 | 08 |



Dirkse, M.H.
Spatial model reduction for transport phenomena in environmental and agricultural engineering.
| WUR | 30 | 01 | 08 |



Roessink, I.
Interactions between nutrients and toxicants in shallow freshwater model ecosystems.
| WUR | 27 | 02 | 08 |

Our research

WIMEK combines fundamental, strategic, applied and participatory research in natural and social environmental sciences. WIMEK especially promotes interdisciplinary research focusing on the interactions between ecological, chemical, physical and socio-economic processes and their interactions with society. This is considered to be essential for a solid contribution towards solving complex environmental problems.

Our research programme strongly concentrates on the components of the cause-effect chain of environmental problems:

- The causes of environmental deterioration and climate change (human activities, causes and determinants of these activities);
- The behaviour of substances and other materials within an environmental compartment and their transfer between compartments;
- The consequences on ecosystems and society; and
- The prevention, abatement and/or mitigation of the effects of environmental stress.

WIMEK's research programme is fully embedded in SENSE and follows the structure of the SENSE research programme. In this programme, SENSE concentrates on environmental problems in a multidisciplinary approach. The four Core Themes of SENSE reflect the main research efforts with regard to environmental change:

Core theme 1: Environmental contaminants and nutrients.

Chair: Professor J. (Jacob) de Boer (IVM-VU);

Core theme 2: Environmental processes and ecosystem dynamics. Chair: Professor A.J. (Jan) Hendriks (RU Nijmegen);

Core theme 3: Global Environmental Change

Chair: Professor C. (Carolien) Kroeze (ESA-WU);

Core theme 4: Sustainable development and social change: actors, institutions and governance
Chair: Professor G. (Gert) Spaargaren (ENP-WU).

Scientific Output & Impact

The scientific output of WIMEK researchers is rather constant over the past six years (see figure 1). On average 30 PhD candidates defended their PhD thesis successfully every year. The number of articles in refereed journals fluctuated between 230 and 330 per year. Remarkable is the fast increase in the number of publications for the general public, which is mainly due to the activities of the Nature Calendar.

The scientific impact of WIMEK publications is constantly at a high level. Table 1 shows that the Relative Impact of all WIMEK publications is on average 2.0, which is two times above the world average. The same holds for the top 1% and top 10% publications of WIMEK.

WIMEK PhD Graduations 2008

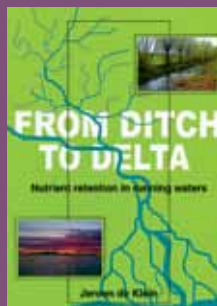
4



Vliet, A.J.H. van
Monitoring, analysing, forecasting and communicating phenological changes.
| WUR | 03 | 06 | 08 |



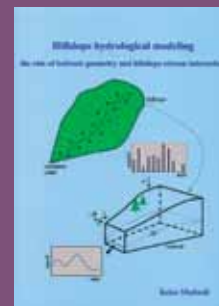
Breeuwer, A.J.G.
Effects of climate change and nitrogen deposition on vegetation and decomposition in bog ecosystems.
| WUR | 03 | 06 | 08 |



Klein, J.J.M. de
From ditch to delta: nutrient retention in running waters.
| WUR | 06 | 06 | 08 |



Vries, D.
Estimation and prediction of convection-diffusion-reaction systems from point measurement.
| WUR | 06 | 06 | 08 |



Shahedi, K.
Hillslope hydrological modeling: the role of bedrock geometry and hillslope-stream interaction.
| WUR | 18 | 06 | 08 |



Zomeren, A. van
On the nature of organic matter from natural and contaminated materials: isolation methods, characterisation and application to geochemical modelling.
| WUR | 10 | 10 | 08 |

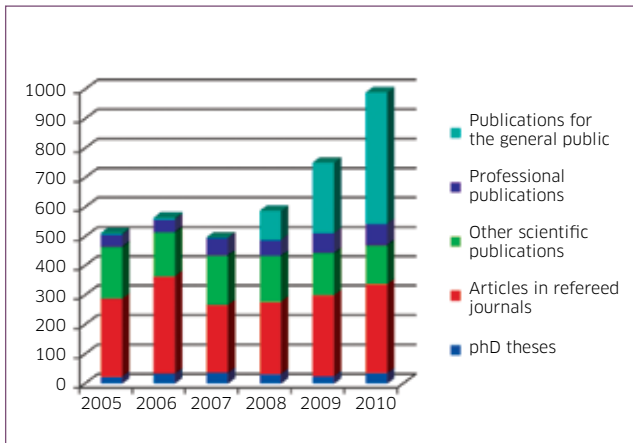


Figure 1: Number of WIMEK publications 2005 - 2010

Year of publication	N	RI	%T10 (T10)	%T1 (T1)
2005	225	1.8	22% (50)	4% (9)
2006	286	2.1	22% (63)	6% (18)
2007	199	1.7	20% (39)	5% (9)
2008	224	1.9	21% (46)	4% (8)
2009	244	2.2	24% (59)	4% (9)
All years	1178	2.0	22% (257)	4% (53)

Table 1: Scientific impact of all WIMEK publications

Indicator Meaning

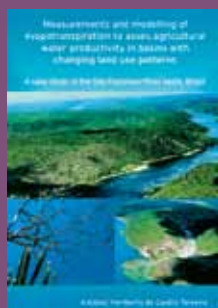
- N** Total number of publications in a series that is analyzed.
- RI** Relative impact or the item oriented field normalized citation score. This indicator corresponds to the number of citations to publications from a unit during the analyzed time span, compared to the world average of citations to similar publications (of the same age and within the same research areas as for the group's publications). The term "item oriented" indicates that the normalization of the citation values is done on an individual article level after which the average over all articles gives the score of RI.
- %T10 (T10)** Percentage of the 10% best cited papers compared to total number of publications (Total number of publications within the top 10% best cited publications in their field).
- %T1 (T1)** Percentage of the 1% best cited papers compared to total number of publications (Total number of publications within the top 1% best cited publications in their field).



Bogers, R.
Markers of endocrine disruption in fish.
| WUR | 12 | 10 | 08 |



Wolfer, S.R.
Clonal architecture and patch formation of *Potamogeton perfoliatus* L.: in response to environmental conditions.
| WUR | 20 | 10 | 08 |



Castro Teixeira, A.H. de
Measurements and modelling of evapotranspiration to assess agricultural water productivity in basins with changing land use patterns: a case study in the São Francisco River basin, Brazil.
| WUR | 21 | 10 | 08 |



Wiratno
Effectiveness and safety of botanical pesticides applied in black pepper (*Piper nigrum*) plantations.
| WUR | 22 | 10 | 08 |



Brehmer, B.
Chemical biorefinery perspectives: the valorisation of functionalised chemicals from biomass resources compared to the conventional fossil fuel production route.
| WUR | 24 | 10 | 08 |



Bosch, P.L.F. van den
Biological sulfide oxidation by natron-alkaliphilic bacteria: application in gas desulfurization.
| WUR | 31 | 10 | 08 |

Some highlights

Critical transitions in social and ecosystems

In the past three years research on critical transitions got a real boost in output (articles in *Nature*,^{1,2} and *PNAS*³) and prestigious grants (SPINOZA, ERC). Moreover, Professor Marten Scheffer (AEW) published a well received book "Critical Transitions in Nature and Society",⁴ in 2009. Scheffer is interested in unravelling the mechanisms that determine the stability and resilience of complex systems. Although much of his work has focused on the ecosystems of lakes, he also worked with a range of scientists from other disciplines to address issues of stability and shifts in natural and social systems. Examples include the feedback between atmospheric carbon and the earth temperature, the collapse of ancient societies, inertia and shifts in public opinion, evolutionary emergence of patterns of species similarity, the effect of climatic extremes on forest dynamics and the balance of facilitation and competition in plant communities.

Complex dynamics of plankton species in aquatic food webs

Elisa Benincà (PhD AEW-WU & IBED-UvA) et al studied the complex ups and downs of plankton species in an aquatic food web isolated from the Baltic Sea. In a study that was published in *Ecology Letters*⁵ in December 2009 they presented the first experimental demonstration of coupled predator-prey oscillations in a

chaotic food web. Their results shed new light on the intriguing complexity of species interactions in food webs. In recognition of the quality and significance of the article, in 2010 The Netherlands Ecological Research Network (NERN) awarded the annual Best Paper Award to Elisa Benincà. It is not the first time that one of Benincà's papers is honoured in such a way. In 2008 she won the Best Publication Prize of the Women in the Science Faculty (WiF) network for her article "Chaos in a long-term experiment with a plankton community" that appeared in *Nature*.⁶

Sea research at IMARES

The common Sole (*Solea solea*) is a marine flat fish and as such metamorphoses from a symmetrical larvae into an asymmetrical juvenile during early development. Sole is chosen as model species in an IMARES research project focussing on the impact of maternally transferred toxic substances on the development of fish early life stages and how this can affect the development of a population that is also subject to other stressors, such as fisheries.⁷

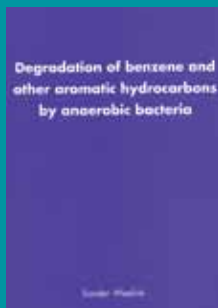
Mesocosms or experimental ecosystems are a tool to bridge the gap between small scale (single species) laboratory tests and field observations (see cover photo). Mesocosms are set-up mimicking a specific (part of the) ecosystem and allow to study the impact of a treatment under controlled conditions. At IMARES marine mesocosms are used to assess the impact

WIMEK PhD Graduations 2008

6



Havlikova, M.
Integrated environmental assessment of agriculture in the Czech Republic: the case of dairy cattle.
| WUR | 18 | 11 | 08 |



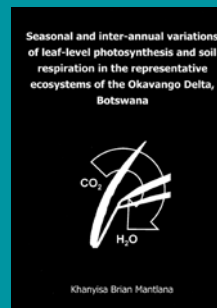
Weelink, S.A.B.
Degradation of benzene and other aromatic hydrocarbons by anaerobic bacteria.
| WUR | 18 | 11 | 08 |



Janssen, G.M.C.M.
Stochastic forward and inverse groundwater flow and solute transport modeling.
| WUR | 19 | 11 | 08 |



Crushell, P.H.
Soak systems of an Irish raised bog: a multidisciplinary study of their origin, ecology, conservation and restoration.
| WUR | 19 | 11 | 08 |



Mantlana, K.B.
Seasonal and inter-annual variations of leaf-level photosynthesis and soil respiration in the representative ecosystems of the Okavango Delta, Botswana.
| WUR | 21 | 11 | 08 |



Grunsvan, R.H.A. van
Plants on the move: plant-soil interactions in poleward shifting plant species.
| WUR | 03 | 12 | 08 |

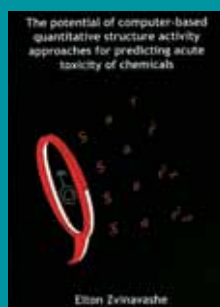
of toxic substances, increasing CO₂ levels and disinfected ship ballast water on a benthic and pelagic Dutch coastal ecosystem.

How anaerobic bacteria grow in syntrophy with methanogens

There are many places on earth which are anoxic and produce methane. These include swamps, rice paddy fields and deep lake sediments, but also waste and wastewater treatment systems. In these systems chemical energy in organic compounds is conserved in methane. Little is known how methanogenic communities retrieve energy from organic compounds to grow. However, it is clear that anaerobic bacteria and methanogenic archaea grow in syntrophy with each other and share chemical energy. Research by Petra Worm et al⁸ aimed to use a genomic approach to get insight into energetic aspects of syntrophic propionate degradation. It appeared that hydrogen and formate producing enzymes couple an energy-requiring reaction with an energy-gaining reaction. Because of this, small portions of energy, that would otherwise be lost can be made useful for the organism. By performing measurements in a wastewater treatment system, indications were obtained that molybdenum, tungsten and selenium are required for a good performance of these enzymes.⁹

An interesting and important finding was that the available energy is not always shared equally between the syntrophic microorganisms and that the syntrophy is more flexible than was previously thought. Petra Worm (et al) studied transcription of genes coding for formate dehydrogenases (fdh's) and hydrogenases (hyd's) in *Syntrophobacter fumaroxidans* and *Methanospirillum hungatei* (see cover photo) at different growth conditions. Under all conditions tested all fdh's and hyd's were transcribed. However, transcription levels of the individual fdh's and hyd's varied dependent on substrate and growth conditions. In syntrophically grown *S. fumaroxidans* cells, the [FeFe]-hydrogenase, FDH 1 and Hox may confurcate¹⁰ electrons from NADH and ferredoxin to protons and carbon dioxide to produce hydrogen and formate, respectively. A membrane integrated energy converting [NiFe]-hydrogenase of *M. hungatei* might be involved in the energy dependent CO₂ reduction to formylmethanofuran. 16S rRNA ratios indicate that in one of the triplicate cocultures of *S. fumaroxidans* and *M. hungatei*, less energy was available for *S. fumaroxidans*. This led to an enhanced transcription of genes coding for the Rnf-complex and several fdh's and hyd's. The Rnf-complex probably re-oxidized NADH with ferredoxin reduction, followed by ferredoxin oxidation by the induced formate dehydrogenases and hydrogenases.

WIMEK PhD Graduations 2009



Zvinavashe, E.
The potential of computer-based quantitative structure activity approaches for predicting acute toxicity of chemicals.
| WUR | 16 | 12 | 08 |



Ploeg, M.J. van der
Polymer tensiometers to characterize unsaturated zone processes in dry soils.
| WUR | 19 | 12 | 08 |



Ritzema, H.P.
Drain for gain: making water management worth its salt: subsurface drainage practices in irrigated agriculture in semi-arid and arid regions.
| WUR | 16 | 01 | 09 |



Melse, R.W.
Air treatment techniques for abatement of emissions from intensive livestock production.
| WUR | 26 | 01 | 09 |



Haperen, A.M.M. van
Een wereld van verschil: landschap en plantengroei van de duinen op de Zeeuwse en Zuid-Hollandse Eilanden.
| WUR | 28 | 01 | 09 |



Snep, R.P.H.
Biodiversity conservation at business sites: options and opportunities.
| WUR | 06 | 02 | 09 |

A multisite surface complexation model for ferrihydrite nanoparticles

Ir. Tjisse Hiemstra and Professor Willem van Riemsdijk (SOQ) developed a multisite surface complexation (MUSIC) model for ferrihydrite (Fh)¹¹. The surface structure and composition of Fh nanoparticles are described in relation to ion binding and surface charge development. The site densities of the various reactive surface groups, the molar mass, the mass density, the specific surface area, and the particle size are quantified. As derived theoretically, molecular mass and mass density of nanoparticles will depend on the types of surface groups and the corresponding site densities and will vary with particle size and surface area because of a relatively large contribution of the surface groups in comparison to the mineral core of nanoparticles. Nanoparticles have an enhanced surface charge. The charging behaviour of Fh nanoparticles can be described satisfactory using the capacitance of a spherical Stern layer condenser in combination with a diffuse double layer for flat plates.

The development of new polymer tensiometers

Dr. Martine van der Ploeg et al. (SEG) wrote an article on 'Polymer tensiometers with ceramic cones: direct observations of matric pressures in drying soils'¹². Measuring soil water potentials is crucial to characterize vadose zone processes. Conventional tensiometers only measure until approximately -0.09 MPa, and indirect methods may suffer from the non-uniqueness in the relationship between matric potential and measured properties. Recently developed polymer tensiometers (POTs) are able to directly measure soil matric potentials until the theoretical wilting point (-1.6 MPa). By minimizing the volume of polymer solution inside the POT while

maximizing the ceramic area in contact with that polymer solution, response times drop to acceptable ranges for laboratory and field conditions. Contact with the soil is drastically improved with the use of cone-shaped solid ceramics instead of flat ceramics. The comparison between measured potentials by polymer tensiometers and indirectly obtained potentials with time domain reflectometry highlights the risk of using the latter method at low water contents. By combining POT and time domain reflectometry readings in situ moisture retention curves can be measured over the range permitted by the measurement range of both POT and time domain reflectometry. See also: www.hydro-earth-syst-sci.net/14/1787/2010/

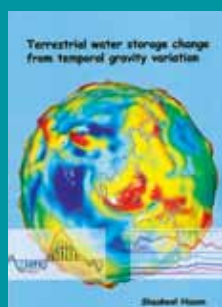
Dr. Martine van der Ploeg, who featured as a research highlight in the previous WIMEK report, has been acknowledged as a Technological Top Talent in 2009 by the Dutch Technological Foundation for her work on developing polymer tensiometers.

Land use and heat waves

Ryan Teuling (HWM) Eddy Moors (ESS-CC) and a team of international climate scientists published their research on the role of land use during heat waves in Nature Geoscience¹³. The study was prompted by recent heat waves in Europe, which have raised interest in questions about the influence of land use on temperatures and regional climate. Up to now, scientists had assumed that a lack of precipitation during heat waves would lead to a reduction in evaporation. For this study, observations made above forests and grasslands in Europe by an extensive network of flux towers were analysed, including those in Cabauw (KNMI) and Loobos (Alterra Wageningen UR), along with satellite observations. These observations revealed large differences in evaporation strategies during heat waves. Grasslands evaporate more at higher temperatures and stop only when no more

WIMEK PhD Graduations 2009

8



Hasan, S.
Terrestrial water storage change from temporal gravity variation.
| WUR | 27 | 04 | 09 |



Tas, N.
Dehalococoides spp. in river sediments: insights in functional diversity and dechlorination activity.
| WUR | 29 | 05 | 09 |



Hurkmans, R.T.W.L.
Effect of climate variability and land use change on the water budget of large river basins.
| WUR | 15 | 06 | 09 |



Abu-Ghunmi, L.N.A.H.
Characterization and treatment of grey water: option for (re)use.
| WUR | 16 | 06 | 09 |



Hendrickx, T.L.G.
Aquatic worm reactor for improved sludge processing and resource recovery.
| WUR | 16 | 06 | 09 |



Kassab, G.
Combined carbon and nitrogen removal in integrated anaerobic/anoxic sludge bed reactors for the treatment of domestic sewage.
| WUR | 17 | 06 | 09 |

water is available. Forests, in contrast, respond to higher temperatures by evaporating less, which leaves more water at their disposal. During brief heat waves, therefore, the greatest warming is found above forests, but during prolonged heat waves the increased evaporation of grasslands ends up causing a shortage of water. This can lead to exceptionally high temperatures, such as those measured in France in the summer of 2003. In these types of extreme situations, forests in fact have a cooling effect on the climate. In addition, Ryan Teuling received a Veni grant to further investigate the role of forests in land use and hydrometeorological extremes.

Bio-energy production

Innovative PhD research performed at the Environmental Technology Group (ETE) also appealed also to the imagination of science and society. Especially the research on hydrogen production from waste water (René Rozendal)¹⁴⁻¹⁵⁻¹⁶ blue energy (Jan Post)¹⁷⁻¹⁸ and green electricity production with living plants and bacteria in a fuel cell (David Strik)¹⁹⁻²⁰⁻²¹ got much attention (see also proofs of esteem). Dr Alexander Hendriks and Dr Grietje Zeeman (ETE) published their research results on pretreatments to enhance the digestibility of lignocellulosic biomass.²² Lignocellulosic biomass represents a rather unused source for biogas and ethanol production. Many factors, like lignin content, crystallinity of cellulose, and particle size, limit the digestibility of the hemicellulose and cellulose present in the lignocellulosic biomass. Pretreatments have as a goal to improve the digestibility of the lignocellulosic biomass. Each pretreatment has its own effect(s) on the cellulose, hemicellulose and lignin; the three main components of lignocellulosic biomass. This paper reviews the different effect(s) of several pretreatments on the three main parts of the lignocellulosic biomass to

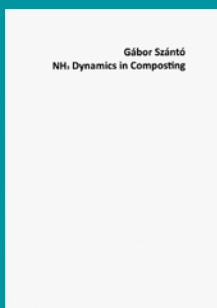
improve its digestibility. Steam pretreatment, lime pretreatment, liquid hot water pretreatments and ammonia based pretreatments are concluded to be pretreatments with high potentials. The main effects are dissolving hemicellulose and alteration of lignin structure, providing an improved accessibility of the cellulose for hydrolytic enzymes.

Biogeochemical cycles, climate change and land use

The research of the Earth System Science and Climate Change Group (ESS-CC) focuses on the properties and processes of the components of the Earth System, such as carbon or water cycles in the terrestrial and atmospheric compartments. These are investigated as integral parts of the system, focusing on their interactions and feedbacks. This research has led to many publications in the field of interactions between biogeochemical cycles and land use.²³⁻²⁴⁻²⁵⁻²⁶

In this respect we looked also to the potential impact of a hypothetical complete switch to plant-based protein food production, resulting in an article "Climate benefits of changing diet".²⁷ Climate change mitigation policies tend to focus on the energy sector, while the livestock sector receives surprisingly little attention, despite the fact that it accounts for 18% of the greenhouse gas emissions and for 80% of total anthropogenic land use. From a dietary perspective, new insights in the adverse health effects of beef and pork have lead to a revision of meat consumption recommendations. Here, we explored the potential impact of dietary changes on achieving ambitious climate stabilization levels.

By using an integrated assessment model, we found a global food transition to less meat, or even a complete switch to plant-based protein food to have a dramatic effect on land use. Up to 2,700 Mha of pasture and 100 Mha of cropland could be abandoned, resulting in



Szanto, G.L.
NH₃ dynamics in composting: assessment of the integration of composting in manure management chains.
| WUR | 18 | 06 | 09 |



Meulepas, R.J.W.
Biotechnological aspects of anaerobic oxidation of methane coupled to sulfate reduction.
| WUR | 19 | 06 | 09 |



Pabon Pereira, C.P.
Anaerobic digestion in sustainable biomass chains.
| WUR | 30 | 06 | 09 |



Ansink, E.J.H.
Game-theoretic models of water allocation in transboundary river basins.
| WUR | 29 | 09 | 09 |



Smit, M.P.J.
Contaminant release from sediments: a mass flux approach.
| WUR | 05 | 10 | 09 |



Baas, P.
Turbulence and low-level jets in the stable boundary layer.
| WUR | 14 | 10 | 09 |

a large carbon uptake from regrowing vegetation. Additionally, methane and nitrous oxide emission would be reduced substantially. A global transition to a low meat-diet as recommended for health reasons would reduce the mitigation costs to achieve a 450 ppm CO₂-eq. stabilisation target by about 50% in 2050 compared to the reference case. Dietary changes could therefore not only create substantial benefits for human health and global land use, but can also play an important role in future climate change mitigation policies.

Global atmospheric transport modelling and the carbon cycle

Dr. Wouter Peters (MAQ) research focuses on deriving greenhouse gas budgets from observations of the atmospheric composition. To properly interpret the increasing amount of for instance carbon dioxide, as well as its variations over time one needs accurate models of atmospheric transport, land-atmosphere exchange, vegetation development, ocean biogeochemistry, and turbulent mixing in the planetary boundary layer. He participated in a forward atmospheric transport modelling experiment carried out by the TransCom research group, which published an article on TransCom model simulations of hourly atmospheric CO₂: Experimental overview and diurnal cycle results for 2002.²⁸ Model simulations were run for biospheric, fossil, and air-sea exchange of CO₂ and for SF₆ and radon for 2000-2003. Twenty-five models or model variants participated in the comparison. Hourly concentration time series were submitted for 280 sites along with vertical profiles, fluxes, and meteorological variables at 100 sites. The submitted results have been analysed for diurnal variations and are compared with observed CO₂ in 2002. Mean summer diurnal cycles vary widely in amplitude across models. The choice of sampling

location and model level account for part of the spread suggesting that representation errors in these types of models are potentially large. Despite the model spread, most models simulate the relative variation in diurnal amplitude between sites reasonably well. The modelled diurnal amplitude only shows a weak relationship with vertical resolution across models; differences in near-surface transport simulation appear to play a major role. Examples are also presented where there is evidence that the models show useful skill in simulating seasonal and synoptic changes in diurnal amplitude.

Design guidelines for public spaces in climate proof cities

Dr. Sanda Lenzholzer (LAR) graduated in 2010 on a thesis "Designing atmospheres: research and design for thermal comfort in Dutch urban squares".²⁹

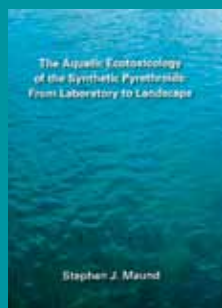
Many Dutch urban squares lack that 'atmosphere' and spatial quality that invites people to spend their time there and enjoy urban life. This sojourn quality is also strongly influenced by thermal comfort and microclimate perception. Yet, in the designs of Dutch urban squares, this aspect was often neglected. This was also due to the scarcity of applicable design guidelines for thermal comfort and microclimate. The research presented here aimed at generating such design guidelines for the Dutch climate context. It was done by using different research methods: research on design, research for design and research through design. The result of this study is a set of easily applicable design guidelines that can be used by the landscape architects and urban designers who are involved in design of public spaces in the Netherlands to improve thermal comfort and microclimate perception. These guidelines do not only address the physical microclimate 'atmosphere' but also manipulations of spatial -aesthetical 'atmospheres'.

WIMEK PhD Graduations 2009

10



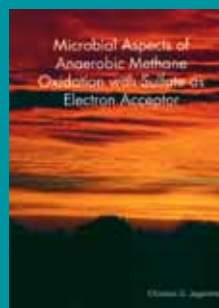
Noordijk, J.
Arthropods in linear elements: occurrence, behaviour and conservation management.
| WUR | 03 | 11 | 09 |



Maund, S.J.
The aquatic ecotoxicology of the synthetic pyrethroids: from laboratory to landscape.
| WUR | 10 | 11 | 09 |



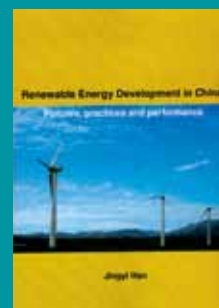
Post, J.W.
Blue energy: electricity production from salinity gradients by reverse electrodialysis.
| WUR | 17 | 11 | 09 |



Jagersma, C.G.
Microbial aspects of anaerobic methane oxidation with sulfate as electron acceptor.
| WUR | 20 | 11 | 09 |



Overeem, A.
Climatology of extreme rainfall from rain gauges and weather radar.
| WUR | 04 | 12 | 09 |



Han, Jingyi
Renewable energy development in China: policies, practices and performance.
| WUR | 08 | 12 | 09 |

Indicators for biodiversity in agricultural landscapes

Professor Paul Opdam et al (LUP / Alterra) contributed to a large pan-European study on indicators for biodiversity in agricultural landscapes.³⁰ In many European agricultural landscapes, species richness is declining considerably. Studies performed at a very large spatial scale are helpful in understanding the reasons for this decline and as a basis for guiding policy. In a unique, large-scale study of 25 agricultural landscapes in seven European countries, we investigated relationships between species richness in several taxa, and the links between biodiversity and landscape structure and management. We estimated the total species richness of vascular plants, birds and five arthropod groups in each 16-km² landscape, and recorded various measures of both landscape structure and intensity of agricultural land use. We studied correlations between taxonomic groups and the effects of landscape and land-use parameters on the number of species in different taxonomic groups. Our statistical approach also accounted for regional variation in species richness unrelated to landscape or land-use factors. The results reveal strong geographical trends in species richness in all taxonomic groups. No single species group emerged as a good predictor of all other species groups. Species richness of all groups increased with the area of semi-natural habitats in the landscape. Species richness of birds and vascular plants was negatively associated with fertilizer use. We conclude that indicator taxa are unlikely to provide an effective means of predicting biodiversity at a large spatial scale, especially where there is large biogeographical variation in species richness. However, a small list of landscape and land-use parameters can be used in agricultural landscapes to infer large-scale patterns of species richness. Our results suggest that to halt the loss of biodiversity in these landscapes, it is important to preserve and, if possible, increase the area of semi-natural habitat.

A conceptual framework for selecting environmental indicators sets

Dr. David Niemeijer and Dr. Rudolf de Groot (ESA) developed a conceptual framework for selecting environmental indicator sets.³¹ In recent years, environmental indicators have become a vital component of environmental impact assessments and "state of the environment" reporting. This has increased the influence of environmental indicators on environmental management and policy making at all scales of decision making. However, the scientific basis of the selection process of the indicators used in environmental reporting can be significantly improved. In many studies no formal selection criteria are mentioned and when selection criteria are used they are typically applied to indicators individually. Often, no formal criteria are applied regarding an indicator's analytical utility within the total constellation of a selected set of indicators. As a result, the indicator selection process is subject to more or less arbitrary decisions, and reports dealing with a similar subject matter or similar geographical entities may use widely different indicators and consequently paint different pictures of the environment. In this paper, a conceptual framework for environmental indicator selection is proposed that puts the indicator set at the heart of the selection process and not the individual indicators. To achieve this objective, the framework applies the concept of the causal network that focuses on the inter-relation of indicators. The concept of causal networks can facilitate the identification of the most relevant indicators for a specific domain, problem and location, leading to an indicator set that is at once transparent, efficient and powerful in its ability to assess the state of the environment.

WIMEK PhD Graduations 2010



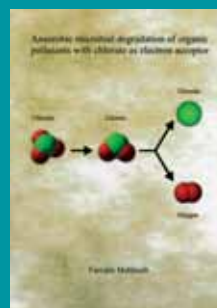
Schipper, C.A.
Assessment of effects of chemical contaminants in dredged material on marine ecosystems and human health.
| WUR | 08 | 12 | 09 |



Reinds, G.J.
Air pollution impacts on European forest soils: steady-state and dynamic modelling.
| WUR | 16 | 12 | 09 |



Weert, J.P.A. de
Fate of the estrogen nonylphenol in river sediment: availability, mass transfer and biodegradation.
| WUR | 16 | 12 | 09 |



Mehboob, F.
Anaerobic microbial degradation of organic pollutants with chlorate as electron acceptor.
| WUR | 19 | 01 | 10 |



Rotterdam-Los, A.M.D. van
The potential of soils to supply phosphorus and potassium: processes and predictions.
| WUR | 26 | 02 | 10 |



Nagashima, M.N.
Game-theoretic analysis of international climate agreements: the design of transfer schemes and the role of technological change.
| WUR | 12 | 03 | 10 |

The role of transparency in global environmental governance

Dr. Aarti Gupta (ENP) wrote an article on “transparency under scrutiny: information disclosure in global environmental governance”.³² Although transparency is a key concept of our times, it remains a relatively understudied phenomenon in global environmental politics. The link between transparency and accountable, legitimate and effective governance is assumed, yet the nature and workings of this link require further scrutiny. Transparency via information disclosure is increasingly at the heart of a number of global environmental governance initiatives, termed “governance-by-disclosure” here. Gupta identifies two assumptions that underpin such governance-by-disclosure initiatives, and calls for comparative analysis of the workings of such assumptions in practice, as a way to illuminate the nature and implications of a transparency turn in global environmental governance and its link to accountable, legitimate and effective governance. A special issue of Global Environmental Politics was edited by Aarti Gupta on the theme of “transparency in global environmental governance” in 2010³³, with a contribution of Arthur Mol as well.

Cost-benefit analysis of adaptation to climate change

The PhD research of Karianne de Bruin (ENR) focuses on cost-benefit analysis of adaptation to climate change. This resulted in 2009 in an article “Adapting to climate change in The Netherlands: an inventory of climate adaptation options and ranking of alternatives”.³⁴ In many countries around the world impacts of climate change are assessed and adaptation options identified. We describe an approach for a qualitative and quantitative assessment of adaptation options to respond to climate change in the Netherlands.

The study introduces an inventory and ranking of adaptation options based on stakeholder analysis and expert judgement, and presents some estimates of incremental costs and benefits. The qualitative assessment focuses on ranking and prioritisation of adaptation options. Options are selected and identified and discussed by stakeholders on the basis of a sectoral approach, and assessed with respect to their importance, urgency and other characteristics by experts. The preliminary quantitative assessment identifies incremental costs and benefits of adaptation options. Priority ranking based on a weighted sum of criteria reveals that in the Netherlands integrated nature and water management and risk based policies rank high, followed by policies aiming at ‘climate proof’ housing and infrastructure.

The stability of international climate coalitions

The PhD candidate Myuki Nagashima (ENR) studied the stability of international climate coalitions, resulting in a well received publication in Ecological Economics in 2009.³⁵ We find that well-designed transfer schemes can stabilise larger coalitions and increase global abatement levels. In our applied setting we find that for allocation-based and outcome-based rules only small coalitions are stable, and, in the case of grandfathered emission permits, there is no stable coalition at all. Some obstacles associated with grandfathered emission permits can be overcome by incorporating the expected growth of emissions in developing countries in the distribution of emission permits. For the optimal transfer scheme we find that larger coalitions, which include key players such as the United States and China, can be stable, but no transfer scheme is capable of stabilising the Grand Coalition.

WIMEK PhD Graduations 2010

12



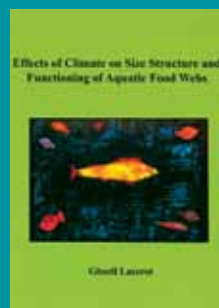
Steinbusch, K.J.J.
Liquid biofuel production from volatile fatty acids.
| WUR | 19 | 03 | 10 |



Kosten, S.
Aquatic ecosystems in hot water: effects of climate on the functioning of shallow lakes.
| WUR | 06 | 04 | 10 |



Kruk, C.
Morphology captures function in phytoplankton: a large-scale analysis of phytoplankton communities in relation to their environment.
| WUR | 06 | 04 | 10 |



Lacerot, G.
Effects of climate on size structure and functioning of aquatic food webs.
| WUR | 06 | 04 | 10 |



Graaff, M.S. de
Resource recovery from black water.
| WUR | 16 | 04 | 10 |



Willemsen, L.
Mapping and modelling multifunctional landscapes.
| WUR | 12 | 04 | 10 |

Societal Impact

WIMEK researchers play an important role in the scientific underpinning of national and international policy documents regarding climate change, reduction of biodiversity, the disturbance of ecosystems and a sustainable reform of production and consumption. They participate actively in advisory boards of governmental and non-governmental organisations and are frequently asked to comment on recent developments in newspapers, on radio and television. Some highlights

Climate gate

The WIMEK-SENSE researchers were very active in the debate on ClimateGate and the so-called errors in the IPCC report. Professor Rik Leemans (ESA-WU) and Professor Wim Turkenburg (STS, Utrecht University) initiated a open letter to parliament (www.sense.nl/openletter) in which they regret the mistakes, suggest opportunities for improvement of the IPCC process and state that these mistakes do not alter IPCC's conclusion. Both wrote several letters-to-the-editor of Dutch Newspapers, gave interviews and published an essay in Milieu, the magazine for environmental professionals, and engaged the SENSE community actively in the debate.

Nature calendar – Nature report – Allergy radar

Dr. Arnold van Vliet (ESA) continues with the Nature's Calendar (www.natuurkalender.nl), which provides a monitoring network on phenology and climate change.

Results of this network are weekly summarized in the national radio show 'Vroege Vogels' on Sunday morning. Additionally, in spring 2008 we started the website www.natuurbericht.nl. The website publishes 365 days per year at least two articles on new insights in changes in the direct environment of people by focusing on plants, insects and other natural phenomena. Since the start over three million articles have been read by visitors. Many of the published articles have been taken over by the media resulting in hundreds of newspaper articles. Furthermore, in 2009 we started the website www.allergieradar.nl. This website is fed by data, entered by +/- 1000 participants, and provides (i) an overview of real time symptoms that participants experience in different parts of the Netherlands; (ii) a "pollen planner" which provides a forecast on the flowering season of various allergenic pollen producing plants; and (iii) general information on allergy and allergenic pollen.

Partnership for Research on Viable Environmental Infrastructure Development in East Africa (PROVIDE)

The WIMEK research groups ENP, ETE and ESA contribute to the WIMEK-MGS programme PROVIDE (2006 – 2010), co-financed by the Interdisciplinary Research Fund (INREF) from Wageningen University. This INREF programme aims at capacity building for environmental infrastructure development in East Africa.

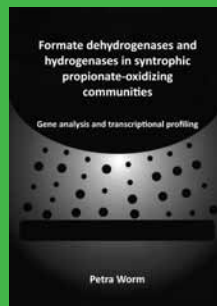
The PROVIDE project focuses on, and contributes to,



Werners, S.E.
Adaptation to climate related risks in managed river basins: diversifying land use and water management activities to adapt to climate related risks in the Netherlands and Hungary.
| WUR | 25 | 05 | 10 |



Maphosa, F.
Chasing organohalide respirers: ecogenomics approaches to assess the bioremediation capacity of soils.
| WUR | 31 | 05 | 10 |



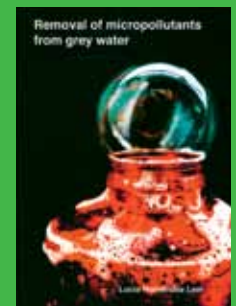
Worm, P.
Formate dehydrogenases and hydrogenases in syntrophic propionate-oxidizing communities: gene analysis and transcriptional profiling.
| WUR | 28 | 06 | 10 |



Brzozowska, A.M.
Reduction of protein adsorption on surfaces coated with Complex Coacervate Core Micelles.
| WUR | 29 | 06 | 10 |



Lenzholzer, S.
Designing atmospheres: research and design for thermal comfort in Dutch urban squares.
| WUR | 18 | 07 | 10 |



Hernandez Leal, L.
Removal of micropollutants from grey water: combining biological and physical/chemical processes.
| WUR | 10 | 09 | 10 |

the improvement of sanitation and solid waste management in cities in East Africa (Kenya, Uganda and Tanzania) with an emphasis on the Lake Victoria Region. Developing and assessing the modernised mixtures approach (MMA approach) is the focal point. This approach integrates the (eco) technological, economic, social and governance dimensions of new environmental infrastructures against the background of specific local contexts.

The PROVIDE programme is a collaboration between various research groups within Wageningen University and the Department of Engineering at Ardhi University (ARU), previously known as University College of Land and Architectural Studies (UCLAS) in Tanzania, the Makerere University of Environment and Natural Resources in Uganda, and the Kenyatta University in Kenya. PROVIDE collaborates with organisations working on the topic of urban environment and development in the region like WASTE (the Netherlands), Practical Action (Kenya), National Environmental Management Authority (Uganda), UN-Habitat (Kenya), ILO-East Africa (Tanzania), and several other Universities, CBOs and NGOs. The research programme is carried out by nine sandwich PhD candidates.

Dissemination of research output is done through several channels. Next to workshops and presentations, the maintenance of a network of academic institutions, national and local policy makers, international NGOs and the private sector also supports a good exposure of the attained research results. This network building occurs at two levels. On a personal level, PROVIDE researchers approached several international institutions, NGOs and private organizations in the last years. UN-Habitat, World Bank, NEMA - Uganda, WASTE, ILO - Tanzania, Umande Trust - Nairobi, Tampere University of Technology - Finland are a few examples of these efforts. On a programme level, a new website was built to invite primarily scientific groups into a social environmental network.

This environmental research network initiative (www.ernafrica.org) is meant to provide an international academic forum for cooperation, exchange and debate on socio-environmental problems in Africa.

Green Roofs – analysing the real effects

To analyse the greening of roof surfaces SEG formed a consortium with NIOO_KNAW and commercial firms (Daklab, Betonrestore). This consortium is going to analyse and monitor water- energy and biodiversity of green roofs. In combination with Plant-e (a spinoff of the environmental technology group) an experimental setup to harvest electricity generated by plants will be upscaled. The consortium won two prizes for the innovative ideas - one in the SBIR programme, the second in the “Mooi Nederland” programme. More information can be found in the document “een gebouw dat leeft”.

Conference and Book on the World-Wide Sanitation Challenge

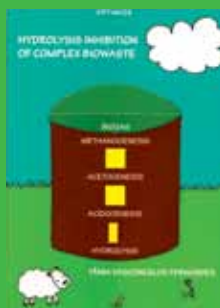
The WIMEK research groups ENP and ETE together with LeAF (Lettinga Associates Foundation) and Wetsus organized an international IWA Sanitation Challenge Conference in Wageningen, may 2008. It was a unique event as it enabled a truly multi-disciplinary approach in discussing Sanitation Challenges in the North and in the South with social and political scientists, natural scientists, environmental engineers and practitioners in one scientific conference. One of the follow-up activities was the publication of a book on “Social Perspectives on the Sanitation Challenge”.³⁶

WIMEK PhD Graduations 2010

14



Schrier-Uijl, A.P.
Flushing meadows: the influence of management alternatives on the greenhouse gas balance of fen meadow areas.
| WUR | 10 | 09 | 10 |



Vasconcelos Fernandes, T.
Hydrolysis inhibition of complex biowaste.
| WUR | 10 | 09 | 10 |



Veeken, P.L.R. van der
Dynamic partitioning of nanoparticulate metal species between gel layers and aqueous media.
| WUR | 13 | 09 | 10 |



Rubach, M.N.
Predicting the response of aquatic invertebrates to stress using species traits and stressor mode of action.
| WUR | 07 | 10 | 10 |



Hiemstra, T.
Surface complexation at mineral interfaces: Multisite and Charge Distribution approach.
| WUR | 13 | 10 | 10 |



Zaan, B.M. van der
Monitoring biodegradation capacity of organic pollutants in the environment.
| WUR | 19 | 10 | 10 |

Our education

All WIMEK PhD students participate in the SENSE training programme. The SENSE training programme aims (i) to train PhD students to be able to conduct research in a systematic and productive way, (ii) to work effectively in an international arena, (iii) to contribute to an improved understanding of the causes and effects of environmental problems and of possible solutions, (iv) to position their own research in a multidisciplinary context and (v) to translate environmental problems into relevant sound research proposals.

In the end, we wish to help PhD students in performing their PhD study, in understanding the wider environmental context of their study, and in preparing them for their future careers.

In the period 2008 – 2010, WIMEK has been involved in the coordination and organisation of several international PhD courses, for example:

- Speciation and Bioavailability (2008, 2010; Prof. Herman van Leeuwen)
- Topics in Ecotoxicology (2008, 2010; Prof. Tinka Murk; Dr. Kees van Gestel, VU)
- Principles of Ecological Genomics (2009; Dr. Hauke Smidt; Prof. Nico van Straalen, VU)
- Alternet Summer School on biodiversity and ecosystems (2008, 2009, 2010; Prof. Rik Leemans et al)
- Biogeochemistry and -physics of the lower atmosphere (2010; Dr. Jordi Vila et al)
- Understanding Global Environmental Change: Pressure, State and Impact (2009; Dr. Nynke Hofstra)
- Understanding Global Environmental Change: Causes and response (2008; Dr. JosÈ Potting)
- Coping with Climate Change in Integrated Watershed Management (2008; Dr. Ronald Hutjes)
- Summer School Green house gas emissions from rural activities – monitoring, reporting and verification (2010; Dr. Ronald Hutjes)

Furthermore, international PhD courses have been organised by our SENSE partner institutes and other Wageningen Graduate Schools.

In addition WIMEK staff has organised several internal PhD courses for our own PhD students. The Wageningen Graduate Schools (WGS) collaborate in the organisation of skills courses, such as PhD competence assessment; Techniques for writing and presenting a scientific paper; Project and time management; Mobilising your scientific network; Information literacy; Career orientation and other courses.



Mahonge, C.P.I.
Co-managing complex social-ecological systems in Tanzania: the case of Lake Jipe wetland.
| WUR | 22 | 10 | 10 |



Stremke, S.
Designing sustainable energy landscapes: concepts, principles and procedures.
| WUR | 22 | 10 | 10 |



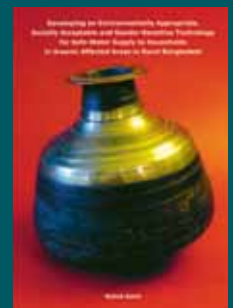
Pham Thi Ahn
Mitigating water pollution in Vietnamese aquaculture production and processing industry: the case of pangasius and shrimp.
| WUR | 27 | 10 | 10 |



Limpt, B. van
Performance relations in Capacitive Deionization systems.
| WUR | 02 | 11 | 10 |



Paudel, K.
Role of sediment in the design and management of irrigation canals: Sunsari Morang Irrigation Scheme, Nepal
WUR Wageningen.
| WUR | 17 | 11 | 10 |



Amin, N.
Developing an environmentally appropriate, socially acceptable and gender-sensitive technology for safe-water supply to households in rural Bangladesh.
| WUR | 19 | 11 | 10 |

Proofs of Esteem

SPINOZA award

The NWO/Spinoza Prize, the highest Dutch award in science sometimes also referred to as the 'Dutch Nobel Prize', is awarded to Dutch researchers who rank among the world's top scientists. The laureates are internationally renowned, and know how to inspire young researchers.

The Netherlands Organisation for Scientific Research (NWO) has awarded Professor Marten Scheffer (Aquatic Ecology and Water Quality Management Group) one of the three NWO/Spinoza Prizes for 2009. Professor Scheffer receives the prize (2,5 M€) for his pioneering contributions to our understanding of critical transitions in complex systems, varying from shifts in shallow lakes to climate change and the collapse of ancient cultures. For more information see: <http://www.aew.wur.nl/UK/Staff/MS>.

European Research Council (ERC) Grants

In 2010, Professor Marten Scheffer has also been selected as one of the top research leaders by the European Research Council (ERC) in its competition for "Advanced Grants". Scheffer will spend the grant (2,5 M€) to do more research on early signals that announce a sudden change in a system, be it a migraine attack or a change in climate. Moreover, the WIMEK researcher Lars Hein (Environmental Systems Analysis group) has been awarded a prestigious research grant from the European Research Council (ERC). Lars Hein receives the grant for his proposal 'EcoSpace: Spatial-Dynamic Modelling of Adaptation Options to

Climate Change at the Ecosystem Scale'. The ERC grants are the European equivalent of the Veni, Vidi and Vici grants of the Dutch NWO. They are given to promising top researchers with an outstanding CV and research proposal.

NWO Veni – Vidi – Vici grants 2008 - 2010

VENI grants

A Veni grant is considered a big step in an academic career. The NWO received many research proposals in 2010 and honoured 161 of them, just 16 percent of the total. In 2010 Veni grants have been awarded to the following projects and researchers:

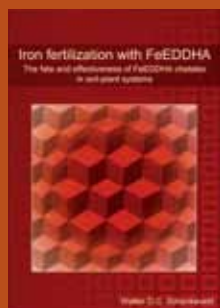
Sea water desalination: salt out first – **Dr. Jan Post** (Environmental Technology Group), wants to show when you desalinate seawater, it is more efficient to remove the salt first and then the water.

Turbulent fog – **Dr. Gert-Jan Steeneveld** (Meteorology and Air Quality Group), wants to be able to predict persistent fog better with reference to atmospheric turbulence and variations in the landscape.

Do forests amplify heat waves? – **Dr. Ryan Teuling** (Hydrology and Quantitative Water Management Group), will be looking at how the evaporation from forests during a heat wave differs from the evaporation from other types of landscape.

WIMEK PhD Graduations 2010

16



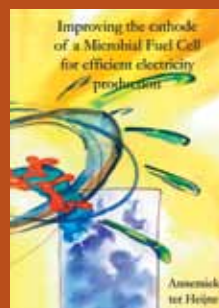
Schenkeveld, W.D.C.
Iron fertilization with FeEDDHA: the fate and effectiveness of FeEDDHA chelates in soil-plant systems.
| WUR | 19 | 11 | 10 |



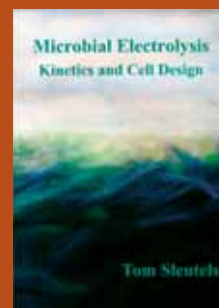
Verhaart, M.R.A.
Genomics and transcriptomics of the hydrogen producing extremophile bacterium *Caldicellulosiruptor saccharolyticus*.
| WUR | 19 | 11 | 10 |



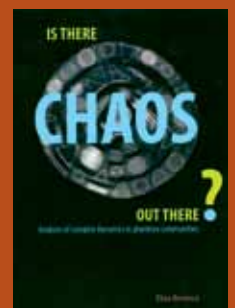
Bereschenko, L.A.
Biofilm development on new and cleaned membrane surfaces.
| WUR | 22 | 11 | 10 |



Heijne, A. ter
Improving the cathode of a microbial fuel cell for efficient electricity production.
| WUR | 03 | 12 | 10 |



Sleutels, T.H.J.A.
Microbial electrolysis kinetics and cell design.
| WUR | 03 | 12 | 10 |



Benincà, E.
Is there chaos out there?: analysis of complex dynamics in plankton communities.
| WUR | 06 | 12 | 10 |

VIDI grants

The prestigious Vidi grants (up to 800,000 euros), awarded by the Dutch Organization for Scientific Research (NWO), enable young researchers to pursue their own line of research for five years. In 2007 – 2009 Vidi grants have been awarded to the following WIMEK researchers:

Dr. Wouter Peters, Postdoc at the Meteorology and Air Quality Group (MAQ), received a Vidi grant in 2008. His research focuses on deriving greenhouse gas budgets from atmospheric observations.

Dr. Bas van de Wiel, assistant professor at the Meteorology and Air Quality Group (MAQ), has been awarded a Vidi-grant in 2009 for his research to get a grip on the phenomenon that winds die down and suddenly gust again on clear evenings.

Dr. Monique Heijmans, assistant professor at of the Nature Management and Plant Ecology Group (NCP), received a Vidi grant in 2009 for research on the influence of vegetation on the thawing of permafrost. She will join WIMEK from 01-01-2010.

Additional Awards

Professor Arthur Mol (Environmental Policy Group, ENP) will be honoured in July 2010 by the International Sociological Association (ISA) for his work in environmental sociology. He will receive the Frederick H. Buttel International Award for Distinguished Scholarship in Environmental Sociology, awarded every four years and seen as one of the biggest prizes in the field of environmental sociology. Prof. Mol will receive the prize during the ISA's annual conference in Gothenburg in Sweden.

In August 2010, he also received the 2009 Distinguished Contribution Award from the American Sociological

Association (ASA), for his work in environmental sociology. This has made him the first non-American to receive the prize since its inception in 1983. The prize has been presented at the 105th Annual Meeting of the American Sociological Association, in Atlanta, USA. (<http://www.enp.wur.nl/UK/Staff/Arthur+Mol/>)

Excellent PhD Candidates and Graduates

Chiel van Heerwaarden (Meteorology and Air Quality Group) received a NWO Top Talent PhD grant (about 200 k€) for research “Understanding boundary layer clouds over heterogeneous landscapes”

René Rozendal (Environmental Technology Group) invented and patented a microbial electrolysis, a novel bioelectrochemical technology for the production of hydrogen from wastewater as part of his PhD research. René Rozendal graduated his PhD Cum Laude on the 24th of October 2007 and received various research awards for his achievements: SENSE PhD award 2008; The Most Appealing Dissertation (MAD) award 2008; Honorable mention at the DSM Science & Technology awards 2008; and the DOW Energy Dissertation Prize 2009.

Jan Post (Environmental Technology Group) has won the SENSE PhD Award 2010. Jan Post's thesis is entitled “Electricity production from salinity gradients by reverse electrodialysis”. Jan successfully defended his thesis at the end of 2009 and was awarded it Cum Laude. The committee was particularly impressed by the combination of a wide spectrum of research fields and depth, combining knowledge on membranes, biofouling, electrochemistry and engineering-economics. His research has not only resulted in a number of publications, but also a number of patents. Moreover, his research has resulted in a successful VENI application (see Veni grants).



Buuren, J.C.L. van
SANitation CHOice
Involving Stakeholders:
a participatory multi-
criteria method for
drainage and sanitation
system selection in
developing cities applied
in Ho Chi Minh City,
Vietnam.

The WIMEK PhD Council

The WIMEK PhD Council (WPC) represents all PhD students involved in the Graduate School WIMEK at Wageningen University. The main aims of the council are to provide students with all the information relevant to their work at the University and to strongly work together on solving problems regarding education, supervision and planning that students might face during their research project.

A representative of the Council is normally present at the meetings of the WIMEK Advisory Board and actively defends the PhD students interests. On a wider range, WPC is also present at the Wageningen PhD Council meetings with the University General Board, and in the SENSE Education Committee gathering 3 times a year. In all these instances, the council focus attention on all work-related issues brought by students to the WPC.

In the past years, some of the issues that we worked on were: the overall rules regarding the teaching

responsibilities of PhD students, the modification and improvement of the introductory A1 course to all WIMEK students and analysis of the budget for PhD courses. Other activities of the WPC also include: organization of events that encourage students to participate in WIMEK/SENSE activities, promote the WIMEK Graduate School as a Center of Excellence in research and create a link between students from different departments.

The WPC consists of a group of motivated and cooperative PhD students from different departments within WIMEK. If you want to know more about the current members, check out the WPC website. If you have any complain, suggestions or doubts regarding the WPC, feel free to contact us. And off course we always warmly welcome new members interested in taking part of our activities.

Contact: Bruno Bastos Sales; bruno.bastossales@wur.nl.

ANNEX 1: WIMEK RESEARCH GROUPS

Code	Chair Group	WIMEK Research Group Leader(s)	%
AEW	Aquatic Ecology and Water Quality Management Group	Prof. M. (Marten) Scheffer & Prof. A.A. (Bart) Koelmans	100 %
ENP	Environmental Policy Group	Prof. A.P.J. (Arthur) Mol & Prof. G. (Gert) Spaargaren	55%
ENR	Environmental Economics and Natural Resources Group	Prof. E.C. (Ekko) van Ierland	35%
ESA	Environmental Systems Analysis Group	Prof. R. (Rik) Leemans	100%
ESS	Earth System Science Group	Prof. P. (Pavel) Kabat	100%
ETE	Environmental Technology Group	Prof. H.H.M. (Huub) Rijnaarts & Prof. C.J.N. (Cees) Buisman	100%
HWM	Hydrology and Quantitative Water Management Group	Prof. R. (Remko) Uijlenhoet	100%
IWE	Irrigation and Water Engineering Group	Prof. B. (Bart) Schulz (UNESCO-IHE) & Dr. F.P. (Frans) Huibers	20%
LAR	Landscape Architecture Group	Prof. A. (Adri) van den Brink	100%
LDD	Land Degradation and Development Group	Prof. L. (Leo) Stroosnijder	40%
LUP	Land Use Planning Group	Prof. P.F.M. (Paul) Opdam	20%
MAQ	Meteorology and Air Quality Group	Prof. A.A.M. (Bert) Holtslag & Prof. M. (Maarten) Krol	100%
MIB	Microbiology Group (only Environmental Microbiology part)	Prof. W.M. (Willem) de Vos & Prof. A.J.M. (Fons) Stams	30%
NCP	Nature Conservation and Plant Ecology Group (3)	Prof. F. (Frank) Berendse	20%
PCC	Physical Chemistry and Colloid Sciences Group	Prof. M.A. (Martien) Cohen Stuart & Prof. H.P. (Herman) van Leeuwen	30%
SCO	Systems and Control Group	Prof. G. (Gerrit) van Straten & Dr. K. (Karel) Keesman	20%
SEG	Soil Physics, Ecohydrology and Ground Water Quality Group	Prof. S.E.A.T.M. (Sjoerd) van der Zee	100%
SOQ	Soil Chemistry and Chemical Soil Quality Group	Prof. W.H. (Willem) van Riemsdijk	100%
TOX	Toxicology Group	Prof. I.M.C.M. (Ivonne) Rietjens & Prof. A.J. (Tinka) Murk	20%

Notes

- Scheffer, M.; Bascompte, J.; Brock, W.A.; Brovkin, V.; Carpenter, S.R.; Dakos, V.; Held, H.; Nes, E.H. van; Rietkerk, M.; Sugihara, G. (2009); Early-warning signals for critical transitions; *Nature* 461, p. 53 - 59.
- Rockström, J.; Steffen, W.; Noone, K.; Scheffer, M. (2009); A safe operating space for humanity; *Nature* 461, p. 472 - 475.
- Dakos, V.; Scheffer, M.; Nes, E.H. van; Brovkin, V.; Petoukhov, V.; Held, H. (2008); Slowing down as an early warning signal for abrupt climate change; *Proceedings of the National Academy of Sciences of the United States of America* 105 (38), p. 14308 - 14312.
- Scheffer, M. (2009); *Critical Transitions in Nature and Society*; Princeton University Press, USA
- Elisa Benincà, Klaus D. Jöhnk, Reinhard Heerkloss & Jef Huisman (2009); Coupled predator-prey oscillations in a chaotic food web; *Ecology Letters* 12, pp. 1367-1378
- Benincà, E.; Huisman, J.; Heerkloss, R.; Jöhnk, K.D.; Branco, P.; Nes, E.H. van; Scheffer, M.; Ellner, S.P. (2008); Chaos in a long-term experiment with a plankton community; *Nature* 451, p. 823 - 826.
- Foekema, E. M., C. M. Deerenberg, et al. (2008). "Prolonged ELS test with the marine flatfish sole (*Solea solea*) shows delayed toxic effects of previous exposure to PCB 126." *Aquatic Toxicology* 90(3): 197-203.
- Worm P, Stams AJM, Cheng X, Plugge CM. Growth and substrate dependent transcription of formate dehydrogenase and hydrogenase coding genes in *Syntrophobacter fumaroxidans* and *Methanospirillum hungatei*. *Microbiology* 157, 280-289 (2010).
- Worm P, Feroso, FG, Stams AJM, Lens PNL, Plugge CM. Transcription of *fdh* and *hyd* in *Syntrophobacter* spp. and *Methanospirillum* spp. as a diagnostic tool for monitoring anaerobic sludge deprived of molybdenum, tungsten and selenium, *Environmental Microbiology*. DOI:10.1111/j.1462-2920.2011.02423.x (2011)
- Confurcation is the endergonic reduction of NAD+ that is driven by the exergonic reduction of a second NAD+ with reduced ferredoxin
- Hiemstra, T.; Riemsdijk, W.H. van; Rossberg, A.; Ulrich, K. (2009); A surface structural model for ferrihydrite II: Sites related to primary charge, molar mass, and mass density; *Geochimica et Cosmochimica Acta* 73 (15); p. 4437 - 4451
- Van der Ploeg, M.J., H. P. A. Gooren, G. Bakker, C. W. Hoogendam, C. Huiskes, L. K. Koopal, H. Kruidhof, and G. H. de Rooij. 2010. Polymer tensiometers with ceramic cones: direct observations of matrix pressures in drying soils. *Hydrol. Earth Syst. Sci.*, 14, 1787-1799, doi:10.5194/hess-14-1787-2010.
- Teuling, A. J., S. I. Seneviratne; R. Stoeckli; M. Reichstein; E. Moors; P. Ciais; S. Luysaert; B. van den Hurk; C. Ammann; C. Bernhofer; E. Dellwik; D. Gianelle; B. Gielen; T. Grunwald; K. Klumpp; L. Montagnani; C. Moureaux; M. Sottocornola & G. Wohlfahrt (2010), Contrasting response of European forest and grassland energy exchange to heatwaves. *Nature Geosci.* 3, 722-727, doi:10.1038/ngeo950.
- Rozendal, R.A.; Hamelers, H.V.M.; Rabaey, K.; Keller, J.; Buisman, C.J.N. (2008); Towards practical implementation of bioelectrochemical wastewater treatment; *Trends in Biotechnology* 26 (8); p. 450 - 459.
- Rozendal, R.A.; Sleutels, T.H.J.A.; Hamelers, H.V.M.; Buisman, C.J.N. (2008); Effect of the type of ion exchange membrane on performance, ion transport, and pH in biocatalyzed electrolysis of wastewater; *Water Science and Technology* 57 (11); p. 1757 - 1762.
- Rozendal, R.A.; Jeremiase, A.W.; Hamelers, H.V.M.; Buisman, C.J.N. (2008); Hydrogen production with a microbial biocathode; *Environmental Science and Technology* 42 (2); p. 629 - 634.
- Post, J.W. (2009); Blue energy: electricity production from salinity gradients by reverse electrodialysis; Wageningen UR; Promotor(en): Buisman, Prof dr ir C.J.N., co-promotor(en): Hamelers, Dr ir H.V.M.
- Post, J.W.; Hamelers, H.V.M.; Buisman, C.J.N. (2008); Energy recovery from controlled mixing salt and fresh water with a reverse electrodialysis system; *Environmental Science and Technology* 42 (15); p. 5785 - 5790.
- Strik, D.P.B.T.B.; Hamelers, H.V.M.; Snel, J.F.H.; Buisman, C.J.N. (2008); Green electricity production with living plants and bacteria in a fuel cell; *International Journal of Energy Research* 32 (9); p. 870 - 876.
- Strik, D.P.B.T.B.; Terlouw, H.; Hamelers, H.V.M.; Buisman, C.J.N. (2008); Renewable sustainable biocatalyzed electricity production in a photosynthetic algal microbial fuel cell (PAMFC); *Applied Microbiology and Biotechnology* 81 (4); p. 659 - 668.
- Strik, D.P.B.T.B.; Hamelers, H.V.M.; Buisman, C.J.N. (2010); Solar energy powered microbial fuel cell with a reversible bioelectrode; *Environmental Science and Technology* 44 (1); p. 532 - 537.
- Hendriks, A.T.W.M.; Zeeman, G. (2009); Pretreatments to enhance the digestibility of lignocellulosic biomass; *Bioresource Technology* 100 (1); p. 10 - 18.
- Lelieveld, J.; Butler, T.; Crowley, J.N.; Dillon, T.J.; Fischer, H.; Ganzeveld, L.N.; Harder, H.; Lawrence, M.G.; Martinez, M.; Taraborelli, D.; Williams, J. (2008); Atmospheric oxidation capacity sustained by a tropical forest; *Nature* 452 (7188); p. 737 - 740.
- Pitman, A.J.; Noblet-Ducoudré, N. de; Cruz, F.T.; Davin, E.L.; Bonan, G.B.; Brovkin, V.; Claussen, M.; Delire, C.; Ganzeveld, L.N.; Gayler, V.; Hurk, B.J.J.M. van den; Lawrence, P.J.; Molen, M.K. van der; Müller, C.; Reick, C.H.; Seneviratne, S.I.; Strengers, B.J.; Voldoire, A. (2009); Uncertainties in climate responses to past land cover change: First results from the LUCID intercomparison study; *Geophysical Research Letters* 36; p. L14814.
- Hoosbeek, M.R.; Scarascia-Mugnozza, G. (2009); Increased Litter Build Up and Soil Organic Matter Stabilization in a Poplar Plantation After 6 Years of atmospheric CO₂ Enrichment (FACE): Final Results of POP-EuroFace Compared to Other Forest FACE Experiments; *Ecosystems* 12 (2); p. 220 - 239.
- Eerdeken, G.; Ganzeveld, L.N.; Vilj-Guerau de Arellano, J.; Kl, pfe, T.; Sinha, V. (2009); Flux estimates of isoprene, methanol and acetone from airborne PTR-MS measurements over the tropical rainforest during the GABRIEL 2005 campaign; *Atmospheric Chemistry and Physics* 9; p. 4207 - 4227.
- Stehfest, E.; Bouwman, A.F.; Vuuren, D.P. van; Elzen, M.; Kabat, P. (2009); Climate benefits of changing diet; *Climatic Change* 95 (1-2); p. 83 - 102.
- Law, R.; Peters, W.; Krol, M.C. (2008); TransCom model simulations of hourly atmospheric CO₂: Experimental overview and diurnal cycle results for 2002; *Global Biogeochemical Cycles* 22; p. GB3009.
- Lenzholzer, S. (2010) Designing atmospheres: research and design for thermal comfort in Dutch urban squares; WUR Wageningen UR. Promotor(en): Koh, Prof.dr. J.; Kätzschner, Prof. dr. L..
- Billeter, R.; Liira, J.; Bailey, D.; Bugter, R.; Arens, P.F.P.; Augenstein, I.; Aviron, S.; Baudry, J.; Bukacek, R.; Burel, F.; Cerny, M.; Blust, G. de; Cock, R. de; Diekötter, T.; Dietz, H.; Dirksen, J.; Dormann, C.; Durka, W.; Frenzel, M.; Hamersky, R.; Hendrickx, F.; Herzog, F.; Klotz, S.; Koolstra, B.J.H.; Lausch, A.; Coeur, D. Le; Maelfait, J.P.; Opdam, P.; Roubalova, M.; Schermann, A.; Schermann, N.; Schmidt, T.; Schweiger, O.; Smulders, M.J.M.; Speelmans, M.; Simova, P.; Verboom, J.; Wingerden, W.K.R.E. van; Zobel, M.; Edwards, P.J. (2008); Indicators for biodiversity in agricultural landscapes: a pan-European study; *Journal of Applied Ecology* 45 (1). - p. 141 - 150.
- Niemeijer, D.; Groot, R.S. de (2008); Framing environmental indicators: moving from causal chains to causal networks; *Environment, Development and Sustainability* 10 (1); p. 89 - 106.
- Gupta, A. (2008); Transparency Under Scrutiny: Information Disclosure in Global Environmental Governance; *Global Environmental Politics* 8 (2); p. 1 - 7.
- Gupta, A. (2010) Special Issue Transparency in Global Environmental Governance. *Global Environmental Politics*, Volume 10, number 3.
- Bruin, K. de; Dellink, R.B.; Ruijs, A.J.W.; Bolwidt, L.; Buuren, A. van; Graveland, J.; Groot, R.S. de; Kuikman, P.J.; Reinhard, S.; R'tter, R.P.; Tassone, V.C.; Verhagen, A.; Ierland, E.C. van (2009); Adapting to climate change in The Netherlands: an inventory of climate adaptation options and ranking of alternatives; *Climatic Change* 95 (1-2); p. 23 - 45.
- Nagashima, M.N.; Dellink, R.B.; Ierland, E.C. van; Weikard, H.P. (2009); Stability of international climate coalitions - A comparison of transfer schemes; *Ecological Economics* 68 (5) p. 1476 - 1487.
- Vliet, B. van, G. Spaargaren, P. Oosterveer (eds.) (2008). *Social Perspectives on the Sanitation Challenge*. Dordrecht: Springer.

WIMEK

Scientific Director

Professor Rik Leemans
(Rik.Leemans@wur.nl)

Executive Secretary and Confidential Advisor PhD candidates

Mr. Johan Feenstra
(Johan.Feenstra@wur.nl)

Coordinator WIMEK's postdoc and Talents & Topics programme

Dr. Marcel Hoosbeek
(Marcel.Hoosbeek@wur.nl)

Secretariat Mr. Egbert Nab

(Egbert.Nab@wur.nl)

Address WIMEK, PO Box 47
6700 AA, Wageningen

Office Room C 603,
Atlas Building (WUR building 104)
Droevendaalsesteeg 4, Wageningen.

Phone +31 317 484836
(Mr. Johan Feenstra)

International Advisory Board (IAB) WIMEK

**Emeritus Professor of Environmental
Biotechnology at ETH Zurich** Alex Zehnder

**Professor of Global Ecology, Institute of
Geo-ecology, Potsdam University, Germany**
Wolfgang Cramer

**Associate Director for Research and Director
of the "Earth-Sun Systems Laboratory" ESSL at
NCAR** Guy Brasseur

**Professor of Rural Economy, University of
Newcastle upon Tyne** Philip Lowe

SENSE

Director of Education

Dr. Ad van Dommelen
(Ad.van.Dommelen@ivm.vu.nl)

Coordinator PhD Training & Education

Mr. Johan Feenstra
(Johan.Feenstra@wur.nl)

Website manager communication officer

SENSE website: www.sense.nl



WAGENINGENUR
For quality of life



COVER PHOTOGRAPHY

Front cover | MIB group: Transcription of genes coding for formate dehydrogenases and hydrogenases in bacteria under different growth conditions | IMARES: mesocosm experiments

Back cover | SENSE: Participants A1 course September 2010 | EU HighNoon project: Retreat of glaciers in the Himalaya