

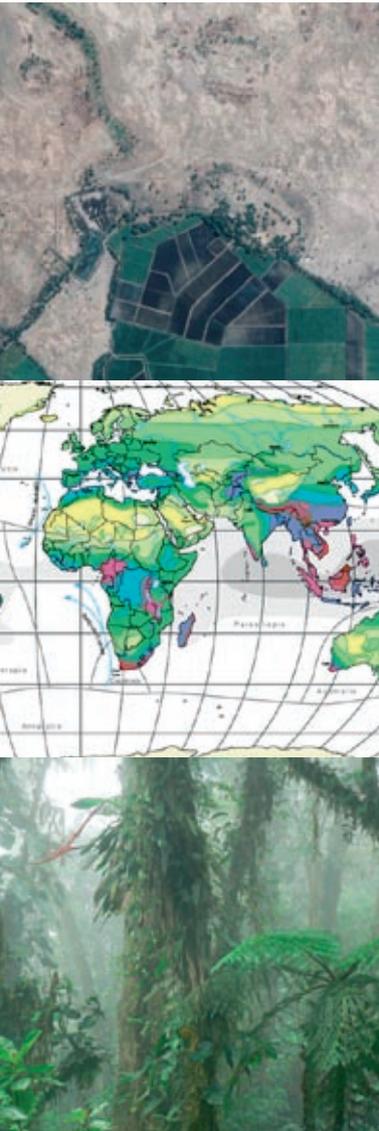
Summer School

October 11 to 15, 2010,
Thurnau, Germany

Assessing and Communicating the Loss of Biodiversity and Ecosystem Services

with Remote Sensing, Web Mapping,
Regional Planning Tools and
Life Cycle Assessment
for Better Decision Support

www.global-change-ecology.de



Organizers



UNIVERSITÄT
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WÜRZBURG



Global Change Ecology (M.Sc.),
University of Bayreuth



Bren School of Environmental Science &
Management, UC Santa Barbara

Supported by

Elite Network
of Bavaria



Bavaria California Technology Center

Content of the Summer School

Global change of land use and land cover has severe impacts on biodiversity, ecosystems and the services they provide. The summer school's goal is to learn about innovations in information technologies to generate information on changes of biodiversity and ecosystem services. Such information technologies are Remote Sensing, Web Mapping, Regional Planning Tools and Life Cycle Assessment (LCA). In combination they allow to better assess the ecological impact of land use and land intensive products (e.g., from agriculture, forestry, mining). Even more important they can channel this ecological information from science to decision-makers in industries, NGOs and governmental organizations as well as to consumers. Especially Web Mapping technologies as provided by Google together with decision support tools like LCA have a great potential to inform decision-makers about global ecological problems.

The participating students will learn about the assessment of biodiversity loss and ecosystem services with remote sensing and how decision support tools communicate this information to decision-makers. They will discuss with the lecturers the potential and limitations for designing decision support tools to address the loss of biodiversity and ecosystem services.

The summer school shall also strengthen the collaboration between researchers in California, Bavaria and other regions to generate knowledge on innovative links between Remote Sensing, Web Mapping and Life Cycle



Travel plans

For your travel plans and bookings we have uploaded a guide (How to get to Thurnau?) to the summer school homepage.

Book your train ticket best to Kulmbach. We provide a shuttle from Kulmbach station to the venue in Thurnau at Sunday afternoon to evening (Oct 10), have dinner at Sunday at 19:00 and start with the course program at Monday morning at 9:00 (for those who arrive at Monday). The summer school ends Friday (Oct 15) at 16:00.

Schedule for Talks & Workshops

	11.10.2010	12.10.2010	13.10.2010	14.10.2010	15.10.2010
	Regional Planning Tools & Web Mapping	Remote Sensing	Life Cycle Assessment (morning)	Life Cycle Assessment (morning)	
	Welcome to the summerschool				
09:00	Trade-offs analysis for biofuel and biodiversity—where are the sweet spots? (David M. Stoms, UCSB)	Latest improvements in sensor technology for quantification of biodiversity (Christopher Conrad and Martin Wegmann, UW and DLR)	Quantifying biodiversity in Life Cycle Assessment (Laura de Baan, ETH and Thomas Koellner, UBT)	Coupling GIS and Life Cycle Assessment (Roland Geyer, UCSB)	Parallel Workshops cont.
10:30	Coffee-Break	Coffee-Break	Coffee-Break	Coffee-Break	Coffee-Break
11:00	Forest information technology (Alfred Schultz, HNE Eberswalde)	Remote Sensing of biodiversity in the National Park 'Bavarian Forest' (Carl Beierkuhnlein, UBT)	Quantifying ecosystem services in Life Cycle Assessment (Manuele Margni and Rosie Saad, CIRAI - École Polytechnique de Montréal)	Web mapping and green receipts: Communicating the results of Life Cycle Assessment to decision-makers (Chris Mutel, ETH)	Parallel Workshops cont.
12:30	Lunch	Lunch	Lunch	Lunch	Lunch
14:00	InVEST – a spatial decision support tool to value ecosystem services in Sumatra (Marc Conte, Natural Capital Project, Stanford University)	Remote Sensing to assess climate related ecosystem services (Thomas Nauss, UBT)	Field trip on the change of biodiversity and ecosystem services (Carl Beierkuhnlein, UBT)	Parallel Workshops 1: Regional Planning Tools and Web Mapping (Thomas Koellner and Yohannes Ayanu) 2: Remote Sensing (Christopher Conrad and Martin Wegmann) 3: Life Cycle Assessment (Roland Geyer and Laura de Baan)	Panel discussion: How to communicate the loss of biodiversity and ecosystem services to decision-makers?
15:30	Coffee-Break	Coffee-Break			
16:00	Web Mapping: Publishing environmental information (James Frew, UCSB)	Remote Sensing of ecosystem services in India (Jagdish Krishnaswamy, ATREE)			
17:30	Individual Preparation and discussion time	Individual Preparation and discussion time			
19:00	Dinner	Dinner	Dinner	Dinner	

Each slot is of 1 hour 30 min hours is divided into 45 min lecture input and 45 min for an interactive element to engage with the participants.

Invited Speakers

Prof. Dr. Carl Beierkuhnlein

University of Bayreuth

Head of the graduate program (M.Sc.) "Global Change Ecology"

In his research Prof. Beierkuhnlein focuses on global changes and the impact on ecosystems. He is particularly interested in the changing land-use and the effects on biodiversity and impacts of extreme weather events.



Dr. Christopher Conrad

University of Würzburg

Christopher Conrad is working in the field of Remote Sensing. Currently Christopher is involved within the project Economic and Ecological Restructuring of Land and Water Use in the Khorezm Region (Uzbekistan).

Dr. Marc Conte

Stanford University

Dr. Conte is an environmental economist. In the Natural Capital Project he is developing and applying spatially-explicit ecosystem service valuation models to aid policy-makers, non-governmental organizations, and private firms in their land-use decisions.



Laura Simone de Baan

ETH Zürich

Institute for Environmental Decisions (IED)

Laura Simone de Baan's research is addressing the impacts of land use on biodiversity. In this context she intends to develop a spatially differentiated global methodology for Life Cycle Assessment.

Prof. Dr. James Frew

University of California

Bren School of Environmental Science & Management

James' interest cover the emerging field of environmental informatics, a synthesis of computer, information, and Earth sciences. Trained as a geographer, he has worked in remote sensing, image processing, software architecture, massive distributed data systems, and digital libraries.



Prof. Dr. Roland Geyer

University of California

Bren School of Environmental Science & Management

Roland Geyer is Assistant Professor at the Bren School of Environmental Science and Management, University of California, Santa Barbara. One of Prof. Greyers' research interests is estimating the impact of land use on biodiversity by applying Life Cycle Assessment.

Prof. Dr. Thomas Koellner

University of Bayreuth

Thomas Koellner holds a Professorship for Ecological Services at the University of Bayreuth. He is an expert in assessing biodiversity and ecosystem services by developing decision support tools like Life Cycle Assessment.



Dr. Jagdish Krishnaswamy

ATREE India

Ashoka Trust for Research in Ecology and the Environment

Jagdish Krishnaswamy is a Senior Fellow at the Suri Sehgal Centre for Biodiversity and Conservation. He is the Programme Leader for Ecosystem Services and Human Wellbeing. Dr. Krishnaswamy main research areas are linked to watershed hydrology and landscape ecology.

Invited Speakers

Dr. Manuele Margni

CIRAIG Montréal

École Polytechnique de Montréal - Chemical Engineering Department
In his research Manuele Margni is engaged in the topics of multimedia modeling of toxic emissions and in the assessment of ecosystem services in life cycle impact assessment.



Christopher Mutel

ETH Zürich

Institute of Environmental Engineering

In his research, he is engaged in the topics of sustainable consumption and in the development of screening indicators for life cycle assessment of Food Products as well as the regionalization in LCA and open LCA modeling.

Prof. Dr. Thomas Nauss

University of Bayreuth

In his research Thomas Nauss is interested in the impacts of environmental change on climate, cloud properties and rainfall pattern as well as ecosystem properties.



Rosie Saad

CIRAIG Montréal

École Polytechnique de Montréal - Chemical Engineering Department
Rosie Saad is particularly interested in soil functions and ecosystem services in Life cycle impact assessment.

Prof. Dr. Alfred Schultz

HNE Eberswalde

FIT Programme Co-Head & Professor for Environmental Information Technologies

His special expertise is statistics, geostatistics, ecosystem modeling and Landscape Ecology/Systems Analysis.



Dr. David Stoms

University of California

Bren School of Environmental Science & Management

His research interests lie in the field of interdisciplinary partnerships in GIS-based planning support tools for biodiversity conservation planning, mapping ecosystem services, analysis for environmental decision making, impacts of biofuels and site-dependent Life Cycle Assessment.

Dr. Martin Wegmann

University of Würzburg

Martin Wegmann is scientist at the Remote Sensing Unit in cooperation with the German Aerospace Center (DLR/DFD) and the BIOTA-Project. He is particularly interested in Remote Sensing, Landscape/Tropical Ecology and GIS.



Key Paper for your Preparation

Regional Planning Tools & Web Mapping, Oct 11

Trade-offs analysis for biofuel and biodiversity-where are the sweet spots?

(David M. Stoms, Bren School, UCSB)

Key paper:

B.A. Bryan et al., 2008 An assessment of the economic and environmental potential of biomass production in an agricultural region, *Land Use Policy* 25 (2008) 533–549 ([bryan_2008_biomass.pdf](#))

Key Question:

Is biofuel a „good“ strategy in terms of biodiversity? Which type of biomass?
Where should it be produced? What are the uncertainties in those answers?

Forest information technology

(Alfred Schultz, HNE Eberswalde)

Key paper:

E Uuemaa et. al. 2009 Landscape Metrics and Indices: An Overview of Their Use in Landscape Research, *Living Rev. Landscape Res.*, 3, (2009), 1 ([Uuemaa_et_al_landscape_metrics.pdf](#))

W L Gaines 1999 Monitoring Biodiversity: Quantification and Interpretation, Gen. Tech. Rep. PNW-GTR-443. Portland ([Gaines_et_al_quantification_biodiversity.pdf](#))

Key Question:

What is the special benefit we may have from applying information technologies in biodiversity analysis and how reliable are the quantitative results?

InVEST – a spatial decision support tool to value ecosystem services in Sumatra

(Marc Conte, Natural Capital Project, Stanford University)

Key paper:

E Nelson et al., 2009 Modeling multiple ecosystem services, biodiversity conservation, commodity production, and tradeoffs at landscape scales, *Front Ecol Environ* 2009; 7(1): 4–11 ([nelsonetal_frontiers_2009.pdf](#))

E. Nelson et al. 2008 Efficiency of incentives to jointly increase carbon sequestration and species conservation on a landscape, *PNAS*, 2008, vol. 105, 9471–9476 ([nelsonetal_pnas_2008.pdf](#))

Key Question:

What are the challenges and opportunities that the joint production of ecosystem services offer to policy-makers?

Web Mapping: Publishing environmental information

(James Frew, UCSB)

Browse through URLs:

Google Earth: <http://www.google.com/earth/learn/>

KML: <http://code.google.com/apis/kml/>

GeoServer: <http://docs.geoserver.org/stable/en/user/>

Remote Sensing, Oct 12

Latest improvements in sensor technology for quantification of biodiversity

(Christopher Conrad and Martin Wegmann, University of Würzburg and German Aerospace Center)

Key paper:

W Turner et. al. 2003 Remote sensing for biodiversity science and conservation, *TRENDS in Ecology and Evolution*, Vol.18 No.6 June 2003 ([Turner2003.pdf](#))

Key Question:

How would an optimal remote sensing data set look like for one specific ecosystem service?

Key Paper for your Preparation

Remote Sensing of biodiversity in the National Park 'Bavarian Forest'

(Carl Beierkuhnlein, Biogeography, UBT)

Key paper:

G Jurasinski et al. 2009 Inventory, differentiation, and proportional diversity: a consistent terminology for quantifying species diversity, *Oecologia* (2009) 159:15–26 ([JRB oecologia 2009.pdf](#))

Key Question:

What is biodiversity to you?

Remote Sensing to assess climate related ecosystem services

(Thomas Nauss, University of Bayreuth)

Key paper:

T Nauss et al. 2008 Operational discrimination of raining from non-raining clouds in mid-latitudes using multispectral satellite data ([Nauss2008.pdf](#))

Key Question:

How to use remote sensing for climate monitoring?

Remote Sensing of ecosystem services in India

(Jagdish Krishnaswamy, Ashoka Trust for Research in Ecology and the Environment, India)

Key paper:

J. Krishnaswamy et al. 2009 Quantifying and mapping biodiversity and ecosystem services: Utility of a multiseason NDVI based Mahalanobis distance surrogate, *Remote Sensing of Environment* 113, 857–867 ([Krishnaswamy_2009_Remote Sensing of Environment.pdf](#))

T Elmqvist et al. 2009 Ecosystem services: managing trade-offs between provisioning and regulating services. In Pushpam Kumar Mike Wood. ed(s) (2010) *Valuation of Regulating Services of Ecosystems: Methodology and Applications* (Forthcoming). Routledge, London. ([Ecosystem_services_Elmqvis et al.doc](#))

Key Question:

How does one quantify „bundles“ of different ecosystem services and how can we communicate these trade-offs and synergies?

Life Cycle Assessment, Oct 13-15

Quantifying biodiversity in Life Cycle Assessment

(Laura de Baan, ETH Zurich and Thomas Koellner, UBT)

Key paper:

U de Haes 2006 How to approach land use in LCIA or, how to avoid the Cinderella effect? *LCA* 11 (4) 219 – 221 (2006) ([Udo de Haes_2006_How to approach land use.pdf](#))

L Milà et al. 2007 Key Elements in a Framework for Land Use Impact Assessment within LCA, *LCA* 12, 5-15 ([Mila et al_2007_LandUseLCA.pdf](#))

Key Question:

How can life cycle assessment contribute to assess and communicate biodiversity loss, what are the key assumptions behind it, and which methodological constraints can we identify?

Quantifying ecosystem services in Life Cycle Assessment

(Manuele Margni and Rosie Saad, CIRAI - École Polytechnique de Montréal)

Key paper:

L Milà et al. 2007 Key Elements in a Framework for Land Use Impact Assessment within LCA, *LCA* 12 (1) 5 –15 (2007) ([Mila et al_2007_LandUseLCA.pdf](#))

E Nelson et al., 2009 Modeling multiple ecosystem services, biodiversity conservation, commodity production, and tradeoffs at landscape scales, *Front Ecol Environ* 2009; 7(1): 4–11, ([nelsonetal_frontiers_2009.pdf](#))

Key Question:

To what extent is spatial modelling relevant when assessing land use impacts on ecosystem services in LCA?

Key Paper for your Preparation

Coupling GIS and Life Cycle Assessment

(Roland Geyer, UCSB)

Key paper:

R Geyer et. al. 2009 Coupling GIS and LCA for biodiversity assessments of land use - Part 1: Inventory modeling, Int J Life Cycle Assess (2009) ([Geyer_2009_CouplingGISandLCA_1.pdf](#))

R Geyer et. al. 2009 Coupling GIS and LCA for biodiversity assessments of land use - Part 2: Impact assessment, Int J Life Cycle Assess (2010) 15:692–703 ([Geyer_2010_CouplingGISandLCA_2.pdf](#))

Key Question:

How to assess biodiversity in LCA spatially explicit?

Web mapping and green receipts: Communicating the results of Life Cycle Assessment to decision-makers

(Chris Mutel, ETH Zurich)

1. Read pages 15-45 of attached study on LCA and environmental product Declarations ([Consumer demands on Type 3 environmental declarations.pdf](#))
2. Browse through <http://www.sourcemap.org/> website.
3. Discussion question(s):

Life cycle assessment (LCA) requires interpretation, and it is often difficult for even environmental professionals to assimilate large quantities of data produced by LCA. How do the choices made by environmental professionals in communicating the results of their work influence the way that audiences understand that communication? Should complicated environmental information be interpreted to advance a particular conclusion? How does interpretation affect the impact of assessment results?