



# UFZ Concise

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

2011



## RESEARCH FOR THE ENVIRONMENT

We conduct research to ensure a balance between societal change and the sustainable use of our natural resource base.



HELMHOLTZ  
CENTRE FOR  
ENVIRONMENTAL  
RESEARCH – UFZ



## THE MISSION OF THE UFZ

As an international competence centre for the environmental sciences, the Helmholtz Centre for Environmental Research (UFZ) investigates the complex interactions between mankind and nature under the influence of global change. In close cooperation with decision-makers and stakeholders, scientists at the UFZ develop system solutions to improve the management of complex environmental systems and to tackle environmental issues.

For example, we work on the management of water resources, the impacts of land use change on human landscapes and biodiversity, the impacts of chemicals in the environment and on human health as well as adaptation strategies for climate change. Successful solutions require a solid scientific basis. But this is not sufficient. Environmental research, which is usually dominated by the natural sciences, has to become increasingly linked to the human, social and legal sciences.

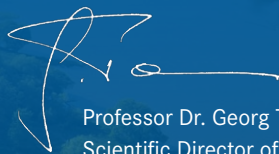




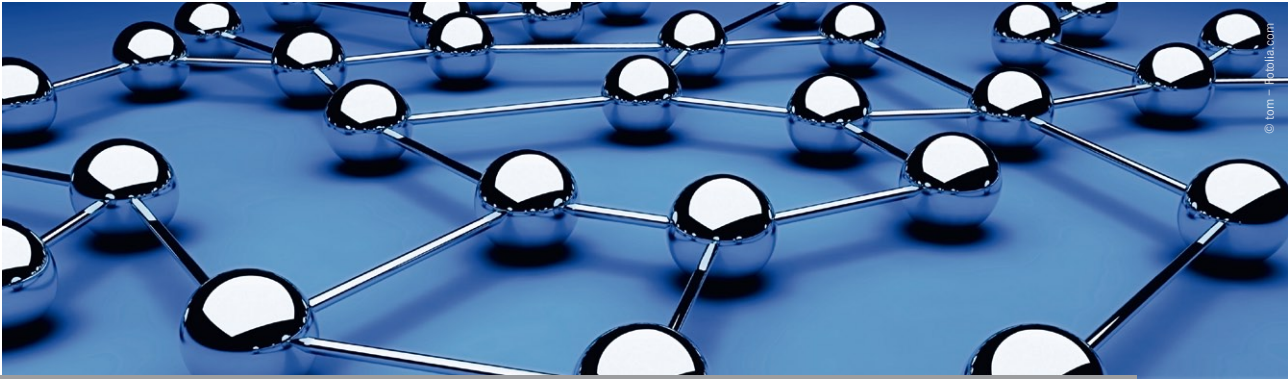
Environmental research must be guided by environmental issues and has to deal with reference to practice, complexity and uncertainty. This requires exchanging knowledge, developing a common understanding and communication, consolidating different competences and fields of expertise, integrating decision-makers and stakeholders from politics, the economy and the public – in short the highest level of integration possible.

This is the challenge that we – the 1000 people working at the UFZ – face.

It is our mission to suggest ways that ensure a balance between economic and societal development on the one hand and the long-term protection of our natural resource base on the other.



Professor Dr. Georg Teutsch  
Scientific Director of the UFZ



## THE UFZ'S RESEARCH STRUCTURE

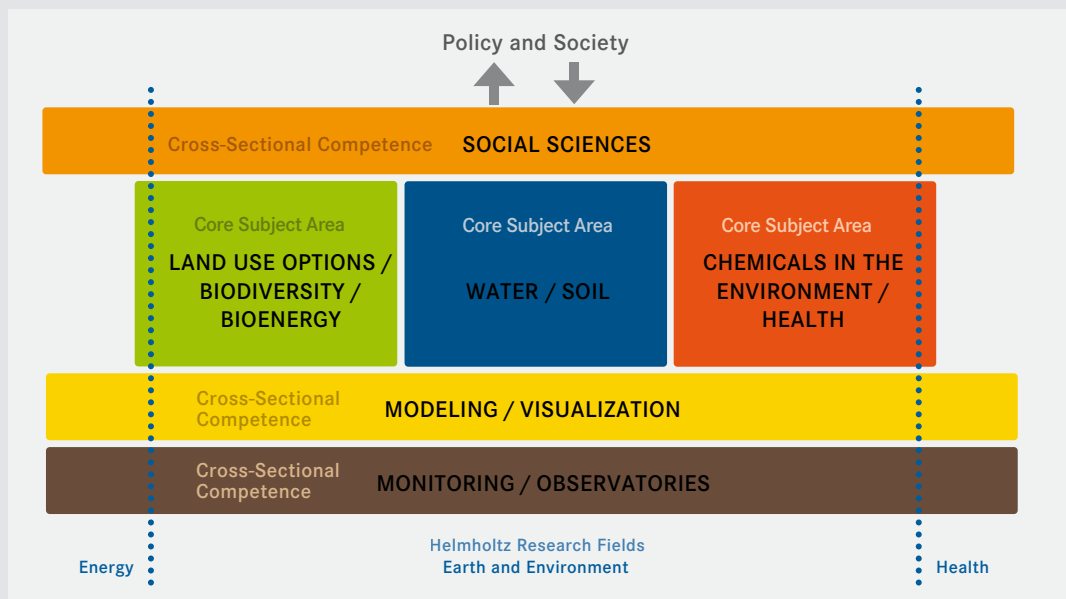
Research at the UFZ is organized into 34 methodical competence centres, the so-called departments. The large number of departments underlines the large range of competences and approaches at the UFZ.

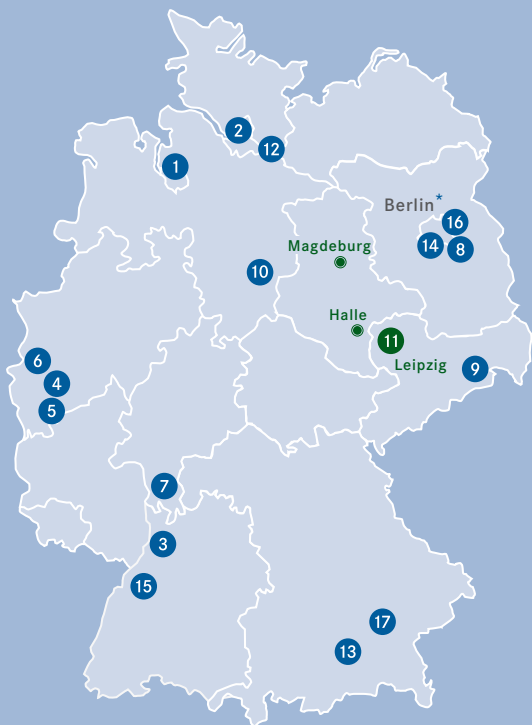
The departments are organized into seven divisions, namely:

1. Environmental Systems, Computation and Monitoring
2. Water and Soil Sciences
3. Terrestrial Ecology
4. Environmental Technology
5. Environmental Health
6. Health Research
7. Social Sciences

In terms of its fields of research the UFZ focuses on three **core subject areas** as well as three **cross-sectional competence areas** (see diagram). These are assigned to the Helmholtz Research Fields of **Earth and Environment** (Research programme „Terrestrial Environment“ / accounting for 85 percent of UFZ resources), **Health** (Research Programme „Environmental Health“ / 8 percent) as well as **Energy** (Research Programmes „Renewable Energies“ and „Technology, Innovation and Society“ / 7 percent).

The research programmes of the Helmholtz Community are evaluated every five years by internationally renowned experts in terms of their scientific excellence and strategic relevance.





- 1 Alfred Wegener Institute for Polar and Marine Research (AWI), Bremerhaven
- 2 Helmholtz Research Centre DESY, Hamburg
- 3 German Cancer Research Centre, Heidelberg
- 4 German Aerospace Centre (DLR)
- 5 German Centre for Neurodegenerative Diseases (DZNE)
- 6 Research Centre Jülich
- 7 GSI Helmholtz Centre for Heavy Ion Research, Darmstadt
- 8 Helmholtz Centre Berlin für Materialien und Energie (HZB)
- 9 Helmholtz Centre Dresden-Rossendorf (HZDR)
- 10 Helmholtz Centre for Infection Research (HZI), Braunschweig
- 11 **Helmholtz Centre for Environmental Research – UFZ**
- 12 Helmholtz Centre Geesthacht  
Centre for Materials and Coastal Research
- 13 Helmholtz Centre Munich –  
German Research Centre for Environmental Health
- 14 Helmholtz Centre Potsdam –  
GFZ German Research Centre for Geosciences
- 15 Karlsruhe Institute of Technology (KIT)
- 16 Max Delbrück Centre for Molecular Medicine (MDC) Berlin-Buch
- 17 Max Planck Institute for Plasma Physics, Garching

\* Helmholtz Association Head Office

## THE HELMHOLTZ ASSOCIATION

The **Helmholtz Association** contributes to solving the major challenges facing society, science and the economy with top scientific achievements in six research fields: Energy, Earth and Environment, Health, Key Technologies, Structure of Matter, Aeronautics, Space and Transport. With 33,000 employees in 17 research centres and an annual budget of approximately 3.3 billion euros, the Helmholtz Association is Germany's largest scientific organisation. Its work is in the tradition of the great natural scientist Hermann von Helmholtz (1821–1894).

[www.helmholtz.de](http://www.helmholtz.de)

### **Hermann Ludwig Ferdinand von Helmholtz – the universal scholar with a sense of practical implementation**

The name Hermann von Helmholtz stands for the full diversity of scientific research and its orientation towards technological practice. Helmholtz was one of the last true polymaths and represented a form of natural science that bridged medicine, physics and chemistry. He also devoted himself to psychology,



Hermann Ludwig Ferdinand von Helmholtz (1821–1894)

music and philosophy. His groundbreaking research work and developments combined theory, experimentation and practical application. The ophthalmoscope for examining the retina is one of Helmholtz's many developments that are still used (in a modern form) to this day. His research into

the conversion of matter led to his formulation of the conservation of energy principle. Helmholtz founded the Imperial Physico-Technical Institute and served as its first Director. The Imperial Physico-Technical Institute was the world's first scientific research centre outside of a university and is therefore a forerunner to the Helmholtz Association.



*We must conserve biodiversity – it is worth it.*



## CORE SUBJECT AREA

# LAND USE OPTIONS | BIODIVERSITY | BIOENERGY



Biodiversity is imperative for us. It provides healthy and functioning ecosystems and ecosystem services. While biodiversity is our biological resource for food, medicines and building materials, ecosystems purify our water and air and capture carbon.

Humans have always benefited from the use of biodiversity. No other species on earth has impacted nature to such an extent by shaping and changing landscapes. In doing so mankind has altered and partially irreversibly destroyed biodiversity and ecosystem functions. Although the appreciation of biodiversity appears to have increased on many levels, the rate of implementing appropriate mitigation is still too slow. As a result the European target of stopping the loss of biodiversity by 2010 has clearly been missed. The question now is what kind of world with how much biodiversity we want to have and need in the future.

More than 100 scientists from different disciplines of the natural and social sciences work at the UFZ in search of answers to this question. In doing so we investigate fundamental relationships for example on the impacts of land consumption, fragmented landscapes, invasive species or climate change on plant and animal populations and the functions of ecosystems. We are trying to find out whether a higher genetic diversity and greater species diversity really ensure that ecosystems are more stable and able to buffer changes.

We regard biodiversity also from an economics point of view, calculate the costs and benefits of making certain decisions and provide systematic knowledge for a sustainable use of the scarce good of biodiversity (TEEB – The Economics of Ecosystems and Biodiversity, [www.teebweb.org](http://www.teebweb.org)). Here we also take ethical arguments into account i. e. questions about what is morally good or bad for nature. We also seek integrative solutions for land use conflicts arising from urbanization and global population growth accompanied by increasing food and energy requirements (GLUES, [www.nachhaltiges-landmanagement.de](http://www.nachhaltiges-landmanagement.de)). Questions about the risks and opportunities of bioenergy are closely related, as renewable sources of energy are currently dramatically affecting agriculture and forestry, water management, the energy supply and societies. Simulation models help to investigate different development perspectives in the form of scenarios to help make informed decisions about a sustainable bioenergy strategy.

Our goal is to support politics and economics with instruments and methods for sustainable land use. An important interface with policy has been established through the BMBF project “Network Forum on biodiversity” that is coordinated by the UFZ (NeFo, [www.biodiversity.de](http://www.biodiversity.de)). An important partner in bioenergy research is the German Biomass Research Centre (DBFZ), also located in Leipzig.

*We must improve the management of water resources,  
as the access to clean water is a basic human right – for all of us.*

## CORE SUBJECT AREA

# WATER | SOIL



Water is indispensable for all ecological and societal processes. It plays a key role in supporting the rapidly growing world population. It influences ecosystems, biodiversity, landscapes and land uses. Every change to the water and matter cycles – whether from climate change, environmental catastrophes or globalisation – changes the form and stability of landscapes and habitats leading to new risks for mankind and the environment.

Integrated system solutions for a sustainable use and management of water resources are therefore urgently needed. The key to this lies in cross-sectoral adaptation strategies, flexible infrastructures for water supply and wastewater disposal, and a significantly higher resource efficiency in terms of all water uses.

About 150 scientists from a number of disciplines at the UFZ contribute to these system solutions. We develop innovative methods of chemical analysis and monitoring as well as computer models, in order to make predictions about the ecological condition and estimation of future development of waters and soils. We analyse, which changes are triggered by chemical compounds or stress factors such as floods, long periods of drought or invasive plant and animal species in water bodies. We deal with land use dynamics as the most important driver of the hydrological and matter

budgets in river basins and support economics and politics in the implementation of the Water Framework Directive of the European Union. The fact that in Germany 90 percent of water bodies have already achieved a “good chemical status” whereas only 10 percent have managed to achieve a good ecological status, still raises questions. Water must be regarded in connection with soil functions, since located at the atmosphere-geosphere interface soil is a reservoir, a filter and a reactor that is directly linked to the water cycle. Therefore we also examine subsurface water and matter fluxes from the field level down to the pore scale. With the help of the UFZ’s research platform SAFIRA, we are developing management concepts for remediation of megasites (contaminated sites over expansive areas). In water-poor regions of the world accurate balances of water resources as well as new remediation and wastewater technologies support saving water resources and the reuse of wastewater.

Our primary goal is to secure the quantity and quality of existing water resources for both humans and natural ecosystems under the conditions of global change and to create the knowledge base for sustainable water management. Therefore the UFZ has initiated the Water Science Alliance – a network that will strengthen German water research on the national, European and international level ([www.watersciencealliance.de](http://www.watersciencealliance.de)).

*Chemicals improve our living conditions, but they also have side effects, against which we need to protect ourselves and the environment.*

## CORE SUBJECT AREA

# CHEMICALS IN THE ENVIRONMENT | HEALTH



We need chemicals in our lives just as we need air to breathe. They are used for computers, telephones, and vehicles and are found in clothing, household appliances and cosmetics, in dyes and medicines. They increase agricultural yields and conserve food. Although chemicals essentially improve our living conditions, they have certain side effects which nature can only counterbalance to a certain degree.

Knowledge of chemical compounds – of their properties, their behaviour in the environment, their ecotoxicity as well as exposure – is the relevant basis for protecting nature and health.

It is the task of about 150 scientists from fields ranging from environmental chemistry, bioanalytical ecotoxicology, analytical chemistry, environmental immunology to genetics to examine the complex behaviour of chemical compounds. In doing so we combine methods of chemical and biological analysis in order to trace contaminants in the environment. We want to find out whether it is ‘the usual suspects’ or whether it is possible that trace elements, transformation products or the combined effects of chemicals can cause problems in the long-term. Here, we are developing model systems

to investigate the biological effects of chemicals to find alternatives for animal testing. As test systems we use aquatic organisms such as algae, luminous bacteria, water fleas or fish and / or their embryos. Furthermore, we work on computer programmes that can be used to predict the properties of compounds, environmental behaviour and the toxicity of chemicals. Thus, we make valuable contributions to implement the European chemical regulation REACH (Registration, Evaluation, Authorisation of Chemicals). We also examine how chemicals affect the cells of the immune system and contribute to environment-related diseases such as allergies. In this respect, system biology is gaining more significance. This new discipline combines biology, mathematics and physics in experimental and model-based approaches to understand biological processes in cells, tissues and organisms as a whole.

Our goal is to generate data and knowledge on the occurrence, the availability and the impact of chemical compounds in order to be able to better assess their potential risk and thus manage them appropriately. We want to move away from artificial test regimes with single compounds and closer to the reality in the field and offer tailor-made test strategies. In doing so we make an important contribution to protect humans and the environment.





*It is in human hands to live and manage things sustainably, which is why we need to understand interactions.*

CROSS-SECTIONAL COMPETENCE

# SOCIAL SCIENCES



Biodiversity, land use, future energy, water resources, soil, chemicals in the environment – all of these have one thing in common: stakeholders from the public and the private sector as well as civil society determine through their actions and decisions, how the environment will develop. How does this work exactly? On which basis, with which knowledge and with which motivations do different stakeholders make their decisions?

Economists, lawyers, sociologists and political scientists at the UFZ analyse how different stakeholders interact within certain societal basic conditions, rules, standards and values – the so called institutions –, but we must first identify and understand these. We examine negotiation processes between stakeholders (also referred to as governance), through which for example decisions on the use and organization of landscapes might be made. We develop policy instruments such as regulations, charges or tradable permits and attempt to clarify, who must be informed or advised on certain issues, so that knowledge and insights may also be used in decision-making processes.

Since many environmental issues and conflicts are at the interface between ecology and economics, it is important to understand how ecological and economic factors interact. Therefore, sociologists of the UFZ are developing integrated methods of analysis together with natural scientists, to arrive at an overall evaluation of alternative decision possibilities. They combine different methods of analysis such as risk analyses, cost-benefit analyses and conservation analysis. They provide a structure for decision-making processes and consider complexity, uncertainty and knowledge gaps. Models and simulations, that help to describe and project complex processes in the environment more reliably, can therefore be used in the dialogue between scientists and decision-makers from politics and management.

Our goal is to strengthen the practical implementation of environmental research at the UFZ and to put it into a societal setting, in order to improve the conditions and implementation possibilities for environmentally- and socially-compatible life-styles and management practices. Our work follows the general principle of sustainable development.

*Reliable data on the condition and changes to the environment are necessary, to be able to make political decisions about the environment.*



CROSS-SECTIONAL COMPETENCE

## MONITORING | OBSERVATORIES



Global change is changing our environment: but where and how exactly? What are the exact local and regional impacts of climate change? Is the filtering function of soils for groundwater impaired? Are soils becoming less arable? Are plants and animals relocating to new habitats? For more precise answers to these questions data collected over a longer period of time is lacking, which would enable changes to be documented and estimates of future developments to be made.

Scientists now want to close this gap, by examining the effects of climate and land use change on terrestrial ecosystems over longer temporal and different spatial scales. For this, we are developing and using innovative methods as well as measuring and sensing devices that allow a more efficient collection of environmental and climate data – with experiments, long-term observation platforms on the ground, as well as with the help of aircraft and satellites from the air and from space. This does not only relate to cycles of water and matter or the composition and function of organisms in communities. We are also investigating the impacts on the economy and society.

Within the context of the Helmholtz project TERENO ([www.tereno.net](http://www.tereno.net)) that involves six Helmholtz Centers, four observatories are in operation: in the north-

east German lowlands, in the Eifel and the Lower Rhein, in the area of Leipzig-Halle and in the Alps. Almost an entire spectrum of relevant environmental data is being collected here and analysed using the most modern measuring techniques, by means of geophysics, and remote sensing. In addition to climate data this also includes observations of water and soil quality, biodiversity and atmospheric interactions. The long-term measurements serve to investigate the exchange and feedback processes in the system “soil-vegetation-climate”, in order to assess the impacts of climate change and to develop process-orientated forecast models. The UFZ climate exploration facility in Bad Lauchstaedt (a large-scale test facility of climate change), as well as MOBICOS (an observation platform especially for watercourses) will also play a specific role here. Furthermore, the research platform MOSAIC of the UFZ unites innovative mapping and monitoring technologies, enabling a high-resolution investigation of complex underground structures. In the future other observatories are planned in the Mediterranean area that will be particularly affected by climate change. These are all to become part of a European network of observatories.

Our goal is to gain a better understanding of the impacts of climate and land use change on the environment and to develop requirements for better forecasts and adaptation strategies.





*Data on the environment must be analysed, understood and processed, otherwise they are without meaning*

## CROSS-SECTIONAL COMPETENCE

# MODELING | VISUALIZATION



Modern environmental research is almost unthinkable without the aid of comprehensive computer models. Although terrestrial environmental research topics can range widely in their immediate focus (e. g. environmental impacts from the loss of biodiversity, water management in water-poor regions, renewable energy and resource efficiency, or the impact of anthropogenic chemicals on biological organisms), scientists often see themselves confronted with similar fundamental problems when developing models to support their research.

Frequently, this is a question of simulating the interactions of different environmental systems or compartments (e. g. the hydrosphere, biosphere, geosphere), which take place on different spatial and temporal scales.

The modeling and visualization platform TESSIN (Terrestrial Environmental System Simulation and Integration Network) aims to unite and strengthen the expertise available in different UFZ departments in the field of environmental modeling, to develop and to apply integrated modeling concepts with a system-analytical approach, and to present the results to scientists and decision makers. Increasingly, the focus is on a detailed visualization of real systems. For this numerical methods and research software are developed at the UFZ to generate simulations and

visualizations in the UFZ's 3D Visualization Center from data collected from the most diverse environmental processes. Many difficulties arise when attempting to represent the spatial heterogeneity of the earth's surface and subsurface on different scales, which may extend from the tiniest soil pores to entire river catchments, and 3D visualization is a critical component in the effort to represent reality as closely as possible.

Examples of problems that we have investigated with TESSIN include optimized irrigation systems in agriculture, early warning systems for heavy rain or storms, the computation of water balances for regions with incomplete data, scenarios for the dispersal of contaminants in groundwater and risk analyses for geothermal processes and other subsurface geotechnical engineering projects. Furthermore, modeling the local and global hydrological process is an important component for improving current climate models.

Our primary goal is to improve process understanding on the basis of models and virtual reality and to facilitate a dialogue between scientists and decision makers through better visualization. This is an important basis for developing measures that can help to prevent imminent dangers and allow humans to adapt smoothly to the effects of global climate change.



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## RESEARCH IN NETWORKS AND ALLIANCES



Our natural resource base extends well beyond the borders of Germany and Europe. Our well-being depends for example on the fact whether in spite of climate change, consumer goods requiring a lot of water can still be produced overseas or whether raw materials and plants for medicines (that can only be found in limited tropical ecosystems) will disappear due to deforestation. Environmental issues such as the protection of biodiversity and ecosystem services, the impacts of land use change, water protection or sustainable urban development don't stop at national borders. Such challenges can therefore only be mastered in the framework of national, European and international projects, networks and alliances with other research establishments.

In 2001 the seven major European environmental research centres set up the network **PEER** (Partnership for European Environmental Research), whose goal it is to develop common strategies, to support national, European and international policies, to increase the competitiveness of European environmental research, to facilitate the exchange of expertise and the training of future scientists, to share infrastructure and to ensure a long-term planning and co-ordination of research programmes ([www.peer.eu](http://www.peer.eu)).

In 2009 the UFZ initiated the **Water Science Alliance** that aims to pool and reinforce the highly competent yet highly fragmented German water research and to position itself better in a national and international

perspective. To develop the concept of the Water Science Alliance, the UFZ received the mandate from the Helmholtz Association's Senate ([www.watersciencealliance.de](http://www.watersciencealliance.de)). Important components of the Water Science Alliance are the International Water Research Alliance of Saxony (IWAS, [www.iwas-sachsen.ufz.de](http://www.iwas-sachsen.ufz.de)) and the Water and Earth System Science Research Centre (WESS, [www.wess.info](http://www.wess.info)).

Furthermore, the UFZ is coordinator and partner of numerous EU projects. We coordinated for example the large EU biodiversity project **ALARM** in which more than 1000 scientific publications and an impressive atlas of biodiversity risks were produced ([www.alarmproject.net](http://www.alarmproject.net)), and the EU project **MODELKEY** in which key chemicals and their influence on waters were determined ([www.modelkey.org](http://www.modelkey.org)). **SCALES** and **OSIRIS** are other important EU projects in the core subject areas of 'land use and biodiversity' and 'chemicals in the environment' respectively ([www.scales-project.net](http://www.scales-project.net); [www.osiris-reach.eu](http://www.osiris-reach.eu)). As co-ordinator of the project **GLUES** the UFZ manages an interface between national, international and interdisciplinary co-operation in the context of the new BMBF programme for sustainable land management ([www.nachhaltiges-landmanagement.de](http://www.nachhaltiges-landmanagement.de)). The UFZ also took over the scientific coordination of the UNEP initiative **TEEB** (The Economics of Ecosystems and Biodiversity, [www.teebweb.org](http://www.teebweb.org)), from which reports have been published for national and international decision-makers, business, science and citizens.





## PROMOTING THE SCIENTISTS OF TOMORROW



Whether student internships, the supervision of Bachelor and Masters degree theses, the training of PhD candidates or post-Docs, there is a wide scope for promoting the next generation of scientists at the UFZ and the excellent technical equipment available provides the optimal conditions for outstanding training. It is also important to integrate UFZ scientists lecturing at universities. The approximately 30 lecturing appointments are a very good prerequisite for this.

The Helmholtz Community has made it an important goal of its mission to promote individual, young, talented researchers. Through its own **Helmholtz Future Scientists Groups** it provides the potentially best scientists of the next generation from Germany and abroad with excellent working conditions in a research environment as well as scientific independence from early on. At the UFZ there are currently six Helmholtz Future Scientists Groups.

Our Helmholtz Interdisciplinary Graduate School for Environmental Research **HIGRADE** has set itself an

ambitious goal: It is cooperating with six partner universities, in order to extend the network between extramural research institutes and universities from central Germany and to offer a structured education for doctoral candidates at the UFZ. In the meantime more than 250 graduate students are enrolled in the programme, 33 percent of these from abroad. The training programme consists of four modules: advanced skills, interdisciplinary aspects, practical application and soft skills ([www.higrade.ufz.de](http://www.higrade.ufz.de)). The UFZ also uses its association in European networks such as **CREAM** ([www.cream-itn.eu](http://www.cream-itn.eu)) or **CSI:Environment** ([www.csi-environment.ufz.de](http://www.csi-environment.ufz.de)) for the training of doctoral candidates.

Motivated, interested and environmentally aware young people can apply for an **apprenticeship** at the UFZ. Whether as office personnel, laboratory technicians, industrial mechanics or IT specialists, the prerequisites are good school results and a high degree of motivation. Beyond that, vocational students in different fields can complete the work experience part of their studies at the UFZ in fields such as computer science, informatics or biotechnology.



## CONVEYING KNOWLEDGE AND BRIDGING GAPS

Conferences, meetings, training courses and seminars all serve the purpose of exchanging information in science and the **Leipziger KUBUS** (conference and education centre of the UFZ) provides the ideal venue for this. It comprises conference rooms of different sizes (for up to 450 participants) with modern technology and a corresponding ambience for accompanying exhibitions and also offers professional support in the organization of events ([www.leipziger-kubus.de](http://www.leipziger-kubus.de)).

**The transfer of technology** at the UFZ closes the gap between the application-orientated environmental research and the economy. It is imperative to include companies early on in the plans of cooperative projects. The conservation and renewal of water resources, groundwater remediation and monitoring methods, pollution-control technologies, wastewater management and decentralized water management, geo-informatics, geodesy and modeling as well as environmental microbiology, biotechnology and bio-

sensor technology are all promising topics for the transfer of technology.

**Equal opportunities** for men and women are part of everyday life at the UFZ and not just a legal requirement. The high proportion of female scientists shows that occupation and family can be compatible, if desired. Flexible working hours, childcare in a local day nursery, reintegration after maternity / paternity leave motivate men and women to invest their competences and creativity in environmental research.

**Dual Careers** are becoming increasingly more important with respect to recruiting excellent scientists. Under the UFZ's initiative the *Dual Career Network of Central Germany* was created. The network of universities and extramural research institutes as well as corporations from industry does not only strive to offer outstanding possibilities for employment, but also dual career couples the option of making their occupation and family compatible.





## ENVIRONMENTAL AWARENESS

For pre-school and primary school children important foundations can already be laid in terms of environmental awareness and interest in scientific interactions.

In the children's environmental bus, environmental teaching experts explain elementary scientific interactions under the motto "observe, understand and protect" using experiments and games to develop an appreciation of nature and to promote environmental awareness. The children's environmental bus makes it possible to work with children or school pupils locally but also outdoors ([www.kinderumweltbus.de](http://www.kinderumweltbus.de)). The children's environmental bus is operated by the UFZ and the Saxonian Nature and Environment Foundation (LaNU) and is supported by the Stadtwerke Leipzig and the DBU foundation.

Under the motto "research for the environment" A-level students can conduct experiments at the UFZ's school laboratory in Leipzig. The laboratory demonstrates a number of scientific methods, which are also implemented in scientific projects at the UFZ in the fields of chemistry or biology. They also include related disciplines such as mathematics, geology or hydrology. Furthermore, experiments in the field of biotechnology and drug prevention are also on offer. The pupils experience science in an ultra-modern research laboratory, while at the same time being trained to think interdisciplinary.

The UFZ's school laboratory team is supported by Saxonia's regional education agency for Leipzig ([www.ufz.de/schuelerlabor](http://www.ufz.de/schuelerlabor)).

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Magdeburg / 39114 / Brückstraße 3a

Founded: December 1991

Employees: approx. 1000, thereof 250 Ph.D. Students

Funding: approx. 100 million Euro/year  
(basic and third-party funding)

Basic funding: 90% Federal Ministry of Education and  
Research (BMBF), 5% Free State  
of Saxony, 5% State of Saxony-Anhalt



## Imprint

Publisher: Helmholtz Centre for Environmental Research – UFZ  
Editing: Press & Public Relations Department  
Doris Böhme  
Permoserstraße 15 · 04318 Leipzig  
Phone: 0341/235-1269 · Fax: 0341/235-1468  
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English Translation: Sarah Gwilym-Margianto  
Photography: André Künzelmann  
Cover photo: jarma – Fotolia.com  
Layout: noonox media GmbH, Leipzig  
Printing: Fritsch Druck GmbH, Leipzig

Printed on 100% recycled paper  
Leipzig, November 2011