



# SUSTAINABLE LAND MANAGEMENT

Interactions between Land Management,  
Climate Change and Ecosystem Services

Quarterly Letter | Final Issue (25) | March 2018

Dear colleagues,

with this special, last issue of our Quarterly Letter we would like to say our final goodbyes.

Our research programme has come to its end after more than eight years and we want to thank everyone for their hard work and for helping us complete the project on time, on budget, and with high quality results.

We also would like to let you know that a summary of the collaborative work from the 12 regional projects and GLUES can be found at [www.ufz.de/glues](http://www.ufz.de/glues). We selected nine topics as key words for the landing page, including global scientific synthesis, climate change or stakeholder involvement. By clicking on any of the nine keywords, readers get a general overview of the selected topic, followed by further information about individual regional projects that addressed that particular theme.

Many thanks to all who contributed to this website with texts, pictures or ideas! We hope the website will serve as a source of valuable and inspiring information.

More to be found in this final newsletter: **GLUES in Numbers**, **GLUES in a Nutshell** and the **Last GLUES Supper**.

Kindest regards,

The GLUES Scientific Coordination Team

SPONSORED BY THE



Federal Ministry  
of Education  
and Research





# SUSTAINABLE LAND MANAGEMENT

## GLUES in Numbers

In the last **8¼** years we received a generous funding of **5.2** Mio € from the BMBF to manage an exceptionally complex inter- and transdisciplinary research project: **GLUES** and its **12** collaborating regional projects. From the perspective of the coordinating UFZ team, we successfully orchestrated **10** partner institutions and collaborated with **12** regional projects with even more partner institutions, involving **839** scientist, stakeholders and collaborators.

We did so by organizing **3** major conferences with more than **1.030** participants, as well as **39** workshops. We presented our results at **7** UN Conference of the parties (COP) of UNCCD, UNFCCC and CBD. We published **25** newsletters, **1** book, **1** special issue of an open access journal, **22** movies or videos, **1** online game, **1** policy brief and **17** press releases, which featured

some of the **108** scientific papers and stimulated more than **55** media responses (Tagesspiegel, ORF, The Independent, etc.) to just one of the scientific papers.

At busy times, **10** people worked in the coordinating core group at UFZ, managing e-mail traffic of **5.037** e-mails (just one random account of one team member), generating **10.780.546.103** bytes of project files and project reports to the funders with a total of **1.040** pages.

Now, as the project has ended, the former members of our team work as a consultant, as a forester and undertaker, as a journalist, or are still in science. **4** submitted their thesis or finished their Ph.D. Last, but not least, **5** little ones were born during the project life time.

Author: Ralf Seppelt



# SUSTAINABLE LAND MANAGEMENT

## GLUES in a Nutshell

The way we use land is changing. The demand for farmland, food and energy seems insatiable, but land is a finite resource. “Sustainable Land Management”, the 7-year research programme, which ended in 2017, investigated the consequences of land use under global change and developed strategies for a sustainable use. Coordinated by the Helmholtz Centre for Environmental Research (UFZ), the programme synthesized and integrated results from 12 individual place-based projects located all around the world.

“We actually can achieve a balance between sustainable land use and food security for humankind,” says Prof. Dr. Ralf Seppelt, the leader of the scientific coordination and synthesis project GLUES (Global Assessment of Land Use Dynamics, Greenhouse Gas Emissions and Ecosystem Services). “This can be achieved through an intensification of agricultural production by means of environmentally sound land management, better distribution of foodstuffs around the globe, and adjustment of people’s eating habits and reduction of waste,” summarizes Seppelt, who is the head of the Computational Landscape Ecology department at UFZ. The results of the GLUES project show how important it is that we change the ways we use resources. Among other results, the GLUES researchers have shown that, contrary to the opinion of many experts, we do not need to increase the amount of land used for agriculture in order to feed the world population until the year 2050. They calculated that global yield

could be increased by almost 40 percent, for example through multiple harvests<sup>1</sup>. On the other hand, they also demonstrated that there are limits to the use of renewable resources. Their analysis showed that production rates of numerous key resources, such as maize, rice, wheat, fish, meat and milk, have already exceeded their peak rate of production<sup>2</sup>.

The global outlook for land use is only one of many elements of the “Sustainable Land Management” funding programme that has received funding of EUR 75 million between 2010 and 2017 from the German Federal Ministry of Education and Research (BMBF). More than 800 scientists around the globe were involved in twelve research projects in different regions. For example, a team of scientists working in the KULUNDA project produced ecological and economic strategies for sustainable land use in grasslands of a Siberian steppe region<sup>3</sup>.



# SUSTAINABLE LAND MANAGEMENT

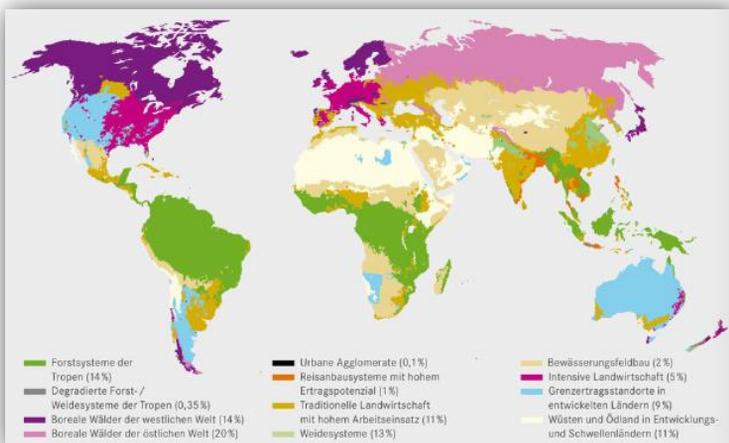
## GLUES in a Nutshell

Researchers in the Philippines and Vietnam involved in the LEGATO project analysed the conditions under which ecological rice cultivation can be economically profitable<sup>4</sup>. In the COMTESS project, scientists developed measures for countering rising sea levels in the North and Baltic Seas through sustainable land management along the coast<sup>5</sup>. **An interactive overview of these and many other results is available at [www.ufz.de/glues](http://www.ufz.de/glues).**



In order to allow a consolidation of the individual results on consequences of land use and to facilitate their assessment and comparison, the GLUES researchers defined global land-use patterns (archetypes) based on more than 30 indicators of agriculture, environment, climate and socio-economics. These archetypes include intensive and extensive cropping systems, pastoral systems or irrigated

croplands in the tropics. A global land-use map clearly but surprisingly showed, for example, that the intensity and type of land use in some regions of China was quite similar to the situation in Western Europe or the United States. The map also highlighted that, as opposed to Eastern Europe or India, yields cannot be increased any more in large parts of Western Europe and the USA<sup>6</sup>.



These results together with the underlying data can be found in the Geodata-Infrastructure (GLUES-GDI, see [geoportal-glues.ufz.de](http://geoportal-glues.ufz.de))

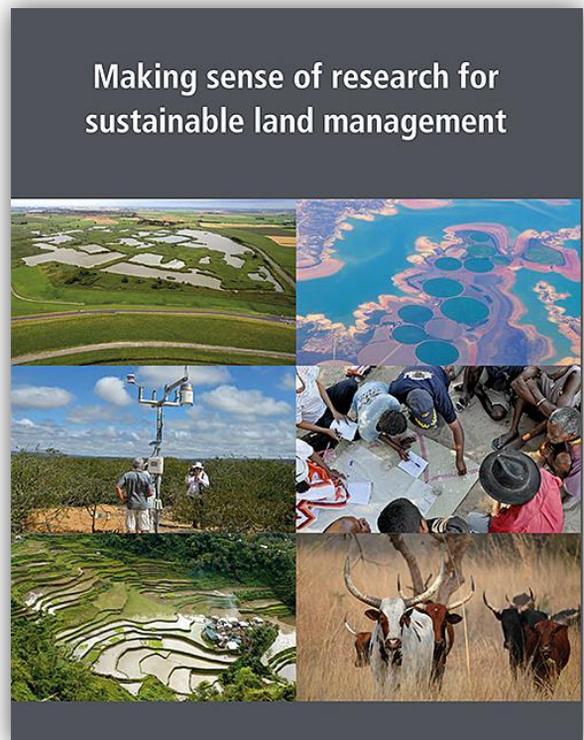


# SUSTAINABLE LAND MANAGEMENT

## GLUES in a Nutshell

The project results were not confined to the scientific community but are to be put into practice. In close cooperation with the World Overview of Conservation Approaches and Technologies (WOCAT) Network, about 140 researchers from the programme compiled the ***Making sense of research for sustainable land management<sup>7</sup>*** book, which outlines land management practices that have been tested in twelve regional projects. The target groups and potential users of the book as well as the GLUES-GDI database include local initiatives, land owners and users, regional and national institutions, government representatives, business people and NGOs. All in all, the book presents more than 30 implementation-focused examples, vividly illustrated with photos and diagrams. By documenting and assessing diverse sustainable land management (SLM) practices, the book strives to share and spread valuable knowledge on land management, support evidence-based decision making, and scale up identified proven practices, thereby contributing to prevention and reduction of land degradation and restoration of degraded land. The new and user-friendly database and the necessity to easily link up to other SLM platforms and databases led to a creation of the new WOCAT website.

The secretariat of the United Nations Convention to Combat Desertification (UNCCD) has picked up on the topic of sustainable land use, integrated the data into the WOCAT Database and recommended its utilisation.



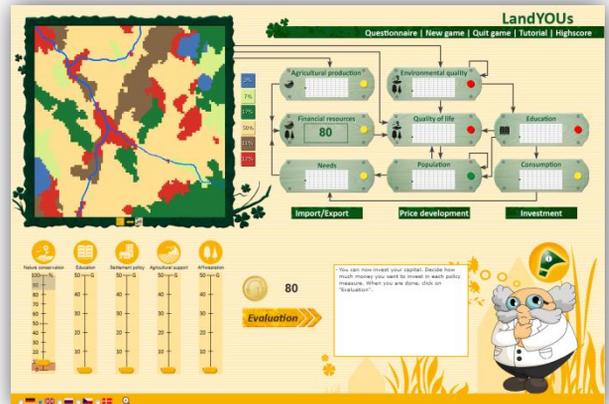
Read, download or order book at:  
[www.ufz.de/makingsense](http://www.ufz.de/makingsense)  
[www.wocat.net/library/media/31/](http://www.wocat.net/library/media/31/)



# SUSTAINABLE LAND MANAGEMENT

## GLUES in a Nutshell

As a final product, the **LandYOUs online game** has been developed to introduce pupils and young people to the topic of sustainable land management. Players can decide how much of their budget they want to invest in conservation, reforestation, agriculture and urban development. By doing so, they learn about the possible consequences of land-use changes for society, biodiversity, forestry and land management. The game is available in 5 languages (English, German, Czech, Danish and Russian) and comes with educational material for German pupils (age 15-16).



A direct link to the LandYOUs game: [landyous.org](http://landyous.org)

- (1) Mauser, W. et al. (2015): Global Biomass Production Potentials Exceed Expected Future Demand without the Need for Cropland Expansion. *Nature Communications*, 6: 8946. [10.1038/ncomms9946](https://doi.org/10.1038/ncomms9946)
- (2) Seppelt, R. et al. (2014): Synchronized peak-rate years of global resources use. *Ecology and Society*, 19(4): 50. [10.5751/ES-07039-190450](https://doi.org/10.5751/ES-07039-190450)
- (3) Mueller, L. et al. (2016): Novel Methods for Monitoring and Managing Land and Water Resources in Siberia. Springer Water 2016, ISBN 978-3-319-24409-9. [www.springer.com/de/book/9783319244075](http://www.springer.com/de/book/9783319244075)
- (4) Settele, J. et al. (2015): Agricultural Landscapes and Ecosystem Services in South-East Asia - the LEGATO-Project. *Basic and Applied Ecology*, 16: 661-664. [10.1016/j.baae.2015.10.003](https://doi.org/10.1016/j.baae.2015.10.003)
- (5) Karrasch, L. et al. (2014): Linking the ecosystem services approach to social preferences and needs in integrated coastal land use management - A planning approach. *Land Use Policy*, 38: 522-532. [10.1016/j.landusepol.2013.12.010](https://doi.org/10.1016/j.landusepol.2013.12.010)
- (6) Václavík, T. et al. (2013): Mapping global land system archetypes. *Global Environmental Change*, 26(6):1637-1647. [10.1016/j.gloenvcha.2013.09.004](https://doi.org/10.1016/j.gloenvcha.2013.09.004)
- (7) Liniger, H.P. et al. (2017): Making sense of research for sustainable land management. Centre for Development and Environment (CDE), University of Bern, Switzerland and Helmholtz-Centre for Environmental Research GmbH (UFZ), Leipzig. [www.ufz.de/makingsense](http://www.ufz.de/makingsense)



# SUSTAINABLE LAND MANAGEMENT

## The Last GLUES Supper



The Last GLUES Supper 19<sup>th</sup> January 2018, Leipzig

## Imprint

**BMBF-Research Programme “Sustainable  
Land Management”**

**Scientific Coordination and Synthesis  
(GLUES)**

Helmholtz-Centre for Environmental  
Research – UFZ

Department for Computational Landscape  
Ecology

Permoserstraße 15, 04318 Leipzig, Germany  
[www.ufz.de](http://www.ufz.de)

For more information please contact  
Prof. Dr. Ralf Seppelt [ralf.seppelt\(at\)ufz.de](mailto:ralf.seppelt(at)ufz.de)  
Layout: Marketa Vaclavikova  
[marketa.vaclavikova\(at\)ufz.de](mailto:marketa.vaclavikova(at)ufz.de)

SPONSORED BY THE



Federal Ministry  
of Education  
and Research

