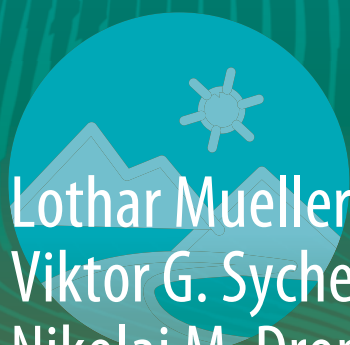


Innovations in Landscape Research



Lothar Mueller  
Viktor G. Sychev  
Nikolai M. Dronin  
Frank Eulenstein *Editors*



# Exploring and Optimizing Agricultural Landscapes

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# Innovations in Landscape Research

## **Series Editor**

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## Aims & Scope

The Springer series “Innovations in Landscape Research” presents novel methodologies and technologies to understand, monitor and manage landscapes of the Anthropocene. The aim is to achieve landscape sustainability at high productivity. This includes halting degradation of landscapes and their compartments, developing cultural landscapes, and preserving semi-natural landscapes. Clean water and air, fertile and healthy soils for food and other ecosystem services, and a green and bio-diverse environment are attributes of landscapes for the survival and well-being of humans who inhabit them.

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 Springer

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## Preface of Editors

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### Dear Reader

This book is devoted to our understanding of agricultural landscapes. These are the regions where our food is produced and where nearly half of the world's population lives. Future generations should also have enough to eat and many people need to have a still better, healthy, peaceful and meaningful life.

Our earth is limited in terms of its size and resources, but economic strategies are directed towards growth. Interconnected problems and locally specific decisions about the degree to which humans and nature interact are inevitable. In the book "Current Trends in Landscape Research" we have shown that the landscape perspective can help to find specific solutions for changes to the landscape in some parts of the globe. Therefore, from a scientific point of view, it is worth taking a more detailed look at agricultural landscapes and their inhabitants. We want to show how landscapes have changed under our influence and how necessary it is to carefully analyse and understand developments. Only better knowledge about the processes in agricultural landscapes enables us to predict future developments, avert threats to human beings and nature, and generate lasting improvements.

Our analysis centres around agricultural production and the purposeful interaction of man and nature in the rhythm of biological processes. We would like to inform you about the latest scientific methods used to analyse and optimize these processes without destroying our environment. In addition, we must take into account the external factors of development on agriculture and its field of action, the agricultural landscape, and question and classify our own role in this context.

Our world has changed drastically, especially in the last 50 years. Science and technology have blossomed, and economic growth has produced prosperity for many. The world population has doubled. Our consumption of resources has increased by two and a half times in terms of CO<sub>2</sub> emissions. Not only information technologies and globalization but also many unresolved political and social conflicts, the decay of cultural assets and values, the littering of the biosphere, the loss of biodiversity and large-scale land grabbing shape many parts of the world of today. These processes are continuing with increasing speed, with modern agriculture and the rural landscape in their midst.

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## Motive for the Book: Looking Backwards

We, the editors, come from Germany and from Russia and have been cooperating in the field of soil and agricultural science for some years. During our scientific field work at the foot of the Seelow Heights and in other regions of Europe, we sometimes came across ammunition remains; remnants of a war-torn past. As a joint research team of German and Russian agronomists, we visited the Belgorod and Kursk regions in the late summer of 2011. We had meetings and scientific symposia in research institutes and at universities, visited field trials with new agro-technologies, and sampled and evaluated soils. The black soils of this region are among the most fertile on the planet.

The village of Prokhorovka is found in this gentle undulating forest steppe region characterized by productive agriculture. It is a heritage site commemorating the awfulness of war and the need for peace. In July 1943, tanks rolled through wheat fields and destroyed human life and the food of the survivors around Prokhorovka. Fascist Germany had invaded numerous countries, including the Soviet Union in 1941. What happened on and around the Prokhorovka fields is known as “Battle of Kursk”, the biggest tank battle in human history. Standing on the fields of Prokhorovka, we remembered the words “Peace is not everything, but without peace everything is nothing” (Willy Brandt, former German chancellor and Nobel Peace Prize laureate, in a speech on 3 November 1981).

It is just our fathers’ generation that was forced to fight in the opposing dugouts of the terrible Second World War. Our parents survived this war and the subsequent time of hunger and poverty. They enabled us to grow up and learn in a peaceful environment. When it became clear that we children were interested in agriculture, we had their goodwill and support.

It was a good and useful decision to deal with agriculture and its scientific basis. Developing scientific tools for exploring and optimizing agricultural systems and landscapes is a challenging task. It requires trans-disciplinary work and international cooperation. It has also offered us an opportunity to get to know other countries, regions, people and cultures and to develop understanding, tolerance and sympathy across borders. During our cooperation, trust has grown and good individual relationships with colleagues have developed. This is important for achieving success. This book is one outcome of the paths that have led us on this journey.

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## Content and Structure of the Book

The book has 39 individual chapters in five parts. These are:

- Part 1: Functions of Agricultural Landscapes and Key Research Topics
- Part 2: Agricultural Land and Its Productivity
- Part 3: Agro-Ecological Problems and Their Monitoring

- Part 4: Preserving and Developing Genetic Resources of Agricultural Landscapes
- Part 5: Regional Optimization of Landscape Processes through Soil, Plant and Water Management

Overall, we hope to have addressed the major challenges and opportunities of agricultural landscapes in these sections and chapters. However, dealing with such a broad field of research required us to focus on some topics and to shorten or omit others. The overall book has a clear European and Eurasian perspective and focuses on cropping systems in agricultural landscapes. We are hoping that other editors and authors also feel encouraged to fill existing gaps in the knowledge on sustainable animal husbandry, pastoral farming systems, and farming and rural development in other regions of the globe. The Springer series “Innovations in Landscape Research” (ILR) provides an appropriate framework for such publications.

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### **Readers, Authors and Editors**

This book addresses many overlapping and conflicting topics. The authors of the different chapters have pioneered novel methods of research, as well as being innovative and experienced scientists. The chapters reflect the authors’ findings and particular interpretations within a given time and place. As editors, we accept approaches and conclusions that are not shared by us in every technical detail. Possible divergences between the findings, conclusions and statements of individual authors, between authors and editors, and between authors and you as informed and experienced readers are natural.

In some chapters, trade names are used to provide specific information about proven technologies applied in the study. Mentioning a trade name does not constitute a guarantee of the product by the authors or editors. It also does not mean a preference for, or recommendation of this product.

We hope to have provided information and inspiration. Readers are encouraged to contact the authors for more information. It is up to you to draw conclusions on how best to act responsibly.

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### **Acknowledgements**

Many people and institutions provided the basis for this book publication. We would like to thank the German Federal Office for Agriculture and Food (BLE) for travel funding on a case-by-case basis over the past 10 years as part of the German–Russian list of agricultural research cooperation. Ms. Anne Koth (Dresden) proofread the majority of chapters with care and professional expertise. Springer International ensured that the editorial and printing process was smoothly managed and completed. The editors would



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Muencheberg, Germany

Muencheberg, Germany

Moscow, Russia

Moscow, Russia

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Frank Eulenstein

Viktor G. Sychev

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