



Moscow  
State University  
www.geogr.msu.ru  
www.landscape.edu.ru



Landscape  
Analysis Commission  
of the International  
Geographical Union  
www.igu-net.org



International  
Association for  
Landscape Ecology  
www.landscape-ecology.org



The World Bank  
www.worldbank.org

Moscow State University, Landscape Analysis Commission of the International Geographical Union (IGU), and the International Association for Landscape Ecology (IALE), in collaboration with The World Bank, are proud to present the first full-size English-language publication of selected key works in modern Russian-language landscape science.

## Landscape Analysis for Sustainable Development: Theory and Applications of Landscape Science in Russia

Editors: Kirill N. Dyakonov, Nikolay S. Kasimov, Alexander V. Khoroshev, Andrey V. Kushlin.  
Moscow: Alex Publishers, 2007.

Format 17x24 cm. Soft cover. 320 pages.  
ISBN 5-9618-0037-7

Copyright © 2007, Faculty of Geography, Moscow State University.  
Published with financial support of the World Bank.

The book is based on the proceedings of the 11th International Conference "Landscape Science – Theory, Methods, Regional Studies, Practice" (August 2006, Moscow, Russia) and offers a systematic overview of the fundamental elements of landscape analysis – theory of landscape science and modelling approaches, landscape dynamics and evolution, landscape geochemistry, protection and monitoring of landscapes, cultural landscapes, landscape planning.

### Dissemination

A limited number of copies will be available to universities and academic institutions free of charge on a first-come-first-served basis. To request a free copy, please write to: Dr. Alexander Khoroshev at [khoroshev@geogr.msu.ru](mailto:khoroshev@geogr.msu.ru) Additional copies may be distributed by Alex Publishers (Moscow, Russia) on a print-on-demand basis for USD 61.00 per copy (including international mailing price). For more details on ordering and prices, please contact Alex Publishers at [alexpublishers@alexpublishers.ru](mailto:alexpublishers@alexpublishers.ru)

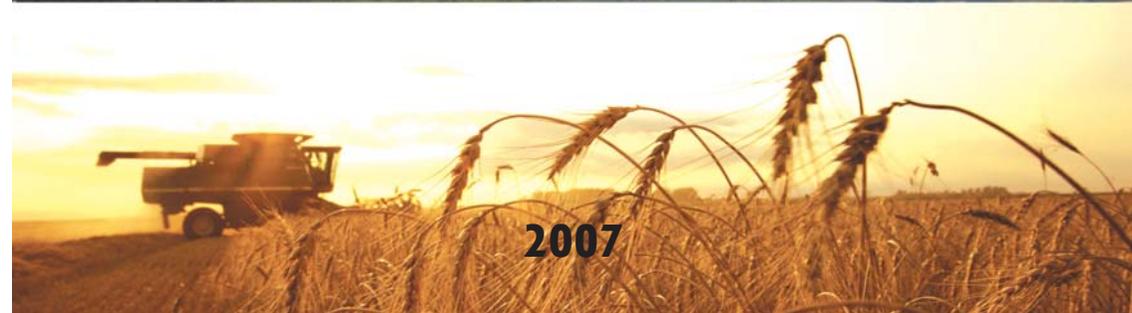
Alex  
PUBLISHERS

[www.alexpublishers.ru](http://www.alexpublishers.ru)



# LANDSCAPE ANALYSIS FOR SUSTAINABLE DEVELOPMENT

Theory and Applications of Landscape Science in Russia



2007

Landscape is a complex, multi-faceted concept that traditionally meant different things to different people. Having originated from the Renaissance art and architecture in Europe (German *Landschaft*, or French *paysage*), it evolved over the last hundred years into a highly organized branch of natural sciences and physical geography in Germany, Russia and Eastern Europe (*landshaftovedenie*, or landscape science). A further notion of landscape ecology, first coined in 1930 by German geographer Carl Troll, picked up a life of its own in the Western academic literature and university curricula since the 1970's — with the advent of the modern environmental agenda.

In the last ten years we are witnessing a rapid expansion in the use of this term beyond its traditionally strict confines of science and education — into the domain of practical land and natural resource management applications (e.g., landscape planning), land-use regulations (e.g., landscape-ecological zoning), and international policy-making (e.g., the European Landscape Convention).

Landscape has now become recognized throughout the world by academics, policy-makers, conservation and industry practitioners alike as a crucial concept of environmentally sustainable development and corporate social responsibility that allows better understand and manage a complex land (or ecosystem) mosaic as “the whole that is larger than the sum of its parts”. As such, it has also become an important term in the quickly expanding industrial voluntary codes of conducts and certification schemes (e.g., Forest Stewardship Council), business and conservation practitioner networks (e.g., High Conservation Value Resource Network), as well as in the safeguard policies of international financial institutions (e.g., the World Bank).

Fast propagation of landscape approaches in the modern policies and applications of sustainable development represents a serious challenge for the international academic community that needs to keep abreast with new and growing demands from governments and private sector for a stronger applied research in landscape sciences and technologies, as well as for a better educated workforce and general public that must be familiar with the fundamentals of landscape-based applications.

Latest developments and trends in landscape analysis offer good opportunities for successfully coping with these challenges. An obvious source of growth lies in strengthening cooperation and interaction between the ‘western’ and ‘eastern’ approaches to landscape studies. Russia and other countries of the former Soviet Union have accumulated more than 50 years worth of solid experience and cutting-edge achievements in landscape research and education, much of which still remains insufficiently known by the ‘younger’ landscape ecology community of the western countries, due to a legacy of language, terminology and cultural barriers.

The purpose of this book is to help break such barriers. It is the first full-size English-language publication of a representative selection of key works of the modern Russian-language landscape science. It by no means claims to be a comprehensive treatment of the subject, but, nevertheless, represents a systematic overview of the fundamental elements of landscape analysis — ranging from the theory of landscape science and modelling approaches, landscape dynamics and evolution, landscape geochemistry, to protection and monitoring of landscapes, cultural landscapes, and landscape planning.

All papers included in the book were first presented at the 11th International Conference “Landscape Science — Theory, Methods, Regional Studies, Practice” that was held in August 2006 in Moscow, Russia, and attended by 240 participants from 12 countries.

A team of eminent landscape professionals from Moscow State University, in collaboration with the World Bank, worked hard to prepare this milestone publication just in time for presenting it at the 7th World Congress of the International Association for Landscape Ecology (IALE), held in July 2007 in Wageningen, the Netherlands. This is an anniversary congress for IALE bringing together 25 years of international achievements in landscape ecology, with focus on its scientific principles and their practical applications to conservation planning, land and water management, and land-use planning both now and in the future.

We hope that this timely publication would contribute to strengthening existing — and establishing new — professional links at an international level between landscape researchers, educators and practitioners, thus helping meet the increasing demand for scientifically valid and technologically robust applications in landscape analysis for sustainable development.

Andrey Kushlin  
Team Leader  
Sustainable Development Department  
Europe and Central Asia Region  
The World Bank

Mária Kozová  
Vice President  
Executive Committee  
International Association  
for Landscape Ecology

# Landscape Analysis for Sustainable Development: Theory and Applications of Landscape Science in Russia

## Table of Contents

### Foreword

### Introduction

#### I. Theory of Landscape Science and Modeling Approaches

- Landscape studies in Moscow Lomonosov University: development of scientific domains and education
- Landscape Science in Russia in the Early 21st Century: state and Methodological Problems
- Landscape as a dynamical and thermostatic system
- Trigger geosystems
- Results of mathematical morphology of landscapes
- Modelling landscapes: toward synthesis based on geophysical parameters
- Concept of landscape information renovation for Siberia area
- The peculiarities of modeling the Earth's landscape field
- Multiscale organization of intercomponent relations in landscape
- Nucleo-vector organization of mountain regions
- Landscape-ecological structure and spatial organization of insular geosystems of Western Siberia
- Landscape hierarchy and landscape diversity (contact zones of lowland and mountain countries as a case study)

#### II. Landscape Dynamics and Evolution

- Local geosystems under global climatic changes (landscape-ecological prediction)
- Regional and local development patterns of present-day geosystems in the Baikal Region
- Long-term conditions of taiga landscapes of European Russia
- Dynamics and functioning of floodplain landscapes

#### III. Landscape Geochemistry

- Basic concepts of landscape geochemistry and soil geography
- Geochemistry of mining technogenesis: methodical aspects and results in the southern Far East of Russia
- The landscape-geochemical map of Russia
- Spatial analysis and modeling of Cs-137 distribution at the microlandscape level (the Bryansk region)

#### IV. Protection and Monitoring of Landscapes

- Monitoring Problems of Natural-Anthropogenetic Landscapes
- Geoecological regionalization of agrolandscapes in Europe
- Key landscape areas: defining the the problem and presenting solutions
- Critical territories in a landscape (experience of landscape studies in Georgia)

#### V. Cultural Landscapes

- Landscape aesthetics (theoretical and methodological issues)
- Cultural landscape in the Russian geographical tradition
- Socio-natural history of landscapes in Central Russia
- Landscape-historical complex “Site of the ancient settlement Dunino”

#### VI. Landscape Planning

- Three notions of landscape as used in Russian practices of territory planning
- Landscape approaches to the Russian provincial town planning: Problems, mission and prospects
- Landscape planning as a foundation for sustainable development in the Kaliningrad region of Russia

#### Bibliography