



## Book review

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Novel Measurement and Assessment Tools for Monitoring and Management of Land and Water Resources in Agricultural Landscapes of Central Asia. Lothar Mueller, Abdulla Saparov and Gunnar Lischeid (Eds.). Switzerland: Springer International Publishing, 2014. xxiii+716 pp.

***Abstract:** On more than 700 pages the editors present the outcomes of the research project “Novel Measurement and Assessment Tools for the Monitoring and Management of Water and Soil Resources in Agricultural Landscapes of Central Asia”, which was funded by the German Federal Ministry of Education and Research (BMBF) from 2010 to 2012. The volume evaluates existing methodologies and recommends improvements, where necessary. Authors are scientists and field specialists from Kazakhstan, Germany, Uzbekistan and Russia. They address scientists and students, but also planners and decision makers in the wide field of land and water use of the region. The 43 chapters are divided into three parts, focusing on the “Environmental and Societal Framework...”, “Novel Methodologies...” and “Applications and Case Studies”, while a final part “Executive Summary and Conclusions” evaluates and aggregates the individual chapters to final recommendations.*

**Keywords:** Integrated Water Resources Management, methods, sustainability, land management, water management.

### Introduction

Within our first book review category, I would like to introduce “**Novel Measurement and Assessment Tools for Monitoring and Management of Land and Water Resources in Agricultural Landscapes of Central Asia**”. The book has been edited by Lothar Mueller, Abdulla Saparov and Gunnar Lischeid and printed by Springer in 2014. It is also available as eBook.

The editors present the outcomes of a Kazakh-German research project which has been funded by the German Ministry for Education and Research (BMBF) in the years 2010 to 2012. While other research publications focus on data and practical conclusions, the volume presents and discusses methods for monitoring and analysis to fight the current deficits on data availability and quality in land and water management in the Central Asian region.

To guide the reader through more than 700 pages, the 43 chapters are grouped into three parts and 8 clusters. In the following I will introduce shortly one or two chapters from each cluster with special preference given to water management, knowing that other

chapters referring more to soil management and agriculture could be of interest for our readers as well.

### Content

Within the 1<sup>st</sup> Cluster the authors summarize the status quo of **land and water resources in Central Asia as well as trends and frame conditions for monitoring and land management**. *Ibrayev et al.* analyze in their chapter the current state of water management in Kazakhstan, its main problems and the expectations on a wider use of modern technologies like remote sensing and GIS. *Lischeid* puts his focus on the state and problems of water resources in rural areas, including future impacts of Climate Change and motivates a wider implementation of Integrated Water Resources Management. Other authors focus on the impact of various land use forms on the wide spread land degradation. Together they provide the reader, who is not yet familiar with the situation in Central Asia with the necessary framework to evaluate the following Clusters.

The 2<sup>nd</sup> Cluster introduces new measurement **devices and field methods for parameter estimation and monitoring**. *Schindler* illustrates a new laboratory method to parameterize the soil's hydraulic properties. *Meissner et al.* give a review of lysimeter technology, its application and new developments. While lysimeters are usually utilized in a laboratory environment, the method described by *Schindler* in an additional chapter can be applied with low costs under field conditions and provides similar quantification of hydraulic properties. These methods allow better quantification of groundwater flows within the unsaturated zone, improving thereby the parametrization of models estimating water availability for plants, evapotranspiration or transport of solutes.

Cluster 3 familiarizes with a number of methods for **resource evaluation, functional mapping and risk assessment** at landscape or regional scale. Besides chapters on soil distribution and classification some chapters thematize regional groundwater quantification on aspects like recharge rates (*Hennings*) and quality conservation (*Eulenstein et al.*, *Dannowski et al.*). The applied models can profit from parameters derived with tools from the 2<sup>nd</sup> Cluster.

The use of **remote sensing for monitoring and modelling of large areas** is presented in Cluster 4. Besides a methodology to create land cover maps for Central Asia (*Klein et al.*) it also includes a chapter on water resources estimation for Kazakhstan (*Ibrayev et al.*). The latter is described for the Irtysh river basin based on geo-information technology.

The 5<sup>th</sup> Cluster introduces methods for **data analysis and modelling at ecosystem scale**. *Michel and Dannowski* recommend the soil-plant model ZEPHYR to improve irrigation efficiency. This complex model simulates the main processes of the soil-water balance and evapotranspiration. An application case from Southern Kazakhstan proves its general suitability for the region.

Cluster number 6 discusses new **biotechnologies for the rehabilitation and improvement of soil and water**. That the term biotech not only refers to new laboratory style methods illustrates the chapter of *Balla et al.* on the use of Duckweed (Lemnaceae) to reduce salinity of agricultural drainage water. They recommend a test of this plant for desalination in Central Asia. The chapter of *Tumlert* reviews robust and available technologies to improve the water quality for rural environments. These can serve as an initial overview for development projects in this area.

The Cluster 7 and 8 describe the **field monitoring of soils** and discuss the **optimization of land use systems**. As the chapters in these Clusters did not cover topics closely related to water management, I conclude here my reflections on the books content.

### **Recommendation**

This book can be recommended for all Central Asian libraries which support research and academic training in the fields of land and water management. It combines an analysis of the current situation in monitoring the sector with a broad overview of available tools and methods to significantly improve the situation. While some methods are based on commercial products others are freely available. The individual chapters are illustrated with a manifold of images, sketches, tables and diagrams. The texts are well written and require in most cases only intermediate knowledge of the English language. As the book collects also an impressive number and range of experts, ideas and perspectives, it can also serve as a source for future research and cooperation projects but also as inspiration for students from the master-level upwards.