

ETHIO-GERMAN PROJECT  
„SUPPORT FOR THE ARBA MINCH WATER TECHNOLOGY INSTITUTE“



**UNIVERSITY OF SIEGEN, GERMANY**  
Research Institute for Water and Environment



**ARBA MINCH UNIVERSITY, ETHIOPIA**  
Arba Minch Water Technology Institute

**Lake Abaya Research Symposium 2004**  
**- Proceedings -**

Catchment and Lake Research

**Editors**

Prof. Dr.-Ing. Gerd Förch, University of Siegen  
Stefan Thiemann, University of Siegen

**FWU Water Resource Publications**

<http://www3.uni-siegen.de/fb10/fwu/ww/publikationen/volume0405/>  
Vol 4, 2005, Lake Abaya Research Symposium - Proceedings  
ISSN No. 1613-1045

**Layout**

Soehnke Neumann & Stefan Thiemann, University of Siegen

**Printing**

Printing Office, University of Siegen, Siegen, Germany  
ISBN No. 3-932604-17-2

- © This work is subjected to copyright. No part of this publication may be reproduced or transmitted in any forms by means, electronic or mechanical, recording or any information storage and retrieval system, without permission in writing from the copyright owner.

**Organizer**

Arba Minch University  
GTZ Country Office Ethiopia  
University of Siegen

**LARS Organising Committee**

Dr. Eckart Bode (GTZ)  
Prof. Dr. Gerd Förch (University of Siegen)  
Stefan Thiemann (University of Siegen)  
Daniel Hailemariam (German Embassy)  
Dr. Semu Moges (Arba Minch University)

**LARS Scientific Committee**

Dr. Seleshi Bekele (IWMI)  
Prof. Dr. Gerd Förch (University of Siegen)  
Prof. Dr. Hans-B. Horlacher (TU Dresden)  
Dr. Semu Moges (Arba Minch University)  
Prof. Dr. Brigitta Schütt (FU Berlin)

**Sponsors**

Arba Minch University  
German Academic Exchange Service (DAAD)  
German Cultural Institute  
German Ministry of Economic Cooperation and Development (BMZ)  
German Technical Cooperation (GTZ)

**Contacts**

gerd.foerch@uni-siegen.de  
stefan.thiemann@uni-siegen.de  
semu\_moges@yahoo.com  
Jutta.Mueller@gtz.de  
pol-1000@addi.auswaertiges-amt.de

## **Preface**

The Arba Minch Water Technology Institute, since June 2004 promoted as Arba Minch University (AMU), has been supported by the German Government since the beginning in the 1980s. The support of training facilities for waterworks personnel was in the interest of both partners, the German Government through GTZ and the Ethiopian Water Commission, because of the urgent and long-term needs for technical personnel to operate water supply systems.

The bilateral project “Assistance to AWTI” started in 1989; in the first phase it focussed on the establishment of laboratory and workshop facilities. However, since the beginning, the development of an appropriate research programme and so-called twinning relations with German universities were on the agenda. Degree programmes in Water Resources Engineering were initiated that made research and consultancy at AWTI possible. The improvement of water supply systems for a sustainable utilisation of the huge water resources of the country alone was not sufficient anymore. Water resources management and development became an important topic of all recent Ethiopian Governments . The in the meantime passed Ethiopian Water Resources Management Policy demands for more and qualified engineers, consultants and researchers.

Therefore, the focus of the last two project phases was changed towards advanced capacity building by supporting PhD and MSc training and research. The German partner universities, i.e, University Siegen and Technical University Dresden, concentrated on the joint research programme “Integrated Water Resources Development in Lake Abaya Chamo Basin” as a basis for advanced research. Other partners, such as academics from the Free University of Berlin, University Rostock, University of Applied Sciences Münster, joined the programme with various supplementary activities. In the meantime, universities in Europe as well as in North America have joined the German universities as international partners of AMU, supporting the academic efforts of this young university.

With this first “Lake Abaya Research Symposium” the German-sponsored project facilitates the presentation of research results and their discussion, while focusing primarily on lake and catchment research conducted by AMU researchers. However, the forum is also offered to academic contributions from all over Ethiopia and beyond.

The symposium offers a forum for discussions on water resources research in general between Ethiopian water professionals and researchers focussing on river and lake catchment areas. This forum will contribute to the overall development of the Ethiopian water sector, as well as enhance the cooperation between the different actors.

Ethiopian and German PhD students, who receive support from the project, present their research findings. As well, their supervisors and other collaborators are invited to present related research results. The make-up of presentations follows international proceedings, keynotes are followed by research papers and supplemented by poster presentations covering a range of various topics. The last session of the symposium focuses on the future; therefore, short papers are presented by young PhD students for discussion. A final panel discussion shall give some ideas on future water research needs in Ethiopia.

The preprints of abstracts and extended abstracts are published as internet publication under “FWU-Water Resources Publications” an internet series of University of Siegen.

**Themes**

Author

<b>Character of Lake Floor Sediments from Central Lake Abaya, South Ethiopia.....</b>	<b>1</b>
Susanne Blumberg and Brigitta Schütt	
<b>Recent Monitoring of Suspended Sediment Stress, Bulk Water Quality Parameters and Meteorological Forcing on Lake Abaya.....</b>	<b>11</b>
Bogale Gebremariam, Brigitta Schütt and Gerd Förch	
<b>The Relative Contribution of Parameters of Water Balance Equation to Rising Water Table Phenomenon in Inland Alluvium Basin of Haryana, India .....</b>	<b>21</b>
Guchie Gulie	
<b>Investigation of Performance of Sediment Transport Formulas in Natural Rivers Based on Measured Data in Kulfo River, Southern Ethiopia.....</b>	<b>35</b>
Nigussie Teklie Girma and Hans-B. Horlacher	
<b>Catchment Modelling for Planning Use of Land and Water Resources in Semi Arid Areas.....</b>	<b>43</b>
Joy Obando	
<b>Geomorphological reconstruction of palaeo-Lake Ashengi, Northern Ethiopia.....</b>	<b>51</b>
Brigitta Schütt and Robert Bussert	
<b>Identification And Delineation Of Hydrological Homogeneous Regions - The Case of Blue Nile River Basin -.....</b>	<b>59</b>
Abebe Sine and Semu Ayalew	
<b>Water Resources Assessment in the Bilate River Catchment - Precipitation Variability –.....</b>	<b>73</b>
Stefan Thiemann and Gerd Förch	
<b>Gis Based Irrigation Suitability Analysis (A Case Study of Abaya-Chamo Basin, Southern Rift Valley of Ethiopia).....</b>	<b>79</b>
Negash Wagesho	
<b>Analytical Chemistry Challenges for Investigation of Sediments.....</b>	<b>91</b>
Bernd Wenclawiak, Ulrike Koch and Thorsten Schmeck	
<b>Selection of Optimum Small Hydropower Sites with the Application of Optimisation Techniques - The Case of the Gelana Basin in Ethiopia .....</b>	<b>97</b>
Zelalem Hailu and Hans-B. Horlacher	
<b>Water Quality Monitoring within the Abaya - Chamo Drainage Basin .....</b>	<b>109</b>
Ababu Teklemariam and Bernd Wenclawiak	
<b>Watershed Management – An Introduction.....</b>	<b>119</b>
Gerd Förch and Brigitta Schütt	