

Water Quality Issues in the Upper Narew Valley (Preface)

Paweł M. ROWIŃSKI and Jarosław J. NAPIÓRKOWSKI,
Editors of the Issue

Institute of Geophysics, Polish Academy of Sciences
ul. Księcia Janusza 64, 02-452 Warszawa, Poland

This book contains contributions by the leading experts dealing with general aspects of water quality in rivers and also specialists focusing their efforts in the Upper Narew Valley. A variety of scientifically based – experimental, computational and theoretical, and also policy-oriented topics are contained herein. A large number of the contributions have been presented during the meeting held in Hotel Leśny in Białystok on July 11, 2000. The main topic embraced sources of pollution and transport processes influencing water quality in the Upper Narew Valley. The Conference was organized by the Institute of Geophysics of the Polish Academy of Sciences in cooperation with the Narew National Park and North Podlasie Society of Bird Protection. It was sponsored by the Sendzimir Foundation and the Institute of Geophysics of the Polish Academy of Sciences.

The objective of the Conference was to provide a forum for sharing and transferring information, expertise, experience and ideas among professionals in the field of ecological problems in the Upper Narew Valley. Emphasis was put on water quality issues. As a special feature to achieve the highest quality, many distinguished researchers were invited to contribute their findings to the meeting (among them a distinguished guest, Stanley P. Finch Centennial Professor of Engineering, Edward R. Holley from the University of Texas at Austin, USA). It was a pleasant surprise that excellent responses have made the Conference the major forum in the field. More than 50 participants were present at the Conference. The meeting also attracted the interest of the media (major local television broadcast, radio, and a number of newspapers).

Due to the success of the meeting it was decided that it is desirable to publish a book aimed at reviewing the present state of the art, reporting the latest findings and identifying future research directions in water quality problems in the Upper Narew region. All the speakers from the meeting held in Białystok were invited to submit papers for this special volume. The present volume is therefore an extended version of conference proceedings. All the papers were reviewed.

We hope that this book will go some way not only in keeping decision-makers and practitioners in touch with the latest research developments, but also in keeping academics in touch with the practical requirements of a rapidly changing environment and needs in the region. We also believe that through this publication the information about problems in this unique and extremely valuable river system will come across international community of specialists.

The presentations, discussion during the meeting and consequently the contributions to this volume have been going along the following main lines:

1. Detailed information on water management and water quality problems in Podlasie Region and particularly in Upper Narew River is given. Stress is put on the principles of sustainable development of the Upper Narew Valley and nature protection especially within the Narew National Park.
2. Biochemical aspects of water quality problems are discussed in great detail. Authors focus their considerations on bio-geo-chemical barriers in the protection of surface water against eutrophication.
3. A significant part of discussion is focused on the role of Siemianówka Reservoir on water quality downstream. Particularly emotive are the negative changes in water quality in the protected part of the river. The opinions about the influence of Siemianówka Reservoir on water degradation vary among specialists quite significantly and it becomes obvious that additional studies have to be performed in this field. The impact of this object on the entire water system and the methods of the reservoir operation are a hot topic of regional debate.
4. Another group of problems is focused around processes affecting transport of dissolved or suspended substances in rivers. Modern trends in the description of those processes and also building of predictive tools (mathematical models) are talked over. A worldwide experience in dye tracer studies in rivers has been discussed in details and it is proposed that such an experiment is absolutely necessary to understand pollution transport pattern in the meridional part of the Narew Valley (although a few conference participants have different opinions). More general sound concepts revealing various aspects of transport of matter in rivers from different perspectives are also presented. They include the concepts of watershed ecosystems, ecotones, river continuum and also nutrient spiraling.

The necessity of performing studies on the transport of pollution results from legal requirements in Poland. It is worth to mention the Ordinance of the Minister of Environment and Forestry of November 5, 1991, on classification of waters and the conditions on the sewage discharge to the waters or reservoirs (Journal of Laws No. 116). The Ordinance was set up in order to adjust our legal regulations to the directives of the EU. In brief, the ordinance states that in case of placing the outflow of the pollutants in the vicinity of security zone of the source or any other river water application, the allowable level of standard indexes of the sewage should be determined in such a way that the water source would have a steady level of quality that could meet up the standards for the mid-land surface waters.

Considering the above mentioned conditions of the pollutants outflow to river waters means *determining the pollution concentration field* on a particular reach or in a specified point on the river. Comparing the maximum values of pollution concentration in time and space to the allowable level in order to determine the class of the waters cleanness is a basis for making projects on sewage processing units as well as issuance of legal permits to build and operate the units.

Effective tools for determining the pollutant concentration field changeable in time are mathematical models of the spread and transformation of the pollutants in rivers. In case of a need to monitor the current quality of waters, the mathematical models: (1) complete the results of the concentration measurements, making it possible to interpret the data, (2) serve for elaboration of forecasts of water condition. They are also a rational method to assess the influence of various factors on the environment. The mathematical models should be calibrated to the local conditions, which is advised by many international organizations (ex. U.S. Water Pollution Control Federation (1981)).

It is very often stated that information gained and decisions made are, at best, as good as the models used and the data available. Having this in mind and observing the state of knowledge about the Narew Valley, we may claim that there is still need for fundamental research to improve our understanding of the processes involved, particularly in water quality. Otherwise flawed models will lead to unsatisfactory and ultimately expensive solutions.

All the discussion reflected in this volume should be understood in a broader context of the Adaptive Environmental Assessment (AEA) experiment, which is the primary mission of the Sendzimir Foundation (main sponsor of both the meeting and this volume). AEA is an approach involving diverse participants in assessment, learning and planning leading to more flexible, adaptive institutions and sustainable outcome than traditional ecosystem management methods. We do realize that ecosystems change in response to the stress imposed by human use and societies adjust their behavior affecting ecosystems in response to perceived changes in these

systems. A thorough understanding of this feedback is the ultimate scientific foundation for designing strategies to achieve sustainable society-nature interaction.

As is usually the case, the efforts of others have significantly eased our tasks. We would like to express our deep appreciation to the Director of the Sendzimir Foundation (USA), Jan Sendzimir, for the encouragement and support for the meeting and also edition of this volume. Likewise, our special thanks go to the Director of the Narew National Park, Bogusław Deptuła, and the Director of North Podlasie Society of Bird Protection (PTOP), Roman Kalski, for the assistance in organizing the seminar. We need to recognize a number of other people who helped us in organizational matters. They are Marzena Kierus from PTOB, Henryk Jaros from the Technical University of Białystok, Marta Biesiada and Iwona Jarzabek from Narew National Park and also Andrzej Relidzyński, Jarosław Szeptycki and Anna Dziembowska for ensuring high quality of English of all the contributions. We also appreciate the efforts of all the authors for this volume, discussers during the conference and all the participants of the meeting in Białystok. We also are grateful to everybody who cares about present-day and future of the unique Narew Valley and people living there.

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