

DYNAMICS AND THERMAL REGIMES OF RIVERS

Editor

K.I. ROSSINSKII

RUSSIAN TRANSLATIONS SERIES

52



1987

A.A. BALKEMA/ROTTERDAM



Contents

INTRODUCTION	...	xiii
--------------	-----	------

I. THERMAL AND ICE REGIMES OF RESERVOIRS AND STREAMS

The Study of Dynamics and Thermal Conditions of Rivers for the Efficient Utilization of Water Resources— <i>K.I. Rossinskii</i>	...	3
The Present Status and Trends in the Study of Ice Regimes of Reservoirs— <i>R.V. Donchenko</i>	...	17
Statistical Characteristics of Velocity and Temperature Distributions in Fresh-water Basins— <i>A.A. Speranskaya and E.P. Anisimova</i>	...	23
The Thermal Regime of Head and Tailwaters in the Krasnoyarsk Hydroelectric Power Plant during the Filling Process— <i>N.M. Sokol'nikov</i>	...	34
Computation and Field Studies of Ice and Thermal Characteristics in an Unstable Ice Regime— <i>N.V. Zhitskaya</i>	...	39
Hydrologic and Geographic Studies of Ice Regime in the Rivers of the Central Volga Region— <i>M.V. Korbutyak</i>	...	47
Characteristic Features of the Thermal Regime of Reservoirs in Georgia— <i>G.S. Metreveli</i>	...	56
Effect of Reservoirs on Air Temperature in Contiguous Areas— <i>P.P. Denisov</i>	...	63

II. HYDRODYNAMICS OF RIVERS AND RESERVOIRS

Hydrodynamics of Rivers and Reservoirs— <i>V.M. Lyatkher and B.A. Fidman</i>	...	79
Recent Studies on Unstable Motion in Open Streams and Pressure Pipes and Schemes of Investigations Undertaken on Channel Processes at the Institute of Hydromechanics AN UkrSSR— <i>I.L. Rozovskii, V.A. Bazilevich, E'.V. Zalutskii, Yu.D. Vlasenko, V.I. Gaiduchenko and S.B. Markov</i>	...	100
Turbulence Mechanism— <i>V.M. Lyatkher</i>	...	105
Theoretical and Experimental Studies of Hydrodynamics in Open Turbulent Flows— <i>E.I. Mass, E'.Sh. Teplitskii, T.I. Amkoladze, D.P. Nadiradze and Sh.Ya. Dolbaya</i>	...	112
Application of Variational Methods to Hydrodynamics— <i>A.I. Kadukin, G.F. Krasnozhon and A.S. Sudol'skii</i>	...	123
Relationship between Turbulent Characteristics of Currents in the Region near the Bottom and in the Subjacent Loose Rock— <i>G.V. Vasil'chenko</i>	...	137
Water Movement in Channels under Abrupt Changes in Roughness along the Wetted Perimeter— <i>G.V. Zheleznyakov</i>	...	146

III. DYNAMICS OF THE RIPARIAN ZONES OF RESERVOIRS

Hydrodynamic Parameters of Wind Disturbance <i>vis-a-vis</i> Sediment Movement in the Riparian Zones of Lakes, Oceans and Reservoirs— <i>A.I. Kadukin, G.F. Krasnozhon and I.G. Sukhanova</i>	...	157
Longshore Migration of Bars and Sediments and the Methods for Controlling it— <i>B.A. Pyshkin, Yu.N. Sokol'nikov, E.S. Tsaitts, E.I. Safronova, A.I. Suzdal'tsev, R.I. Volynskii, L.Yu. Bantysheva, V.V. Khomitskii, V.I. Vechorek and A.L. Onufrienko</i>	...	166
Deformation of the Channel Bed in the Widened Regions— <i>A.N. Butakov</i>	...	175

Dynamics of Estuarine Bars in the Southern Part of Tazovsk Bay— <i>V.N. Korotaev and O.I. Samsonov</i>	184
Laboratory Investigations on the Stability of Beaches and the Location of Shore-protecting Devices along the Black Sea Coast— <i>M.I. Alekseev</i>	189
Observations on the Movement of Sediments along the Shores of the Black Sea at the Mouths of the Bzyb', Kodori and Inguri Rivers— <i>O.I. Khalatyan</i>	199
Aggradation of Lock Pools from Ports and Intake Towers of the Kakhovsk Reservoir— <i>E.S. Tsaitts</i>	204
Possibility of Employing Underwater Manned Laboratory <i>Chernomor</i> for Studying the Hydrodynamics and Lithodynamics of the Riparian Zones of Seas, Lakes and Reservoirs— <i>N.A. Aibulatov</i>	211

IV. RIVERBED PROCESSES

Present Trends in the Study of Riverbed Processes— <i>I.A. Kuz'min</i>	219
Evolution of the Hydromorphological Theory of Channel Processes in the Context of the Optimum Utilization of Water Resources— <i>N.E. Kondrat'ev, I.V. Popov and B.F. Snishchenko</i>	233
Movement of Sediments through Reservoirs. General Characteristics of Sediment Regime in Reservoirs— <i>A.V. Karaushev</i>	248
Characteristic Problems in Scientific Investigations on Automated Regulation of Reservoir Releases for Irrigation— <i>K.F. Artamonov</i>	256
Results of Studies Carried out on the Regulation of Solids Discharge and Riverbed Processes in the Amu-Dar'ya River during Sharp Increase of the Midstream Water-supply Offtake for Irrigation— <i>Kh.Sh. Shapiro</i>	261
Forecasting and Problems Encountered in the Investigations on River Channel Deformations for Better Utilization of the Water Resources in the Terek River— <i>V.S. Lapshenkov</i>	274

Methodology and Some Findings of the Studies on Channel Modification because of Constructions which Do Not Hinder Sediment Transport— <i>O.V. Andreev, T.N. Glagoleva and G.A. Fedotov</i>	283
Results of in situ Observations on Riverbed Erosion of the Syr-Dar'ya below the Chardarinsk Hydro- complex— <i>A.B. Malkov</i>	298
Field and Laboratory Investigations on the Intense Deformation of Easily Erodible Banks (' <i>Deigish'</i>) of the Amu-Dar'ya River— <i>V.S. Altunin</i>	302
Bed Formation in Man-made Rivers under Active Sediment Transport— <i>L.I. Vikulova</i>	311
Bed Formation in Canals through Sandy Rocks/Soils— <i>S.A. Annaev and Kh. Aidov</i>	318
Morphometric Equations for Stable Channels of Rivers Flowing through the Plains of the Latvian Republic of the Soviet Union— <i>E'.G. Golubovskii</i>	327
Riverbed Stability in Mountain Rivers— <i>A.N. Kroshkin</i>	329
Theory of Erosion and Deposition Processes— <i>L.D. Kurdyumov</i>	335
Methods for Verifying the Correspondence between Models and Field Conditions in the Study of Channel Processes— <i>A.Ya. Grosгалis and G.Ya. Segal'</i>	342
Laws Governing the Distribution of Sediment Fractions in Terms of Settling Velocities in a Turbulent Current— <i>Yu.A. Ibad-Zade and R.D. Aliev</i>	349
Application of Statistical Methods for Determining Turbidity Distribution with Respect to Turbulent Current Depth— <i>Yu.A. Ibad-Zade and R.G. Rustamov</i>	357
Distribution of Sediment Concentrations and Particle Sizes in Open-channel Flows— <i>S.M. Antsyferov and V.K. Debol'skii</i>	367
Some Characteristic Features of Bed Load Motion in Rivers in the Mountain and Piedmont Regions— <i>V.F. Talmaza</i>	376
Study of Infiltration Wells/Galleries in Riverbeds under Conditions of Deposition or Erosion of River Sediments— <i>M.A. Sarkisyan</i>	386

Determination of the Laws of Sediment Motion and its Size Distribution in Reservoirs— <i>V.G. Sanoyan</i>	388
Vertical Distribution of Bed Load Materials when the Current Flowing over a Rough Bed is Stable and Weak— <i>V.A. Sutsepın</i>	395
Some Findings of Experimental Studies Conducted on the Intermittent Movement of Gravel in a Turbulent Current— <i>K.M. Arbulieva, S.K. Olevinskaya and A.A. Pivovarov</i>	399

The present volume contains papers presented at the All-Union Symposium on Problems and Tasks of Research in the Conference organized by the Institute of Water Problems of the USSR Academy of Sciences between June 20 and 25, 1971, in Moscow, in order to discuss the main trends of scientific work in the following fields: "Water resources of rivers, channels, reservoirs and sea reservoirs. The study of their properties serves most advantageously in dealing with the problems of management of water resources."

One hundred and twenty delegates belonging to 44 institutions of the USSR Academy of Sciences, academies of the Union Republics and three universities, top level and development institutes of various departments and agencies in the country, as well as specialists from Poland, Romania, Czechoslovakia and Yugoslavia participated in the Conference.

Research in 45th Conference were divided into four sections: "Water resources and control," "Mechanics of rivers, channels and sea reservoirs," "Production and usage of rivers," "Ecological control and improvement of rivers in the area of hydrophobicity of water resources and water management," held under the Department of Hydrophysics of the Institute of Water Problems.

Unfortunately, only a limited selection of papers read at the Conference are presented in this compilation. Naturally, some of the articles selected for publication represent certain field findings and others offer theoretical results.

An organizational committee under the auspices of the Institute of Water Problems was responsible for preparing the reports for publication. The following persons have been responsible for editing the book: the editors: K.I. Arbulieva, Deputy Editor: E.D. Frenkel, G.F. Kozmicheva, I.I. Kuznetsov, M.P. Vashchenko, A.S. Orlov and G.A. Sukhanov.