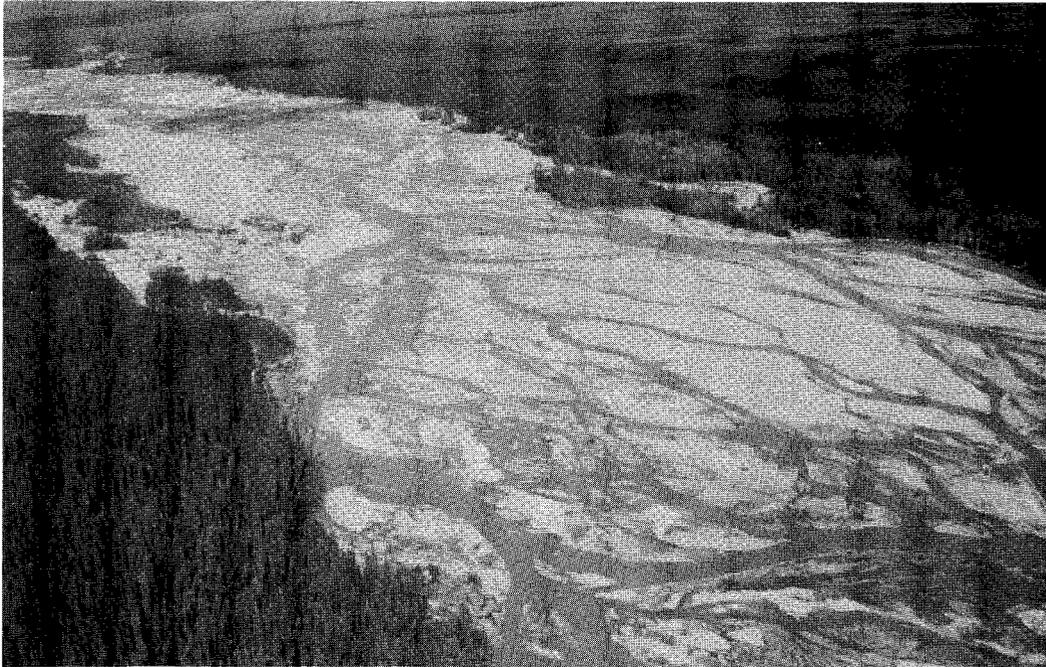


**Proceedings
of the
Fourth Federal Interagency
Sedimentation Conference
1986**

Volume 1



**Subcommittee on Sedimentation
of the
Interagency Advisory Committee
on Water Data**

PROCEEDINGS
OF THE
FOURTH FEDERAL INTERAGENCY
SEDIMENTATION CONFERENCE

MARCH 24-27, 1986

LAS VEGAS, NEVADA

Subcommittee on Sedimentation

Interagency Advisory Committee on Water Data

Agricultural Research Service
Bureau of Land Management
Bureau of Mines
Bureau of Reclamation
Corps of Engineers
Department of Energy
Department of Housing and Urban Development
Environmental Protection Agency
Federal Energy Regulatory Commission
Federal Highway Administration
Forest Service
Geological Survey
National Oceanic and Atmospheric Administration
Office of Surface Mining
Soil Conservation Service
Tennessee Valley Authority

VOLUME I



IN MEMORIAM

Paul C. Benedict, long-time member of the Technical Committee of the Subcommittee on Sedimentation, Interagency Advisory Committee on Water Data, and pioneer in the field of sedimentation in the United States, died on January 23, 1985. Mr. Benedict, who was with the Water Resources Division of the U.S. Geological Survey for almost 55 years, was a recognized authority on fluvial sedimentation and river mechanics. From 1941 to 1945, he conducted research at the University of Iowa's Institute of Hydraulic Research, on fundamental laws governing sediment transport, and on the design of equipment and methods for determining sediment discharge in streams and for measuring fall velocity of sediment particles. The principles established during that research are the basis for much of the current sampling methodology, and they continue to serve as the foundation and standard for today's equipment and methods development.

Mr. Benedict received the Department of Interior Meritorious Service Award in 1968, and the Department's highest award, the Distinguished Service Award in 1973. In addition, he won ASCE's Karl Emil Hilgard Prize in 1976 for participation in the preparation of the ASCE Manual "Sedimentation Engineering," and in 1979, he was honored with the University of Colorado's Distinguished Engineering Alumnus Award.

Beginning with his research in 1941, he served continuously on the Technical Committee of the Subcommittee on Sedimentation, or its equivalent, until his death. During his tenure, he significantly influenced the direction of research and development on methods and equipment used in the measurement and analysis of sediment loads in streams. His foresight, enthusiasm, and dedication will be sorely missed, but his contributions endure.

PREFACE

These proceedings of the Fourth Federal Interagency Sedimentation Conference* contain 102 technical papers which were submitted by representatives of 11 Federal agencies for presentation at the conference. The papers are organized under eight general topics which correspond with the conference symposium topics. These proceedings were prepared in advance of the conference so that this material could be accessible to conference participants during the conference.

The conference is sponsored by the Subcommittee on Sedimentation of the Interagency Advisory Committee on Water Data (IACWD). The Subcommittee on Sedimentation is an interagency advisory group which, as its main function, fosters coordination of agency activities in the collection, analysis, and interpretation of sedimentation information. This includes the exchange of information on environmental considerations associated with the physical, chemical, and biological aspects of sedimentation, including the identification and mitigation of environmental impacts. The Subcommittee has been a focal point for interagency coordination since its establishment in 1946. Presently, 16 Federal agencies participate on the Subcommittee.

Complex issues and problems involving sedimentation or its effects arise frequently in such areas as water quality, stream stabilization, water resources development and construction. The sedimentation aspects of these types of activities frequently have major economic and environmental significance. Efforts to address these concerns and provide solutions are ongoing in many Federal agencies. Since the Third Federal Interagency Sedimentation Conference in 1976, various agencies have made considerable progress in assembling and applying new knowledge in the sedimentation field. The need to gather and disseminate this information to all government agencies and the private sector led to the planning of the Fourth Federal Interagency Sedimentation Conference by the Subcommittee on Sedimentation.

Initial planning for the conference began in August 1983 with the appointment of a four-member task force to determine the feasibility of holding an interagency conference similar to those held in 1947, 1963, and 1976. The task force reported favorably on the proposal and, in March 1984, the Subcommittee voted to proceed with the conference. A conference chairman was elected by the Subcommittee and four conference committees were established to carry out the necessary arrangements.

* The three previous Federal Interagency Sedimentation Conferences were held in Denver, Colorado, May 6-8, 1947; in Jackson, Mississippi, January 28 - February 1, 1963; and in Denver, Colorado, May 22-25, 1976. Proceedings of the conferences were published by the Bureau of Reclamation, U.S. Department of the Interior, in January 1948, by the Agricultural Research Service, U.S. Department of Agriculture, Miscellaneous Publication No. 970, in June 1965, and by the Water Resources Council in 1976, respectively.

The Subcommittee members who participated in setting up the conference are:

Chairman:

G. Douglas Glysson, U.S. Geological Survey

Planning Committee:

G. Douglas Glysson, U.S. Geological Survey
William F. Mildner, Soil Conservation Service

Publications Committee:

Yung-Huang Kuo, Corps of Engineers
Donald K. Leifeste, U.S. Geological Survey
Daniel S. O'Connor, Federal Highway Administration

Proceedings Committee:

David Farrell, Agricultural Research Service
Robert E. Thronson, Environmental Protection Agency
Waite R. Osterkamp, U.S. Geographical Survey
C. D. Clarke, Soil Conservation Service
Dean Knighton, Forest Service
D. C. Woo, Federal Highway Administration
Shou-Shan Fan, Federal Energy Regulatory Commission

Finance and Registration Committee:

Robert T. Joyce, Tennessee Valley Authority
Roy Rush, Bureau of Reclamation

The Subcommittee acknowledges the administrative support and assistance given by its parent committee, the Interagency Advisory Committee on Water Data, and expresses appreciation to the many individuals who assisted with the conference preparations. Particular thanks go to Robert V. Barton of the Bureau of Reclamation for his assistance with financial, registration and tour arrangements; Cathy Sage of the U.S. Geological Survey for on-site clerical support and spousal tour arrangements; Fay S. Carpenter of the Tennessee Valley Authority and Susan M. Cummings of the Bureau of Reclamation for on-site clerical support; Rachel Algaze of the Agricultural Research Service for secretarial assistance to the planning committee; and Patrick A. Glancy and Charles O. Morgan of the U.S. Geological Survey for tour arrangements.

Special recognition goes to Mr. G. Douglas Glysson, the Conference Chairman, for his major contributions in planning the conference and his capable handling of innumerable arrangements for the conference.

OPENING SESSION

The Conference will be opened by Mr. Roy H. Rush, Chairman, Subcommittee on Sedimentation with a call to order.

A welcome address will be given by Mr. Philip Cohen, Chairman, Interagency Advisory Committee on Water Data.

Mr. Robert N. Broadbent, Assistant Secretary for Water and Science, Department of the Interior, will speak on the subject **SEDIMENT, SCIENCE & SOCIETY: MUDDY WATERS FOR PUBLIC POLICY**. Concern about sediment, and its role in water development, was once relegated to a small group of specialized engineers and scientists. With increasing concern over the long-term effects of sedimentation on the environment, sediment is rapidly becoming a political issue. He will discuss several research programs of the Department of the Interior aimed at examining the effects of sedimentation on the Grand Canyon ecosystem and the water quality implications of sediment from agricultural drainage water.

Mr. Orville G. Bentley, Assistant Secretary for Science and Education, Department of Agriculture, will speak on the subject **AGRICULTURAL STRATEGIES FOR REDUCING SEDIMENTATION**. Protection of this Nation's natural resources to ensure the long-term productivity of agriculture, remains one of the highest priority goals of the Department of Agriculture. Research, education, technical assistance to farmers, and the cost sharing of conservation programs are the principal strategies which the Department uses to achieve this goal. Several new and emerging technologies show considerable promise for increasing farmer acceptance of conservation practices and reducing sedimentation and chemical contamination of lakes, streams, and reservoirs.

Mr. Robert K. Dawson, Assistant Secretary for Civil Works, Department of the Army, will discuss the outlook for the Army civil works program, including legislative, financing, and regulatory aspects.

Dr. Dallas L. Peck, Director, Geological Survey, Department of the Interior, will describe the sedimentation related activities of the Geological Survey. He will discuss the Survey's research programs such as the Hazardous Substances in Surface Waters and Sediments and research in volcanic activities as related to sedimentation. The Survey's support of the equipment development work being performed at the Hydrologic Instrumentation Facility and the Federal Interagency Sedimentation Project also will be discussed.