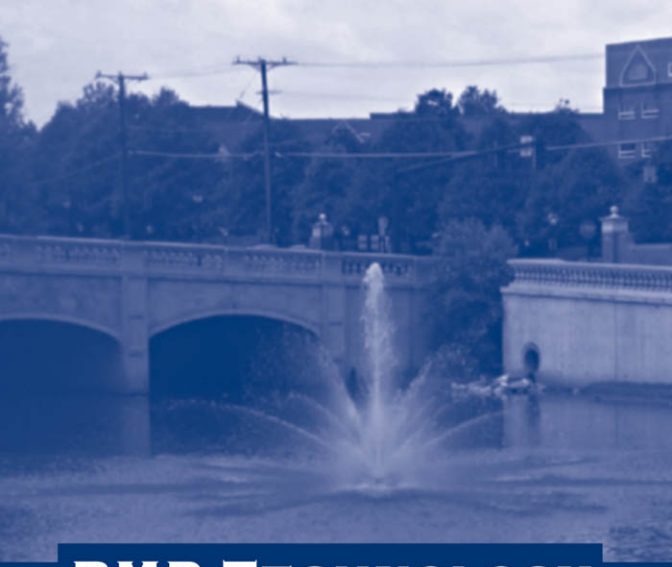

BMP Technology in Urban Watersheds

Current and Future Directions

Edited by Richard Field, Scott D. Struck, Anthony N. Tafuri, Michael A. Ports, Michael Clar, Shirley Clark, and Betty Rushton

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Preface

The purpose of this book is to provide information on various best management practice (BMP) options. BMP designs as well as guidelines for monitoring, selecting, implementing, and costs in urban watersheds are presented.

The urban area in the United States increased approximately five-fold since the mid-1940s and decreased our watersheds' capacities to: mitigate floods, and protect water quality and aquatic health through removal of excess contaminants before runoff enters receiving waters. Urban development also changes the hydrologic regime which can result in habitat loss and other ecological impairments due to relatively frequent, intense, and longer bankfull events, lower baseflows, and increased stream-channel erosion.

Cost-effective structural and nonstructural BMPs are being emphasized to reduce impacts from urbanization on wet-weather flow (WWF) quality and quantity. Urban wet-weather stressors can emanate from combined-sewer overflow (CSO), sanitary-sewer overflow (SSO), and stormwater.

Removal of WWF pollutants using control technologies can be very costly; whereas using BMPs can offer a less costly way to abate stormwater effects. During the relatively short period that BMPs have been applied for water-quality improvement, researchers have collected a substantial amount of data in an attempt to determine performance and develop and demonstrate process options.

This book does not intend to specify actual BMP selection. It is a compilation of the best presentations from the 2004 EWRI World Water and Environmental Congress' BMP Technology Symposium: Current and Future Directions, Salt Lake City, Utah. They were then expanded and improved in an attempt to provide information for selection of BMPs for a stormwater management program. It serves as an information source to individuals and agencies on the current state and future direction of BMPs in urban stormwater management.

Richard Field, D.WRE, P.E., Chair
BMP Technology Symposium: Current and Future Directions Book Committee 2004 EWRI World Water and Environmental Congress

Scott D. Struck, Ph.D., Co-Chair
BMP Technology Symposium: Current and Future Directions Book Committee 2004 EWRI World Water and Environmental Congress

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The International Symposium titled **BMP Technology: Current and Future Directions** was held at Salt Lake City, Utah from June 28 to July 1, 2004. The symposium was sponsored and organized by the U. S. Environmental Protection Agency and the Urban Water Resources Research Council. It was held in conjunction with the World Water and Environmental Congress. The Congress was sponsored and organized by the Environmental and Water Resources Institute of the American Society of Civil Engineers. The objective of the symposium was to bring together the best researchers and the cutting-edge practitioners to present and discuss the current and future directions for the control and treatment of urban stormwater runoff.

The subjects covered by the published symposium proceedings are international in scope and as far reaching as the subject of urban stormwater management. The full range of technical issues, including BMP design, placement within a watershed, performance, inspection, modeling, monitoring, operation, maintenance and rehabilitation are covered. Also covered were legal issues, economics, multi-purpose design concepts, public participation and education, as well as low impact development. A total of ninety three papers were selected, peer reviewed, published in the proceedings, and presented at the symposium. The best papers and presentations from the symposium proceedings have been selected by the chairs of the individual sessions for inclusion in this publication. Thus, the best papers and presentations are expanded and combined into coherent chapters. Each chapter has been subjected to a rigorous peer-review process.

Many individuals were responsible for the success of the Symposium, including the symposium steering committee:

Richard Field, Committee Chair, US EPA, Edison, New Jersey
Scott Struck, Committee Co-chair, US EPA, Edison, New Jersey
Michael A. Ports, Black & Veatch, Kansas City, Missouri
Anthony Tafuri, US EPA, Edison, New Jersey
Michael Clar, Eco-Site, Inc., Ellicott City, Maryland
Betty Rushton, Southwest Florida Water Management District, Brooksville, Florida

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Betty Rushton, Southwest Florida Water Management District, Brooksville, Florida
Shirley Clark, Penn State University-Harrisburg, Middletown, Pennsylvania

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and

Urban Water Resources Research Council
Environmental and Water Resources Institute
American Society of Civil Engineers

Chapter 1

U.S. EPA's Urban Watershed Research Program in BMPs and Restoration for Water Quality Improvement

Sally Guitierrez, Director, Water Supply and Water Resources Division,
National Risk Management Research Laboratory, U.S. Environmental Protection Agency

Introduction

Urban land area in the U.S. more than quadrupled between 1945 and 1997, increasing from 15 to 64 million acres, primarily from conversion of land that was previously forested, pastured, and ranged (USDA, 2000). During this same period, paved road mileage nearly tripled (USEPA, 2000). This urbanization, with the accompanying expansion of impervious surfaces, significantly increased the nation's total amount of developed and paved surface area; reduced the amount of wetlands and other undeveloped land; and, decreased our watersheds' ability to mitigate floods, facilitate sediment replenishment, and protect water quality and aquatic health by removing excess nutrients and other chemical contaminants before runoff enters receiving waters. Urban development also causes changes in the hydrologic regime, which can result in habitat loss and other ecological impairments due to more frequent and longer bankful events, lower baseflows, and increased stream channel erosion (Roesner et al., 2001). Significant decreases in biotic measures of aquatic ecologic health also become apparent at low relative impervious areas (Center for Watershed Protection, 1994).