

Watershed Management 2015



Power of the Watershed

Proceedings of the
Watershed Management Symposium 2015

Reston, VA
August 5–7, 2015



Edited by
Glenn E. Moglen, Ph.D., P.E.



ENVIRONMENTAL &
WATER RESOURCES
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SPONSORED BY
Environmental and Water Resources Institute
of the American Society of Civil Engineers

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Preface

The 2015 Watershed Management Symposium, “The Power of the Watershed” is sponsored by the Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers (ASCE). The 2015 Symposium is the eleventh in a series of specialty conferences focused on watershed management. The first was held in Billings, Montana, in 1965 and has been repeated every five years since. Subsequent conferences were held in the cities of Bozeman, MT (1970); Logan, UT (1975); Boise, ID (1980); Denver, CO (1985); Durango, CO (1990); San Antonio, TX (1995); Fort Collins, CO (2000); Williamsburg, VA (2005); and Madison, WI (2010). The 2015 Symposium in Reston, VA (August 5–7, 2015) is being held at the ASCE National Headquarters, demonstrating the deep commitment of ASCE to this vital series of conferences on the 50th anniversary of this series.

The conference brings together a diverse group of attendees, each with a critical stake in watershed management. The attendees include engineers, hydrologists, biologists, ecologists, economists, attorneys, public officials, and governmental planners. As with past Watershed Management conferences, presentations at the 2015 conference come from national and international professionals and experts whose unique perspectives are central to the goals of the meeting.

The Watershed Management 2015 conference boasts an unusual first day plenary session of seminal and distinguished speakers offering their unique perspective on topics ranging from the history of watershed management, to hydrologic modeling, to the effects of climate change on watershed hydrology. Specific theme tracks appearing on the second and third days of the conference include:

- Fisheries Engineering
- Operations Issues in Watershed Management
- TMDLs and Nutrient Reduction
- Climatic Trends (Global and Northern California)
- Biological, Chemical, and Sedimentation issues in Watershed Management

All papers appearing in this proceedings were reviewed. This review focused on all aspects of content from logic, information, and consistency, to clarity and grammar. The reviewers executed their responsibilities seriously and promptly. Authors were required to revise their papers as a result of the reviews received and, in some cases, multiple revisions were necessary before the paper was accepted for publication. We wish to acknowledge the following individuals who served as reviewers of the papers in the proceedings: Donald Frevert, Claudia Hoeft, Saurav

Kumar, Glenn Moglen, Steve Starrett, Timothy Ward, David Watkins, and Donald Woodward. We thank them for their service to this conference and proceedings. Special thanks are due to Donald Phelps who served as General Conference Chair and Donald Frevert who served as Technical Program Chair.

Glenn E. Moglen
Proceedings Editor

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A New Fish Biological Health Index for Assessing River Health Environment in the Muromi River Japan

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Abstract

This research was carried out to develop and apply a new fish-based biological health index (FBHI) to assess the river health and to diagnose the current state of the Muromi River basin in Japan. The research system was the Muromi River (33°34' 46.38"N, 130° 20' 8.7" E) class B river which flows past the city of Fukuoka prefecture, Japan and confluence destination the Hakata Bay. Data on fish assemblages collected via fishing net. We used the scientific literature and expertise from regional fish researcher to provide a comprehensive functional description of the FBHI, then we screened 14 candidate metrics from inter-regional variation in metric utility which has five main sources, all of which are illustrated in this research: the origin fish community, life history type, swimming layer, suitable flowing type and spawning ecology type. We can quickly calculate the assessment result of an FBHI score using fish data collected from a river section. Hashimoto Bridge was in much better condition than the other four locations, as the area around it exhibited a diversity of habitat types. Hamaide Weir, Hanadate Weir and Tochigawara Weir were all in poor condition, meanwhile Otoide Weir were in moderate condition. According to these results, we suggest some detail design planning to the each site referring to the lacking habitat: to construct floodplain, to make a variety of flow velocity using, and to install some spawning vegetation.

INTRODUCTION

Assessing the river health should be simplified and practical to measure. Lack of the environment assessment (EA) method is thought to be one of the reasons of the former issue. Especially, we don't have an idea that how to install the result of EA to restoration planning. This can be done with a biological index that integrates biological data within a particular indicator group. Appropriate indicators, for

example collected fish community attributes, need to be tested and justified, and linked to measuring units (metrics) that can be used to index ecological condition. In this context, biological indices are used to quantify the condition or health of the river.

Biological index is a simple and informative representation of the condition of the biological community. A biological index summarizes results of the numbers, types, and condition of organisms in a particular environmental setting (streams, lake, wetlands). Indices can report narratively or numerically. Index outcomes are compared a “thresholds” to determine the overall health of a biological community (David Neils, 2012).

MATERIALS AND METHOD

Study design

A The research system was the Muromi River (33°34' 46.38"N, 130° 20' 8.7" E) class B river which flows past the city of Fukuoka prefecture, Japan and confluence destination the Hakata Bay. The Muromi River Basin encompasses approximately 99.1 square kilometers of catchment area and length of 15.1 km. The urban area of downstream, Muromi River river side park that spans 4.7km extension is made, it has become a place of recreation and relaxation for citizens. This park has been selected as one of the "Fukuoka amenities hundred election" in 1993.

We selected research sites from reaches of the Muromi River to represent the full spatial extent of the river and conditions along it (Figure 1). In the upper section of the Muromi River, we selected around Hamaide Weir (130.326524, 33.566347), around Hashimoto Bridge (130.325655, 33.559224), around Otoide Weir (130.325014, 33.554519) around the Hanadate Weir (130.324164, 33.540322) and around Tochiganara Weir (130.322367, 33.528442) on the lowest reach. We conducted biological monitoring to assess the health of riverine environments utilizing fish.