

W A T E R R E S O U R C E S

IMPACT

May 2005 | Volume 7 | Number 3

PALEOHYDROLOGY

AWRA

Community, Conversation, Connections

AMERICAN WATER RESOURCES ASSOCIATION

RIVER MONITOR

The Complete Water Monitoring System



Contact
Global Water
for all your
instrumentation
needs:

Water Level

Water Flow

Water Samplers

Water Quality

Weather

Remote Monitoring

Control

The Global River System includes everything you need to continuously monitor streams and rivers.

- Flow Probe
- Water Level Logger
- Environmental Sampler

Plus complete accessories, software, and measurement manuals.

Also available are water quality meters and systems, chemical analysis kits and Satellite Internet Telemetry.

1-800-876-1172 Visit our online catalog at: www.globalw.com

In the U.S. call toll free
at 1-800-876-1172
International: 916 638-3429
Visit our online catalog at
www.globalw.com



Global Water
The Leader in Water Instrumentation



PALEOHYDROLOGY

Guest Associate Editor • **KENNETH R. WRIGHT**
krw@wrightwater.com

We can all learn from history. By studying the successes and failures of ancient civil engineers and hydrologists and the rise and fall of empires, we can better appreciate the noble calling of public works engineering and its relationship to society. The Inca, Romans, ancestral Puebloans, and ancient Greeks all had one thing in common – the desire and need to deal with water resources development for the public good and community welfare. Prehistoric engineers of the New World knew a lot about the use and handling of water and their legacy is remarkable. Roman engineers built water development projects that still make modern engineers green with envy. Greek engineers and hydrologists built successful flood control walls and embankments to provide developable land for the early Olympic Games in the 7th Century BC. These four case studies, based on scientific field research by the Wright Paleohydrological Institute and prepared by four WPI engineers, take you back into time to demonstrate the value of public service and a high standard of care.

OVERVIEW

3 Paleohydrology: Introduction

Kenneth R. Wright (krw@wrightwater.com)

FEATURE ARTICLES

4 Ancient Roman Water Development in France

Wayne F. Lorenz (wlorenz@wrightwater.com)

An ancient grain processing factory in southern France with 16 waterwheels and a 39 kilometer aqueduct was a marvel of water power development by the Romans of the 2nd and later centuries. The still surrounding wheat fields inspired the artist Van Gogh in 1888.

9 Mesa Verde Reservoirs: Ten Years of Paleohydrology

T. Andrew Earles (aearies@wrightwater.com)

Four prehistoric reservoirs of the ancestral Puebloans in Mesa Verde, dating from AD 750 to 1180, provided much needed water supplies for ancient communities. In 2004, the ASCE designated them as a National Historic Civil Engineering Landmark.

16 Ancient Olympia Floods and Sedimentation

Kenneth R. Wright (krw@wrightwater.com)

Great classical art treasures were excavated at Olympia, Greece, during the last 125 years. They had been lost to ancient floods and the resulting deposited sediments protected the treasures from looting through the centuries.

22 Prehistoric Inca Highway Drainage Engineering

David W. Foss (dfoss@wrightwater.com)

The Inca connected their large empire via massive highway projects that stretched from the Equator to northern Chile. This public works engineering included drainage and flood control structures that still function today, after 500 years.

Editorial Staff

EDITOR-IN-CHIEF • N. EARL SPANGENBERG

(espangen@uwsp.edu)

University of Wisconsin-Stevens Point
Stevens Point, Wisconsin

ASSOCIATE EDITORS

FAYE ANDERSON

(faye_anderson@comcast.net)

Graduate School, USDA • Washington, D.C.

ERIC J. FITCH

(fitche@marietta.edu)

Marietta College • Marietta, Ohio

MICHELLE HENRIE

(mhenrie@rodey.com)

Rodey, Dickason, Sloan, Akin & Robb, P.A.
Santa Fe, New Mexico

JASON K. LEVY

(jlevy@hawaii.edu)

Disaster Prevention Research Institute
Kyoto University • Kyoto, Japan

JONATHAN E. JONES

(jonjones@wrightwater.com)

Wright Water Engineers • Denver, Colorado

CLAY J. LANDRY

(landry@waterexchange.com)

WestWater Research • Laramie, Wyoming

RICHARD H. MCCUEN

(rhmcuen@eng.umd.edu)

University of Maryland • College Park, Maryland

LAUREL E. PHOENIX

(phoenixl@uwgb.edu)

University of Wisconsin • Green Bay, Wisconsin

CHARLES W. SLAUGHTER

(cslaugh@uidaho.edu)

University of Idaho • Boise, Idaho

ROBERT C. WARD

(Robert.Ward@colostate.edu)

Colorado Water Resources Research Institute
Fort Collins, Colorado

BUSINESS CORRESPONDENT

RACHEL CARDONE

(Rachel.Cardone@erm.com)

ERM • New York, New York

A Bi-Monthly Publication of the
AMERICAN WATER RESOURCES ASSOCIATION

AMERICAN WATER RESOURCES ASSOCIATION
 4 West Federal Street • P.O. Box 1626
 Middleburg, VA 20118-1626
 (540) 687-8390 / Fax: (540) 687-8395
 E-Mail: info@awra.org • Homepage: www.awra.org

EDITOR-IN-CHIEF
N. EARL SPANGENBERG
 College of Natural Resources
 University of Wisconsin-Stevens Point
 Stevens Point, WI 54481
 (715) 346-2372 • Fax: (715) 346-3624
 E-Mail: espangen@uwsp.edu

AWRA DIRECTOR OF PUBLICATIONS PRODUCTION
CHARLENE E. YOUNG
 3077 Leeman Ferry Rd., Suite A3
 Huntsville, AL 35801-5690
 (256) 650-0701 • Fax: (256) 650-0570
 E-Mail: charlene@awra.org

Water Resources IMPACT is owned and published bi-monthly by the American Water Resources Association, 4 West Federal St., P.O. Box 1626, Middleburg, Virginia 20118-1626, USA. The yearly subscription rate is \$75.00 domestic and \$90.00 for International subscribers. For the International Airmail Shipping Option, add \$40.00 to the subscription rate. Single copies of *IMPACT* are available for \$10.00/each. For bulk purchases, contact the AWRA Headquarters office.

IMPACT is a magazine of ideas. Authors, Associate Editors, and the Editor-In-Chief work together to create a publication that will inform and will provoke conversation. The views and conclusions expressed by individual authors and published in *Water Resources IMPACT* should not be interpreted as necessarily representing the official policies, either expressed or implied, of the American Water Resources Association.

Mention of any trademark or proprietary product in works published in the *Water Resources IMPACT* does not constitute a guarantee or warranty of the product by the American Water Resources Association and does not imply its approval to the exclusion of other products that may also be suitable.

Contact the AWRA HQ Office if you have any questions pertaining to your membership status. For information on advertising rates and deadlines, contact Charlene Young, AWRA Director of Publications Production, at the address given above.

POSTMASTER: Send address changes to *Water Resources IMPACT*, American Water Resources Association, 4 West Federal St., P.O. Box 1626, Middleburg, VA 20118-1626. Copyright © 2005 by the American Water Resources Association.

• VOL. 7 • NO. 3 • MAY 2005 •
 ISSN 1522-3175

Other features in this issue ...

- ▲ **Employment Opportunity**25
- ▲ **The New Economy of Water**26-27
- ▲ **Water Resources Puzzler**28
- ▲ **AWRA Business**
- 27 **Request for Proposals for Editor of JAWRA**
- 29 **Water Resources Continuing Education Opportunities**
- 31 **Candidates for AWRA Officers & Directors, 2005 (terms commencing Jan. 1, 2006)**
- 31 **April 2005 JAWRA Papers**
- 32 **2005 Meetings (What, Where, When)**
- 33 **2005 Membership Application**

DON'T MISS OUT ... REGISTER TODAY (SEE PG. 32)

AWRA's 2005 SUMMER SPECIALTY CONFERENCE
"INSTITUTIONS FOR SUSTAINABLE WATERSHED
MANAGEMENT: RECONCILING PHYSICAL AND
MANAGEMENT ECOLOGY IN THE ASIA-PACIFIC"
JUNE 27-29, 2005 • HONOLULU, HAWAII

AWRA's ANNUAL WATER RESOURCES CONFERENCE
NOVEMBER 6-10, 2005 • SEATTLE, WASHINGTON

Scheduled Topics for Future Issues ...

JULY 2005

PERFORMANCE-BASED MANAGEMENT MEASURES
FAYE ANDERSON (fayeanderson2@aol.com)

SEPTEMBER 2005

INFRASTRUCTURE CRISIS
LAUREL E. PHOENIX (phoenixl@uwgb.edu)

NOVEMBER 2005

WATER RESOURCES AS A GROWTH TOOL
MICHELLE HENRIE (mhenrie@rodey.com)

MARCH 2006

NATIONAL HYDROLOGY DATASET
JEFFREY D. SIMLEY (GUEST EDITOR) (jdsimley@usgs.gov)

All of the topics listed above are subject to change. For information concerning submitting an article to be included in the above issues, contact the designated Associate Editor or the Editor-In-Chief N. Earl Spangenberg at (espangen@uwsp.edu).



AWRA

*Community
 Conversation
 Connections*

(Cover Photo: Courtesy of Ruth M. Wright ... Ancestral Puebloan Cliff Dwelling at Mesa Verde National Park.)