EPA Office of Water
Water Research Update
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Science for Environmental Protection: The Road Ahead

The National Research Council was recently tasked by EPA to assess the agency's capabilities to develop, obtain, and use the best available scientific and technological information and tools to meet persistent, emerging, and future mission challenges and opportunities. The NRC was also asked to identify and assess transitional options to strengthen the agency's capability to pursue and use scientific information and tools.

The Ground Work Is In Place: The committee concludes that EPA is well equipped to take advantage of many scientific and technological advances, and, in fact, its scientists and engineers are leaders in some fields.

The Road Ahead: Though the NRC Committee on Science does not have a crystal ball, it identified some common drivers and characteristics of problems that are likely to occur in the future. The report outlines key research to address current and future needs, such as research to understand: persistent and future environmental challenges with complex feedback loops; the effects of low-level exposures to numerous stressors (as opposed to high-level exposures to individual stressors); and, social, economic, and environmental drivers. The report also highlights the importance of systems thinking for devising optimal solutions. The report underscores the growing need for cross-disciplinary training and the need to expand capacity in social and information sciences. The report concludes that EPA will continue to need leadership in traditional core disciplines (statistics, chemistry, economics, environmental engineering, ecology, toxicology, etc.). EPA's future success will depend on its ability to address long-standing environmental problems; to recognize and respond to emerging challenges; to link broader problem characterization with solutions; and to meet the scientific needs of policy-makers and the American public.

Obtain a copy of this study from NRC's Committee on Science for EPA's Future; Board on Environmental Studies and Toxicology; Division on Earth and Life Studies; at http://www.nap.edu/catalog.php?record_id=13510.

Protecting Aquatic Life and Human Health from Chemicals and Microbes in Water

From EPA

Assessment of Relative Potential for Biological Threat Agent Exposure during Uses of Drinking Water. EPA/600/S-12/643. Addresses security threats to US water supply.

Go to Report or www.epa.gov/nhsrc

Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Progress Report. EPA/601/R-12/011. Includes: analysis of existing data, scenario evaluations, laboratory studies, toxicity assessments, case studies.

Go to Report or www.epa.gov/hfstudy

Endocrine Disruptor Screening Program Universe of Chemicals (EDSP). EPA's outlined 2-tiered screening and testing process to identify endocrine disruptors and their effects.
Go to Report

EPA and Consumer Product Safety Commission Collaborate to Research Health Impacts of Nanomaterials. Addresses worldwide effort to assess potential impacts of nanomaterials on human health and the environment.

Go to Article or www.epa.gov/nanoscience

Microbial Risk Assessment Guideline: Pathogenic Microorganisms with Focus on Food and Water. Provides framework for performing assessments includes: flexible approaches, methods, tools.

Go to Report or www.epa.gov/science-and-technology

From Collaborators

USGS/EIA - Information on Shale Resources, Development, and Environmental and Public Health Risks. GAO-12-732. Provides EIA and USGS estimate size of shale oil and gas resources in the US.

Go to Report or www.gao.gov

WateReuse - Determination of Cryptosporidium and Giardia Occurrence, Infectivity, and Genotyping in Wastewater Effluents. WRA-06-003-1. Links wastewater treatment processes and occurrence of protozoa in effluents.

Go to Report or www.watereuse.org

USGS - Summary of Cyanobacteria Monitoring and Assessments in USGS Water Science Centers. Discusses pioneering new monitoring, assessment, and laboratory capabilities.

Go to Report or www.usgs.gov

From Journals

Factors Associated with Sources, Transport, and Fate of Chloroform and Three Other Trihalomethanes in Untreated Groundwater Used for Drinking Water. Carter, J.M., et al., 2012. *Environmental Science & Technology,* 46(15), 8189-8197.

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Detection and Occurrence of Indicator Organisms and Pathogens. Bhaduri, P., et al., 2012. *Water Environment Research,* 28, 786-813.

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Detection, Occurrence and Fate of Emerging Contaminants in Agricultural Environments. Snow, D.D., et al., 2012. *Water Environment Research,* 22, 764-785.

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Metagenome Analyses of Corroded Concrete Wastewater Pipe Biofilms Reveal a Complex Microbial System. Gomez-Alvarez, V., R.P. Revetta, and S.J.W. Domingo, 2012. *BMC Microbiology,* 12(1), 122.

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Biosensor Zebrafish Provide New Insights into Potential Health Effects of Environmental Estrogens. Lee, O., et al., 2012. *Environmental Health Perspectives,* 120(7), 90-996.

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Emerging Pollutants - Part I: Occurrence, Fate and Transport. da Silva, A., et al., 2012. *Water Environment Research,* 31, 1878-1908.

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Emerging Pollutants - Part II: Treatment. Bell, K., et al., 2012. *Water Environment Research,* 32, 1909-1940.

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Prenatal and Early Childhood Exposure to Tetrachloroethylene and Adult Vision. Getz, K.D., et al., 2012. *Environmental Health Perspectives,* 120(9), 1327-1332.

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Selective Pressure of Antibiotic Pollution on Bacteria of Importance to Public Health. Tello, A., et al., 2012. *Environmental Health Perspectives,* 120(8), 1100-1106.

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Molecular Survey of the Occurrence of *Legionella* spp., *Mycobacterium* spp., *Pseudomonas aeruginosa*, and Amoeba Hosts in Two Chloraminated Drinking Water Distribution Systems. Wang, H., M. Edwards, J. O. Falkinham and A. Pruden. *Applied and Environmental Microbiology,* 78(17), 6285-6294.

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Minimization of the Formation of Disinfection By-Products. Badaway, M.I., et al., 2012. *Chemosphere,* 89(3), 235-240.

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Assessment of Pathogen Survival Potential during Managed Aquifer Recharge with Diffusion Chambers. Sidhu, J. P. S. and S. Toze. *Journal of Applied Microbiology,* 113(3), 693-700.

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Point Sources of Emerging Contaminants along the Colorado River Basin: Source Water for the Arid Southwestern United States. Jones-Lepp, T.L., 2012. *Science of the Total Environment,* 430, 237-245.

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Oxidation of Cr-III to Cr-VI During Chlorination of Drinking Water. Lindsay, D. R., et al., 2012. *Journal of Environmental Monitoring,* 14(7), 1789-1797.

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Pharmaceuticals and Personal Care Products in the Environment: What Are the Big Questions? Boxall, A.B.A., et al., 2012. *Environmental Health Perspectives,* 120(9), 1221-1229.

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Environmental Transformations of Silver Nanoparticles: Impact on Stability and Toxicity. Levard, C., et al., 2012. *Environmental Science & Technology,* 46(13), 6900-6914.

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Bioavailability of Pharmaceuticals in Waters Close to Wastewater Treatment Plants: Use of Fish Bile for Exposure Assessment. Lahti, M., et al., 2012. *Environmental Toxicology and Chemistry,* 31(8), 1831-1837.

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Reproductive Endocrine Disruption in Smallmouth Bass (*Micropterus dolomieu*) in the Potomac River Basin: Spatial and Temporal Comparisons of Biological Effects. Blazer, V. S., et al., 2012. *Environmental Monitoring and Assessment,* 184(7), 4309-4334.

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Comparison of Nanosilver and Ionic Silver Toxicity in *Daphnia magna* and *Pimephales promelas*. Hoheisel, S. M., S. Diamond and D. Mount. *Environmental Toxicology and Chemistry,* 31(11), 2557-2563.

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Assessing the Impacts of Watershed Indexes and Precipitation on Spatial In-Stream *E. coli* Concentrations. Pandey, P. K. et al., 2012. *Ecological Indicators,* 23, 641-652.

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Screening Estrogenic Activity of Environmental Contaminants and Water Samples Using a Transgenic Medaka Embryo Bioassay. Lee, W., et al., 2012. *Chemosphere,* 88(8), 945-952.

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Copper Oxide Nanoparticles Can Induce Toxicity to the Freshwater Shredder *Allogamus Ligonifer*. Pradhan, A., et al., 2012. *Chemosphere,* 89(9), 1142-1150.

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Toxicity of Silver Nanoparticles to Rainbow Trout: A Toxicogenomic Approach. Gagne, F., et al., 2012. *Chemosphere,* 89(5), 615-622.

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Total Arsenic and Selenium Analysis in Marcellus Shale, High-Salinity Water, and Hydrofracture Flowback Wastewater. Balaba, R. S. and R. B. Smart, 2012. *Chemosphere,* 89(11), 1437-1442.

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Upstream to Downstream: Stormwater Quality in Mayaguez, Puerto Rico. Wengrove, M.E. and T.P. Ballestero, 2012. *Environmental Monitoring and Assessment,* 184(8), 5025-5034.

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Sustained High Temperature Increases the Vitellogenin Response to 17 Alpha-Ethynylestradiol in Mummichog (*Fundulus heteroclitus*). Chandra, K., et al., 2012. *Aquatic Toxicology,* 118-119, 130-140.

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Recent and Upcoming Meetings

SETAC North America 34th Annual Meeting. November 17-21, 2013 in Nashville, TN.

Go to Meeting Page or www.setac.org

2013 UIC Conference. January 22-24, 2013 in Sarasota, FL.

Go to Meeting Page or www.gwpc.org

Disinfection and Public Health Conference 2013. February 24-26, 2013 in Indianapolis, IN.

Go to Meeting Page or www.wef.org

Water Quality Technology Conference. November 3-7, 2013 in Long Beach, CA.

Go to Meeting Page or www.awwa.org

Innovative and Affordable Tools and Technologies for Sustainable Public Health Protection

From EPA

Showing Buried Streams the Daylight. Researchers compare effectiveness of buried vs. open-air streams for removing harmful nitrogen.

Go to Article or www.epa.gov

Stormwater Calculator to Manage Rainfall Runoff. A new EPA tool allows planners and property owners to assess how green infrastructure can be used to reduce rainwater runoff.

Go to Article or www.epa.gov/research/gems/

Science Inventory. Searchable database of EPA science activities and scientific and technical products.

Go to Tool or www.epa.gov/si/

EPA Issues US-Mexico Border Water Infrastructure Program Report. EPA/832/F-12/011. Annual report on the Border water infrastructure program.

Go to Report or www.epa.gov/usmexicoborderwaterinfrastructure

From Collaborators

Summary of Studies Related to Hydraulic Fracturing Conducted by USGS Water Science Centers. Focuses on effects of HF on ground water and surface water sources.

Go to Report or www.usgs.gov

WRF - Anion Exchange Resins as a Source of Nitrosamines and Nitrosamine Precursors – 4295. Investigation of anion exchange resins used in wastewater treatment and occurrence of nitrosamines and their precursors in treated water.

Go to Report or www.waterrf.org

Water Reuse 2030: Identifying Future Challenges and Opportunities. Linden, K., et al., 2012. WRA-06-17-1. Focuses on how water reuse can be part of the solution for dwindling freshwater supply.

Go to Report or www.watereuse.org

Understanding Water Reuse: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Wastewater. Recent advances in treatment technology provide new source of drinking water.

Go to Report or www.watereuse.org

SBIR - Real-Time, In-Line Sensor for Wastewater Monitoring. Tomczak, M., 2012. Describes progress made in developing sensors for real-time detection of biological agents and toxins in wastewater discharge.

Go to Report or www.epa.gov/research

WRF - Evaluating GAC Filters for Control of DBP Precursors and Trace Organic Contaminants. 4101. WRF helping utilities evaluate capabilities of existing GAC filter caps, and plan optimal replacement frequencies.

Go to Report or www.waterrf.org

The Water Efficiency and Conservation State Scorecard: An Assessment of Laws and Policies. Reviews policies including: plumbing fixture standards, conservation requirements, water loss control, technical assistance offered, and more.

Go to Report or www.allianceforwaterefficiency.org/

Presentations and Handouts Available from Salinity Management Study Update Workshop. Discusses salinity management strategies for local and imported sources.

Go to Report or www.socalsalinity.org/

Assessing the Economic and Environmental Benefits of Industrial Water Use within the Great Lakes Region. Assessment of 5 industries in the Great Lakes region to identify conservation opportunities.

Go to Report or www.allianceforwaterefficiency.org/

Declining Water Sales and Utility Revenues: A Framework for Understanding and Adapting. Discusses the nation's successful water conservation efforts, in part through use of water-saving fixtures and improved technology.

Go to Report or www.allianceforwaterefficiency.org/

WRF - Evaluating Carbon Nanotubes as Adsorbents for Removing Synthetic Organic Compounds. 4062. Describes how carbon nanotubes provide several advantages over existing adsorbents.

Go to Report or www.waterrf.org

WERF - Notre Dame Research Could Improve Sustainability and Cost-effectiveness of Wastewater Treatment. Gilroy, W.G., 2012. Membrane-biofilm reactors use hydrogen gas to remove nitrate in wastewater.

Go to Article or www.werf.org

WERF - Wastewater Plants Extract Nutrients from Sewage. Skirble, R., 2012. Mud-like sludge supplies one-third of treatment plant's electrical needs.

Go to Article or www.werf.org

NOAA - Great Lakes Water Level Dashboard. Online tool analyzes historical, current, and projected water levels.

Go to Tool or www.glerl.noaa.gov

From Journals

Microbial Survey of a Full-Scale, Biologically Active Filter for Treatment of Drinking Water. White, C.P., R.W. DeBry, and D.A. Lytle, 2012. *Applied and Environmental Microbiology,* 78(17), 6390-6394.

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Water Reclamation and Reuse. McVicar, M., et al., 2012. *Water Environment Research,* 15, 1332-1346.

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Comparison of Advection-Diffusion Models and Neural Networks for Prediction of Advanced Water Treatment Effluent. Mortula, M. M., et al., 2012. *Environmental Engineering Science,* 29(7), 660-668.

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Optimization of Pressure Gauge Locations for Water Distribution Systems Using Entropy Theory. Yoo, D.G., et al., 2012. *Environmental Monitoring and Assessment,* 184(12), 7309-7322.

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Cylindrospermopsin Determination in Water by LC-MS/MS: Optimization and Validation of the Method and Application to Real Samples. Guzman-Guillen, R., et al., 2012. *Environmental Toxicology and Chemistry,* 31(10), 2233-2238.

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Nutrient Removal Using Biosorption Activated Media: Preliminary Biogeochemical Assessment of an Innovative Stormwater Infiltration Basin. O'Reilly, A.M., 2012. *Science of the Total Environment,* 432, 227-242.

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Whole Effluent Toxicity Assessment at a Wastewater Treatment Plant Upgraded with a Full-Scale Post-Ozonation Using Aquatic Key Species. Magdeburg, A., et al., 2012. *Chemosphere,* 88(8), 1008-1014.

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Modeling Everything Everywhere: A New Approach to Decision-Making for Water Management under Uncertainty. Beven, K. J. and R. E. Alcock, 2012. *Freshwater Biology,* 57(s1), 124-132.

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Contaminants of Emerging Concern in Municipal Wastewater Effluents and Marine Receiving Water. Vidal-Dorsch, D. E., et al., 2012. *Environmental Toxicology and Chemistry,* 31(12), 2674-2682.

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Analysis of Organic Nitrogen Removal in Municipal Wastewater by Reverse Osmosis. Merlo, R., et al., 2012. *Water Environment Research,* 84(7), 588-595.

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Sorption Media for Stormwater Treatment - A Laboratory Evaluation of Five Low-Cost Media for Their Ability to Remove Metals and Phosphorus from Artificial Stormwater. Wium-Andersen, T., et al., 2012. *Water Environment Research,* 84(7), 605-616.

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Apparatus for *In Situ* Monitoring of Copper in Coastal Waters. Chapman, C. S., et al., 2012. *Journal of Environmental Monitoring,* 14(10), 2793-2802.

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Recent and Upcoming Meetings

17th Annual Water Reuse & Desalination Research Conference. May 6-7, 2013 in Phoenix, AZ.

Go to Meeting Page or www.watereuse.org

1st International Conference on Desalination Using Membrane Technology. April 7-10, 2013 in Barcelona, Spain.

Go to Meeting Page or www.awwa.org

28th Annual WateReuse Symposium. September 15-18, 2013 in Denver, CO.

Go to Meeting Page or www.watereuse.org

Conference on Stormwater and Urban Water Systems Modeling. February 21-22, 2013 in Toronto, Ontario.

Go to Meeting Page or www.awwa.org

AWWA Annual Conference and Exposition. June 9-12, 2013 in Denver, CO.

Go to Meeting Page or www.awwa.org

Water Reuse Tech Summit. January 28-30, 2013 in San Diego, CA.

Go to Meeting Page or www.ngwa.org

Disasters and Environment - Science, Preparedness, and Resilience: 13th National Conference on Science, Policy, and the Environment. January 15, 2013 in Washington, DC.

Go to Meeting Page or www.environmentaldisasters.net

Ecological Systems Approach to Protect and Restore Sustainable Water Quality and Water Quantity on a Watershed Basis

From EPA

Climate Change Indicators in the United States 2012. Multiple, independent lines of evidence indicate that climate change is happening.

Go to Report or www.epa.gov/climatechange/

Water Quality Index Aggregation and Cost Benefit Analysis. Walsh, P.J. and W. Wheeler, 2012. Working Paper 12-05. Examination of four aggregation functions of EPA's Water Quality Index: their impact on estimated benefits within the context of cost-benefit analysis.

Go to Report or www.epa.gov/economics/

Implications of Climate Change for State Bioassessment Programs and Approaches to Account for Effects (Final Report). EPA/600/R-11/036F. Report suggests that several biological indicators may be used to detect climate change effects.

Go to Report or www.epa.gov/climatechange

BASINS and WEPP Climate Assessment Tools (CAT): Case Study Guide to Potential Applications (Final Report). EPA/600/R-11/123F. Case studies illustrate tools capabilities for assessing potential effects of climate change on streamflow and water quality.

Go to Report or www.epa.gov/climatechange

Keeping an Eye on Wetlands. EPA's National Wetland Condition Assessment scheduled for completion December 2013; statistical survey of quality of US wetlands.

Go to Article or http://www.epa.gov/ncea/global

AQUATOX - Linking Water Quality and Aquatic Life. New update available for aquatic systems simulation model; predicts fate of pollutants and ecosystem effects.

Go to Report or water.epa.gov/scitech/datait/

From Collaborators

USGS - Impacts of Climate Change on Biodiversity, Ecosystems, and Ecosystem Services. Staudinger, M.D., et al., 2012. Biodiversity and ecosystems are changing more rapidly than predicted.

Go to Report or www.usgs.gov

USGS - Effects of Urban Development on Stream Ecosystems in Nine Metropolitan Study Areas across the United States. Coles, J.F., et al., 2012. USGS Circular 1373. Stream degradation and species loss begins at initial stages of urbanization.

Go to Report or www.usgs.gov

A National Strategy for Advancing Climate Modeling (2012). With the need for advancements in climate projection models, a common software infrastructure could help speed progress.

Go to Article or http://www.dels.nas.edu/

USGS - Nutrient and Suspended-Sediment Trends, Loads, and Yields and Development of an Indicator of Streamwater Quality at Nontidal Sites in the Chesapeake Bay Watershed, 1985-2010. Langland, M., 2012. USGS SIR 2012-5093. New water-quality indicator combines results of 10-year trend analysis with results from a greater number of sites.

Go to Report or www.usgs.gov

USGS - Flux of Nitrogen, Phosphorus, and Suspended Sediment from the Susquehanna River Basin to the Chesapeake Bay during Tropical Storm Lee, September 2011, as an Indicator of the Effects of Reservoir Sedimentation on Water Quality. Hirsch, R.M., 2012. USGS SIR 2012-5185. Discusses importance of brief high-flow events in releasing nitrogen, phosphorus, and sediment stored in the Conowingo Reservoir to the Chesapeake Bay.

Go to Report or www.usgs.gov

USGS - Binational Ecological Risk Assessment of Bigheaded Carps (*Hypophthalmichthys* spp.) for the Great Lakes Basin. Cudmore, B., et al., 2012. Invasive Asian carp poses threat to the Great Lakes.

Go to Report or www.dfo-mpo.gc.ca/csas-sccs/

NGWA – Streamflow Depletion by Wells - Understanding and Managing the Effects of Groundwater Pumping on Streamflow. Barlow, P.M. and L.A Stanley, 2012. 1376. Report points to factors that control the timing, rates, and locations of streamflow depletion caused by groundwater pumping.

Go to Report or http://water.usgs.gov/ogw/

WERF - Development of the Integrated Urban Water Management Tool. Reichel, B.I., et al., 2012. Tool to forecast water demand, waste, and associated costs for water management scenarios.

Go to Report or www.iwaponline.com

The Effect of Wet Weather Driven Dissolved Oxygen Sags on Fishes in Urban Systems. Wolfe, J.R., 2012. Studies fish responses to levels of dissolved oxygen by tracking movement of externally mounted dissolved oxygen (DO) transmitters on fish.

Go to Report or www.werf.org

DOI - WaterSMART: A Three-Year Progress Report. Describes how the program is saving water, helping to meet future water demands.

Go to Report or www.usbr.gov

When It Rains, It Pours: Global Warming and the Increase in Extreme Precipitation from 1948-2011. Madsen, T. and N. Willcox, 2012. Precipitation records indicate increase in severity and frequency of storms.

Go to Report or www.frontiergroup.org

USFWS - National Fish Passage Program: Creating Aquatic Possibilities; 2011 Annual Report and Future Outlook. Hume, C., 2012. Removal of 158 dams and culverts in 2011 helped improve water quality for 2,180 miles of streams.

Go to Report or www.fws.gov

USGS - National Water Monitoring News. Newsletter fosters partnerships and collaboration; highlights advances in water science.

Go to Article or http://acwi.gov/

Colorado River Basin Water Supply and Demand Study. Report offers 50-year projection for supply and demand on the Colorado.

Go to Report or www.usbr.gov

From Journals

NOAA Releases Report: State of the Climate in 2011. Blunden, J. and D. S. Arndt, Eds., 2012. *Bulletin of the American Meteorological Society,* 93(7), S1-S264.

Go to Article or www.ncdc.noaa.gov/

Can We Predict Nutrient Limitation in Streams and Rivers? Keck, F. and F. Lepori, 2012. *Freshwater Biology,* 57(7), 1410-1421.

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Temporal Changes in Aquatic-Invertebrate and Fish Assemblages in Streams of the North-Central and Northeastern US. Kennen, J. G., et al., 2012. *Ecological Indicators,* 18, 312-329.

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A Process-Based and Distributed Model for Nutrient Dynamics in River Basin: Development, Testing and Applications. Alam, M.J. and D. Dutta, 2012. *Ecological Modeling,* 247, 112-124.

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Urban Wet Weather Flows. Rangarajan, S., et al., 2012. *Water Environment Research,* 110, 861-970.

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Evaluating the Relationship between Basin-Scale Fish Species Richness and Ecologically Relevant Flow Characteristics in Rivers Worldwide. Iwasaki, Y., et al., 2012. *Freshwater Biology,* 57(10), 2173-2180.

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Determining Vulnerability of Stream Communities to Climate Change at the Landscape Scale. Bush, A., et al., 2012. *Freshwater Biology,* 57(8), 1689-1701.

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What's a Stream Without Water? Disproportionality in Headwater Regions Impacting Water Quality. Armstrong, A., et al., 2012. *Environmental Management,* 50(5), 849-860.

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Identifying the Spatial Scale of Land Use that Most Strongly Influences Overall River Ecosystem Health Score. Sheldon, F., et al., 2012. *Ecological Applications,* 22(8), 2188-2203.

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The Impact of Chemical Pollution on Biodiversity and Ecosystem Services: the Need for an Improved Understanding. Backhaus, T., et al., 2012. *Integrated Environmental Assessment and Management,* 8(4), 575-576.

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Impacts of Hypoxia on Zooplankton Spatial Distributions in the Northern Gulf of Mexico. Roman, M.R., et al., 2012. *Estuaries and Coasts,* 35(5), 1261-1269.

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Nitrogen Removal in Constructed Wetlands Using Nitritation/Anammox and Nitrification/ Denitrification: Effects of Influent Nitrogen Concentration. Tao, W., et al., 2012. *Water Environment Research,* 84(12), 2099-2105.

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Extinction Rates in North American Freshwater Fishes, 1900–2010. Burkhead, N.M., 2012. *Bioscience,* 62(9), 798-808.

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Community Congruence of Plants, Invertebrates and Birds in Natural and Constructed Shallow Open-Water Wetlands: Do We Need to Monitor Multiple Assemblages? Rooney, R. C. and S. E. Bayley, 2012. *Ecological Indicators,* 20, 42-50.

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Anomalous Biogeochemical Response to a Flooding Event in the Delaware Estuary: A Possible Typology Shift Due to Climate Change. Voynova, Y. G. and J. H. Sharp, 2012. *Estuaries and Coasts,* 35(4), 943-958.

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The Freshwater Shrimp *Atyaephyra desmarestii* (Millet, 1831) as a Bioindicator of Hypoxic Event Effects on Temperate Freshwater Systems. Gonzalez-Ortegon, E., et al., 2012. *Ecological Indicators,* 18, 236-242.

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Development and Validation of Two Fish-Based Indices of Biotic Integrity for Assessing Perennial Coolwater Streams in Wisconsin, USA. Lyons, J., 2012. *Ecological Indicators,* 23, 402-412.

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Bringing New Knowledge to an Old Problem: Building a Biotic Index from Lotic Macroinvertebrate Traits. Monaghan, K. A. and A.V.M. Soares, 2012. *Ecological Indicators,* 20, 213-220.

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Development of Environmental Quality Indexes Based on Fuzzy Logic: A Case Study. Peche, R. and E. Rodriguez, 2012. *Ecological Indicators,* 23, 555-565.

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AQUAFLORA: A Predictive Model Based on Diatoms and Macrophytes for Streams Water Quality Assessment. Feio, M. J., et al., 2012. *Ecological Indicators,* 18, 586-598.

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Water Quality Assessment, by Statistical Analysis, on Rural and Urban Areas of Chocancharava River (Rio Cuarto), Cordoba, Argentina. Gatica, E. A., et al., 2012. *Environmental Monitoring and Assessment,* 184(12), 7257-7274.

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Bivalve-Enhanced Nitrogen Removal from Coastal Estuaries. Carmichael, R. H., et al., 2012. *Canadian Journal of Fisheries and Aquatic Sciences,* 69(7), 1131-1149.

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Coastal Eutrophication as a Driver of Salt Marsh Loss. Deegan, L.A., et al., 2012. *Nature,* 490, 388-392.

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Developing a Framework to Measure Watershed Sustainability by Using Hydrological/Water Quality Model. Sood, A. and W.F. Ritter, 2011. *Journal of Water Resource and Protection,* 3(11), 788-804.

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Why Is Achieving Good Ecological Outcomes in Rivers so Difficult? Harris, G. P. and A. L. Heathwaite, 2012. *Freshwater Biology,* 57, 91-107.

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Identifying Major Stressors: The Essential Precursor to Restoring Cultural Ecosystem Services in a Degraded Estuary. Davis, J. and I. M. Kidd, 2012. *Estuaries and Coasts,* 35(4), 1007-1017.

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Nutrients and Drinking Water. Warner, J., 2012. *Drinking Water Research,* 22(3), 6-13.

Go to Article or www.waterrf.org

Stormwater Contaminant Loading following Southern California Wildfires. Stein, E.D., et al., 2012. *Environmental Toxicology and Chemistry,* 31(11), 2625-2638.

Go to Article or www.setac.org

Temporal Variability in the Spatial and Environmental Determinants of Functional Metacommunity Organization–Stream Fish in a Human-Modified Landscape. Eros, T., et al. *Freshwater Biology,* 57(9), 1914-1928.

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The Use of Benthic Invertebrate Community and Water Quality Analyses to Assess Ecological Consequences of Fish Farm Effluents in Rivers. Guilpart, A., et al., 2012. *Ecological Indicators,* 23, 356-365.

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A Global Pattern of Thermal Adaptation in Marine Phytoplankton. Thomas, M.K., et al., 2012. *Science,* 338(6110), 1085-1088.

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Robustness of the Estuarine Fish Assessment Index (EFAI) Regarding Water Body Definition Criteria. Goncalves, C. I., et al., 2012. *Ecological Indicators,* 20, 1-8.

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Impact of Tributyltin on Immune Response and Life History Traits of *Chironomus riparius*: Single and Multigeneration Effects and Recovery from Pollution. Lilley, T. M., et al., 2012. *Environmental Science & Technology,* 46(13), 7382-7389.

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Eutrophication Induced CO_2– Acidification of Subsurface Coastal Waters: Interactive Effects of Temperature, Salinity, and Atmospheric PCO_2. Sunda, W.G. and W.J. Cai, 2012. *Environmental Science & Technology,* 46(19), 10651-10659.

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Mercury Dynamics in a San Francisco Estuary Tidal Wetland: Assessing Dynamics Using *In Situ* Measurements. Bergamaschi, B. A., et al., 2012. *Estuaries and Coasts,* 35(4), 1036-1048.

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PETROTOX: An Aquatic Toxicity Model for Petroleum Substances. Redman, A. D., et al., 2012. *Environmental Toxicology and Chemistry,* 31(11), 2498-2506.

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Acute Effects of Road Salts and Associated Cyanide Compounds on the Early Life Stages of the Unionid Mussel *Villosa iris*. Pandolfo, T. J., et al., 2012. *Environmental Toxicology and Chemistry,* 31(8), 1801-1806.

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Recent and Upcoming Meetings

2013 AWRA Annual Water Resources Conference. November 4-7, 2013 in Portland, OR.

Go to Meeting Page or www.awra.org

2013 AWRA Spring Specialty Conference: Agricultural Hydrology and Water Quality II. March 25-27, 2013 in St. Louis, MO.

Go to Meeting Page or www.awra.org

8th Annual WERF Research Forum. January 29-30, 2013 in Chicago, IL.

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National Adaptation Forum: Action Today for a Better Tomorrow. April 2-4, 2013 in Denver, CO.

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Climate Leadership Conference. February 27-March 1, 2013 in Washington, DC.

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The National and International Conference on Groundwater. April 28-May 2, 2013 in San Antonio, TX.

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