Focusing on: Progress Made on Initiatives formerly known as "Actions for Change"

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EC 1165-2-211: "Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs"

EC 1165-2-211 has been posted on the United States Army Corps of Engineers (USACE) publications page — *http://140.194.76.129/publications/eng-circulars/*. It provides USACE guidance for incorporating the direct and indirect physical effects of projected future sea-level change in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects and systems of projects.

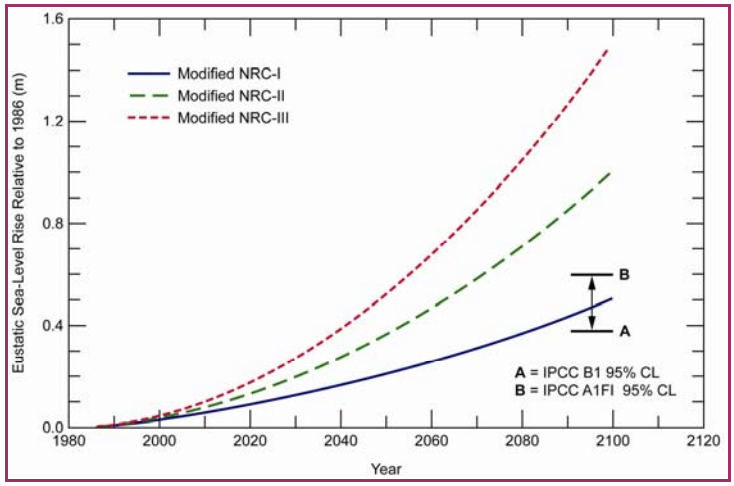
Updated Sea-Level Change Guidance for the U.S. Army Corps of Engineers

Kathleen D. White, IWR, and Heidi P. Moritz, NWP

The American Society of Civil Engineers post-Katrina review panel stressed the need for the U.S. Army Corps of Engineers to incorporate new and changing information in its public infrastructure projects. For coastal projects, the types of new and changing information to be incorporated include subsidence, local relative sea-level changes, and changing patterns in frequency and intensity of coastal storms. Recent guidance has been issued for subsidence and datums. The many USACE projects within the coastal zone will feel the impacts of sea-level change. Prudent stewardship of public infrastructure requires that USACE evaluate potential climate change impacts, including sea-level change, to it projects. The new guidance (see story above) calls for incorporating the direct and indirect physical effects of projected future sea-level change in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects and systems of projects.

The guidance on sea-level recommends using a multiple scenario approach to deal with key uncertainties for which no reliable or credible probabilities can be obtained. In the context of USACE planning, using multiple scenarios helps us address uncertainty and to develop better risk-informed alternatives. The new guidance reflects our philosophy that we must be prepared to implement flexible planning and engineering adaptations that account for a range of possible changes. Three sea-level change scenarios are to be considered: 1) a continuation of the local mean relative sea-level trend, the "low" case, 2) an "intermediate" rate of local mean sea-level change using the modified Curve I provided in the guidance that is from the National Research Council's (NRC) report *Responding to Changes in Sea Level: Engineering Implications*, and 3) a "high" rate of local sea-level change using the modified NRC Curve III provided in the guidance.

In preparing the new sea-level change guidance, USACE relied entirely on climate change science performed and published by agencies and entities external to the U.S. Army Corps of Engineers. Sea-level change is a subject of intense study, and new knowledge and understanding of the drivers and outcomes of sea-level change will require updating of this guidance.
POC: Dr. Kathleen White, *Kathleen.D.White@usace.army.mil*, and Heidi Moritz, *Heidi.P.Moritz@usace.army.mil*.



Modified NRC (1987) eustatic sea-level rise scenarios and the IPCC (2007) scenario estimates for use in predicting future sea-level change.

Summary of the Proceedings of the USACE HH&C National Coastal Working Group Meeting, 1-2 June 2009

Brian Williams, SAC

The U.S. Army Corps of Engineers Hydraulics, Hydrology & Coastal (HH&C) Community of Practice Coastal Working Group (CWG) convened a meeting in San Diego, California, 1-2 June 2009, in advance of the 86th Coastal Engineering Research Board (CERB) Meeting. The theme of the CERB meeting was "Coastal Data: Requirements and Use," and many presentations and discussions during the CWG meeting echoed this theme. MG Bo Temple, Director of Civil Works USACE and President of the Coastal Engineering Research Board, attended part of the meeting. USACE Headquarters, ERDC, IWR, 18 Districts and 4 Divisions were represented by 70 attendees at the meeting, hosted by the Los Angeles District. The meeting agenda was packed with topics relevant to coastal USACE personnel and the nation as a whole.

After opening remarks and a briefing on new developments regarding the Corps' HH&C Community of Practice, Heidi Moritz from Portland District presented the results of a nationwide survey, sent to the CWG members, concerning the collection and use of coastal data. The survey, which was conceived during one of the monthly CWG teleconferences, received 100% response from coastal Districts. Almost every District listed wave data as a primary need, important to note since all wave buoys data collection depends on congressional funding. Another major theme of the survey results was the need to collect coastal data outside authorized project boundaries. This is particularly important due to the increased emphasis on utilizing a systems-based approach for Corps' studies and to requirements for successful Regional Sediment Management (RSM) projects. Some ideas for action in Moritz's presentation included: 1) a standardized and accessible data storage platform that is robust, adaptive, discoverable, and not program-specific; 2) the development of consistent national guidance and a data collection standard with identified points of contact for each type of data; 3) the call for a move toward consistent base-level funding of long-term data needs; and 4) the identification of gaps in data collection that have the potential to put people and projects at risk.

RSM principles and the application of and needs for RSM were mentioned repeatedly throughout the meeting. RSM uses a systems-based approach for sediment resource management. Jeff Waters of ERDC/CHL, Program Manager for RSM, reported there are 24 USACE Districts involved in RSM projects during FY09. Lynn Martin of IWR presented a summary of the April 2009 RSM Policy and Implementation Workshop. Please see *http://www.iwr.usace.army.mil/waterresources/plan/rsmworkshop.cfm* for information concerning the workshop. Dr. Barbara Kleiss, Mississippi Valley Division, presented the current status of the Mississippi River Diversions in South Louisiana. One question that study seeks to answer is whether river diversions can be used to capture and/or retain sediment. Dr. Kleiss provided several examples of diversions currently functioning with various degrees of success.

A District/Division "Blitz" was designed to give each coastal District and Division 5 minutes to present their top highlights, concerns, lessons learned, and problems/needs relative to coastal issues over the past year. The 22 Blitz presentations echoed the interest and passion of each coastal District and Division. The presentations also highlighted tools currently being used to solve coastal issues.

MG Temple concluded the meeting by thanking attendees for their high level of performance and challenging them to seize the opportunity to learn and to improve the Corps' coastal program by focusing on the physical, economic, financial, political, and social conditions in all future planning. He also encouraged the group to maintain contact with groups outside the Corps, i.e., academia and international partners, to help maintain the Corps' reputation as a national treasure. (POC for CWG: Lynn Bocamazo, *Lynn.M.Bocamazo@usace.army.mil*)

Sensing Levee Under-Seepage

Jose Llopis, GSL

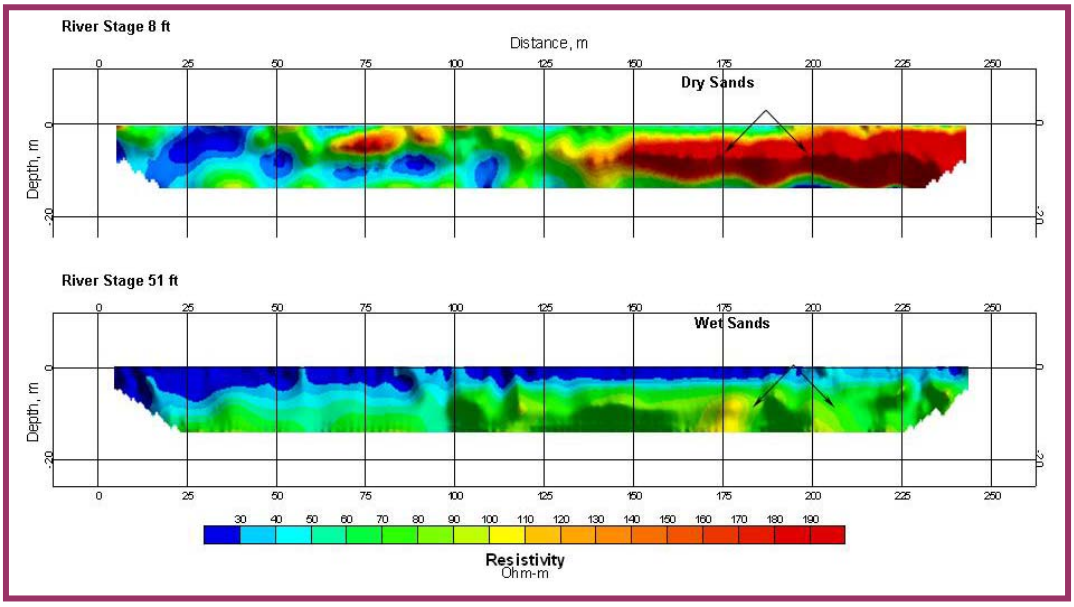
A section of the Mississippi River levee near Eagle Lake, MS, known as Buck Chute is a test site for research to assess geophysical methods as a means to monitor levee under-seepage. Under-seepage generally results in surface seepage, which is usually seen in the form of sand boils. Sand boils can be indicators of possible levee failure sites. This research concentrates on developing the capability to rapidly collect information about levee and levee foundation conditions and to disseminate that data to decision-makers during emergency operations, particularly where levee failure is possible.

Buck Chute was selected because it has a history of seepage. There is concern that future river flooding episodes may cause sand boils to appear again which could lead to a failure of the levee in that area.

Soil temperatures probes, water content reflectometers, and soil water content profile probes have been installed along the toe to detect seepage events in the upper 2 m (6.5 ft). An automated electrical resistivity array was also installed along the toe. This array is designed to detect changes in soil electrical properties to depths of approximately 13 m (43 ft). Changes in soil resistivity are an indication of under-seepage, since soil electrical properties are greatly affected by water content. When collected periodically, the electrical resistivity data can be used to map changes in the vertical and horizontal extent of the seepage. Soil temperature probes, water content reflectometers, and soil water content profile probes collect data at a point, but the electrical resistivity method allows data to be collected in a continuous fashion along the entire length of the array, in this case 248 m (813 ft). Data can be collected daily from Buck Chute via a cell phone network, post-processed, and then displayed on the Corps Integrated Levee Assessment Utility, a web-based utility under development at CRREL. Levee managers and emergency response personnel will have the ability to use the Integrated Levee Assessment Utility to remotely monitor conditions of Buck Chute or any other similarly instrumented area. When the instruments detect water, personnel will be able to pinpoint the sites to visit and then be better informed when making emergency management decisions.

Monitoring conditions of a levee suspected to be weakened by under-seepage in near real-time will provide levee managers ample time to activate emergency response plans. Future planned enhancements include self-potential monitoring (a geophysical survey method which measures natural voltages caused by subsurface flow) and expanding the number of electrical resistivity arrays to allow for three-dimensional mapping of subsurface flow. This research is being conducted by the U.S. Army Engineer and Research Development Center (ERDC) under

the Flood and Coastal Storm Damage Reduction Research and Development Program. POC: Jose L. Llopis, *Jose.L.Llopis@usace.army.mil*.



Cross sections comparing soil resistivity values during dry (top plot) and flooding (bottom) periods, protected toe, Mississippi River levee, Buck Chute, MS. Note the difference in resistivity values between the two plots between 150 and 225 m.

Flood Risk Assessment Model For Complex Riverine Systems

Mike Deering, HEC

For more than two decades the U.S. Army Corps of Engineers has required its planning processes address the Nation's water resources needs in a systems context. Corps policy also requires that flood risk management studies adopt risk analysis. While the Corps has a requirement for systems approaches using risk analysis, there is little guidance and few tools to support these requirements. The USACE Institute for Water Resources and the USACE Civil Works Research and Development (R&D) program have sponsored investigations into the development of a new tool which would analyze complex riverine systems while implementing the flood risk analysis and systems requirements. This new tool, HEC-FRM (Flood Risk Management), is the next generation of the Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA) model.

The HEC-FRM framework starts from the organization and structure of another systems tool being created from the R&D program called HEC-WAT, or the Watershed Analysis Tool. FRM will operate within the WAT as a computational option if the user chooses to perform plan formulation or system performance analyses. FRM will have the capability to sample from a predefined flow-frequency with associated inflow hydrographs, or utilize the HEC-HMS (Hydrologic Modeling System) and HEC-ResSim (Reservoir Simulation) models in the WAT to generate inflows to the system. A levee fragility curve (stage vs. probability of failure) sampling utility in the WAT will assign levee failure elevations to be used in HEC-RAS (River Analysis

System). The selected inflow hydrographs are then routed down the system using HEC-RAS. Where failures occur, breach hydrographs will be made available to a spreading model to delineate inundation areas and compute depths, velocities and duration in the consequence area of interest. Once the inundation and gridded hydraulics data are determined, those data are made available for HEC-FIA (Flood Impact Analysis) to compute consequences. The FRM process will apply the Monte Carlo simulation, a numerical-analysis procedure that computes the expected value of consequences ($ damage, loss-of-life, etc) while explicitly accounting for the uncertainty in the parameters used to determine those flood inundation consequences. FRM will be configured to allow for a life-cycle type computation of consequences and associated performance indices. (POC: Mike Deering, *Michael.K.Deering@usace.army.mil*)

Rapid Repair of Levee Breaches

Dr. Jimmy Fowler, CHL

The devastating losses associated with Hurricane Katrina following the breaches of the levees in and around New Orleans renewed interest in the critical need for a rapid levee repair capability. To make a substantial difference in interior flood levels and damages, first responses in levee repair efforts must occur quickly to minimize the amount of flooding through the breach and to avoid additional growth of the breach and "unraveling" of the levee. In FY 2008, the Department of Homeland Security Advanced Research Projects Agency (HSARPA) and the Southeast Region Research Initiative (SERRI) funded a Coastal and Hydraulic Laboratory (CHL) led project to develop and demonstrate concepts for Rapid Repair of Levee Breaches (RRLB).

To achieve the ability to respond rapidly, CHL developed concepts and strategies that focus on solutions that are helicopter transportable and deployable. A fast-paced study of many different concepts for the rapid repair of breached levees led to the development of promising new methods to accomplish such repairs, potentially even when massive amounts of water are flowing through the breach. This method is currently being developed/refined and features a large water-filled fabric-reinforced tube that is filled on-site after delivery by helicopter.

Figure 1. Intermediate Scale Model used in the RRLB Study.

Early efforts featured small- (1:50) and intermediate-scale (1:16) physical model tests, all conducted at CHL facilities at the U.S. Army Engineer Research and Development Center – Waterways Experiment Station (WES). All aspects of these physical model experiments were tested such that all results could be properly extrapolated to full scale system requirements and conclusions. Initial results from these experiments were quite promising and led to a program that focused on three concepts for rapid repair of levee breaches, including: 1) a manually deployable system that allows water to flow over an earthen dam or embankment while

preventing erosion to the underlying surface; 2) a fabric tube system for stopping flow over a wide, shallow breach; and 3) a fabric tube system for stopping flow through a deep breach.

Following the small and intermediate scale experiments, each of the three concepts were evaluated at large scale using the facilities available at the Hydraulic Engineering Research Unit (HERU) of the Agricultural Research Service in Stillwater, OK. Each of the three concepts involves the use of reinforced fabric tubes filled on-site with locally available water. All concepts tested at HERU yielded promising results, matching the results obtained at small and intermediate scales.

Figure 2. Large Scale Model used at HERU in the RRLB study.

Present studies are focused on development of viable rapid methods for delivering, filling, and placing these systems. To date these studies have involved the use of the intermediate scale models and facilities at WES. Preliminary results from these experiments indicate that no single method is suitable for all levee types or breach scenarios and that the system developed must be tailorable for maximum utility and effectiveness. One of the most promising options for such a system incorporates the ability to use on-board air bladders to allow the fabric tubes to be initially floated/towed into position, and once it is drawn into and "seated" within the breach have the air removed.

All test results to date have been encouraging and have demonstrated that a rapidly emplaced concept that uses water-filled fabric designs for closing breaches through which large volumes of water are flowing is within reach. The next step on the road ahead involves the design and construction of a full-scale test facility that can be used to test the operational concepts and operational guidelines for deploying these levee closure devices and to test this new class of rapid levee repair technology. It is anticipated that such a facility will be available for testing in FY 2010. POCs include: Dr. Donald Resio, *Donald.T.Resio@usace.army.mil*; Dr. Jimmy E. Fowler, *Jimmy.E.Fowler@usace.army.mil*; Stanley Boc, *Stanley.J.Boc@usace.army.mil*.

Demonstration of the Rapid Repair of Levee Breaches

Dr. Jimmy Fowler, CHL

The Rapid Repair of Levee Breaches (RRLB) Program will hold a demonstration of the new technologies that have been developed as part of this effort. These technologies include the Portable Lightweight Ubiquitous Gasket (PLUG), the Rapidly Emplaced Protection for Earthen Levees (REPEL), and the Rapidly Emplaced Hydraulic Arch Barrier (REHAB).

The demonstration will include 1/4 scale model emplacements of the above mentioned technologies within an active water flow environment with 125 CFS flow rate. The demonstration will be held at the Hydraulic Engineering Research Unit, (HERU), Stillwater, Oklahoma on 9 November 2009. The RRLB program is sponsored by the Department of Homeland Security, Advanced Research Projects Agency (HSARPA) & U.S. Army Engineer Research and Development Center (ERDC). Register online at the event website: *http://chl.erdc.usace.army.mil/rrlb/rrlbdemo2009.htm*

National Flood Risk Management Program

Dinah McComas, CHL, & Jeffrey Jensen, IWR

In May of 2006, the U.S. Army Corps of Engineers (USACE) established the National Flood Risk Management Program (NFRMP) for the purpose of integrating and synchronizing USACE flood risk management programs and activities with counterpart activities of the Department of Homeland Security Federal Emergency Management Agency (FEMA), other Federal agencies, state organizations and regional and local agencies. USACE is transitioning from a narrow focus on flood damage reduction to a broader focus on flood risk management. Flood risk management is defined as a combination of managing the floodwaters to reduce the probability of flooding (i.e. structural approaches such as levees and dams) and managing the floodplains to reduce the consequences of flooding. Also, flood risk management must be a collaborative effort since other agencies external to USACE have roles, responsibilities, and authorities in floodwater and floodplain management.

It is the long term goal of USACE to work through the National Flood Risk Management Program with other Federal agencies, state and local governments and agencies, and the private sector to develop a national flood risk management strategy that eliminates conflicts between different flood risk management programs and takes advantage of all opportunities for collaboration. The objectives of the National Flood Risk Management Program are to:

1. Coordinate USACE programs and activities that contribute to managing flood risk.
2. Manage flood risk in a "Life Cycle" watershed framework that integrates, Emergency Management, Dam and Levee Safety, Planning and Operations.
3. Coordinate Flood Risk Management policies, programs and activities with Federal, State and local partners.

In June 2009 Headquarters USACE issued initial guidance to establish the NFRMP. A Headquarters USACE implementation team conducted a series of regional workshops over the past summer to gather additional feedback from the MSCs. Final implementation guidance for the NFRMP should be released soon. (POC: Jeffrey Jensen, *Jeffrey.D.Jensen@usace.army.mil*)

Some Recent Corps Publications

Bailey, P. (2009). *Prairies and water management on Corps lands.* U.S. Army Engineer Research and Development Center, Ecosystem Management and Restoration Research Program, ERDC TN-EMRRP-ER-11. *http://el.erdc.usace.army.mil/elpubs/pdf/er11.pdf*

Brown, G. L., G. Savant, C. Berger, and D. S. Smith. (2009). *Considerations for stationary ice covered flows in ADaptive Hydraulics (ADH).* U.S. Army Engineer Research and Development Center, ERDC TN-SWWRP-09-4. *http://libweb.wes.army.mil/uhtbin/hyperion/TN-SWWRP-09-4.pdf*

Johnson, B. E., and Z. Zhang. (2009). *Development of a river and stream water quality module.* U.S. Army Engineer Research and Development Center, Environmental Laboratory, ERDC/EL TR-09-4. *http://el.erdc.usace.army.mil/elpubs/pdf/trel09-4.pdf*

Killgore, K. J., J. J. Hoover, and C. E. Murphy. (2008). *Library of habitat models to evaluate benefits of aquatic restoration projects on fishes.* U.S. Army Engineer Research and Development Center, Ecosystem Management and Restoration Research Program, ERDC TN-EMRRP-ER-10. *http://el.erdc.usace.army.mil/elpubs/pdf/er10.pdf*

Ray, G. L. *Application of habitat equivalency analysis to USACE projects.* U.S. Army Engineer Research and Development Center, ERDC TN-EMRRP-EI-04. *http://el.erdc.usace.army.mil/elpubs/pdf/ei04.pdf*

Riveros, G. A., J. L. A. Burgos, and J. Perez. *Numerical investigation of miter gates.* U.S. Army Engineer Research and Development Center, Information Technology Laboratory, ERDC/ITL TR-09-1. *http://libweb.wes.army.mil/uhtbin/hyperion/ITL-TR-09-1.pdf*

Savant, G., and C. Berger. (2009). *Considerations for modeling flow control structures in ADaptive Hydraulics (ADH).* U.S. Army Engineer Research and Development Center, ERDC TN-SWWRP-09-3. *http://libweb.wes.army.mil/uhtbin/hyperion/TN-SWWRP-09-3.pdf*

Wendland, L., H. Balbach, M. Brown, J. D. Berish, R. Littell, and M. Clark. (2009). *Handbook on gopher tortoise (Gopherus polyphemus): Health evaluation procedures for use by land managers and researchers.* U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory, ERDC/CERL TR-09-1. *http://www.cecer.army.mil/techreports/ERDC-CERL_TR-09-1/ERDC-CERL_TR-09-1.pdf*

Zarillo, G. A., J. Kelley, and V. Larson. *A GIS based tool for extracting shoreline positions from aerial imagery (beach tools). Revised.* U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory, ERDC/CHL CHETN-IV-73. *http://chl.erdc.usace.army.mil/library/publications/chetn/pdf/chetn-iv-73.pdf*

Of Interest...

A water supply workshop held in Tulsa, OK on 2-3 June, was attended by 64 people representing Army General Counsel, HQUSACE, four MSC's, 12 districts, IWR, the NWD Hydropower Analysis Center as well as representatives from the Southwestern Power Administration and the states of Texas, Oklahoma and Kansas. See the September 2009 issue of 'Planning Ahead.' *http://www.usace.army.mil/CECW/PlanningCOP/Documents/pa_newsletter/v12i8.pdf*

The latest issue of "The Corps Environment" has just been released and is available at: *https://environment.usace.army.mil/corps_environment/index.cfm* .Under "Current Published Article," check out the Los Angeles District article, "Constructed wetlands built to sustain." Also, look under the "Web-Exclusive" section for the New England District article, "Critical dam repair under way in New England."

PROSPECT Courses FY 2010

No.	Title	Dates	Location
164	Water and the Watershed	12–16 November 2009	Davis, CA
209	Risk Analysis-Flood Damage Reduction	7–11 December 2009	Davis, CA
13	Coastal Engineering	22–26 February 2010	Vicksburg, MS
394	Advanced Streambank Protection	5–9 April 2010	Grenada, MS
11	Coastal Project Planning	19–23 April 2010	Duck, NC
270	Economic Analysis	19–23 April 2010	Alexandria, VA
123	Flood Frequency Analysis	17–21 May 2010	Davis, CA
11	Coastal Project Planning	30 August - 3 September 2010	Duck, NC

Additional Information: *http://pdsc.usace.army.mil/downloads/PurpleBook2010.pdf*

Conferences

This listing is for information only and is not a complete list of FRM-related meetings. These meetings are not endorsed by the Corps of Engineers unless specifically stated.

4–8 October 2009 — International Water Conference, Orlando, FL, *www.eswp.com/water*

13–15 October 2009 — Pacific Northwest Waterway Association (PNWA) 2009 Annual Meeting, "Celebrating the Past, Shaping the Future," Vancouver, WA, *www.pnwa.net*

14–16 October 2009 — American Shore and Beach Preservation Association, "National Coastal Conference: Integrating Science and Policy," St. Petersburg, FL, *www.asbpa.org/*

15–16 October 2009 — Virginia Water Research Conference, "Water Resources in Changing Climates," Richmond, VA, *www.vwrrc.vt.edu/2009conference.html*

20–23 October 2009 — National Association of Flood and Stormwater Management Agencies, Colorado Springs, CO, *www.nafsma.org/meetings-upcoming.php*

26–28 October 2009 — 2009 California Water Conference, "Changing Tides in the Inland Sea – A Confluence of Challenges and Opportunities," Sacramento, California, *http://www.samesacramento.org/*

3–5 November 2009 — Mid-Atlantic Stream Restoration Conference, "The Benefits of Stream Restoration," Morgantown, WV, *http://www.canaanvi.org/canaanvi_web/events_ed.aspx?collection=cvi_workshops&id-141*

10–12 November 2009 — 4th International Conference and Exhibition on Consequences of Climate Change and Flood Protection (acqua alta 2009) – *http://www.hamburg-messe.de/acquaalta/acquaalta_en/start.php*

10–13 December 2009 — 2009 National Ground Water Association (NGWA) Ground Water Expo and Annual Meeting – New Orleans, LA – *http://www.ngwa.org/*

3–5 February 2010 — National Conference on Beach Preservation, Melbourne, FL, *http://www.fsbpa.com/seminar.htm*

25–28 April 2010 — Ports 2010, Jacksonville, FL, *http://content.asce.org/conferences/ports2010/*

16–21 May 2010 — Association of State Floodplain Managers 34th Annual National Conference, "Building Blocks of Floodplain Management," Oklahoma City, OK, *http://www.floods.org/*

27 June – 1 July 2010 — Joint Federal Interagency Conference – 9th Federal Interagency Sedimentation Conference (FISC) and 4th Federal Interagency Hydrologic Modeling Conference (FIHMC). Las Vegas, NV. *http://www.jfic2010.org/*

30 June – 5 July 2010 — International Conference on Coastal Engineering, Shanghai, China, *http://www.icce2010.cn/*

23–27 August 2010 — Watershed Management Conference, "Innovations in Watershed Management under Land Use and Climate Change," Madison, WI, *http://content.asce.org/conferences/watershedmanagement2010/index.html*

5–9 September 2011 — Coastal Structures 2011, Yokohama, Japan. *http://www.jsce.or.jp/committee/ocean/coastalstructures/*

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To subscribe/unsubscribe: *http://operations.usace.army.mil/flood.cfm*.

We would love your input – recommended article length is ½ to 1 page. Articles should be submitted to Doyle L. Jones, Canvassing Editor, *Doyle.L.Jones@usace.army.mil*.

Also, we would appreciate your feedback. Contact Dinah McComas, Managing Editor, *Dinah.N.McComas@usace.army.mil* or Doyle Jones.

Upcoming Newsletter Themes

So you can begin to formulate articles for future issues, here is the current plan for newsletter themes:

December 2009 — Non-structural flood risk management alternatives