AIH BULLETIN

SPRING/SUMMER 2020

President's Message

I want to greet you all and thank the large number of American Institute of Hydrology (AIH) members who renewed their membership before the January 15 deadline. It certainly helps with planning activities and initiatives for the New Year. We've had a few retirements, but we have added some new members in 2019, as well. The Institute is growing - yes, slowly, but it is growing. I believe that a lot of the growth came about due to two initiatives. One is related to the three webinars we offered in 2019. The other initiative is the connection that we have had with the American Water Resources Association (AWRA) over the past three years, with the initiative being led by President-Elect, Jamil Ibrahim (Stantec) and Vice President (VP) for Institute Development, Julé Rizzardo (State of California Water Resources Control Board). They both have worked hard at getting the word out about AIH, clearly sending the message about why it is beneficial to be certified professionally.

For the Executive Committee (EC), we had the retirement of four members in 2019: Treasurer, Greg Bevenger (WyoHydro Professional Hydrology); VP for Academic Affairs, Faisal Hossain (University of Washington); VP for Communications, Rahul Ranade (Lidstone & Company Law Corporation) ; and VP for International Affairs, Zhuping Sheng (Texas A&M University). These positions have been filled by vote from the membership, electing Zhong Zhang (Portland State University) as VP for Academic Affairs, Salam Murtada (Minnesota Department of Natural Resources) as Treasurer, Yige Gao (Gwinnett County Department of Water Resources) as VP for International Affairs, and Brennon Schaefer (Minnesota Department of Agriculture) as VP for Communications. The efforts provided by the former EC members are appreciated, as it is looked forward to the contributions that the new members will provide.

In recognition of the need to improve our member application review and examination administration processes, new initiatives for the Institute in 2020 include rebuilding the Board of Registration and the Board of Examinations. We hope to have at least two member volunteers for each of our four speciality areas for certification (groundwater, hydrologic technician, surface water, and water quality) represented on the Board of Registration and the Board of Examinations.

Nick Textor (Environmental Design International, Inc.) is the current Chair of the Board of Registration. Recent appointees to the Board of Registration include Rahul Ranade for surface water and Matt Young (Santa Barbara County Water Agency) for water quality. As noted above, we would like to have two volunteer members on the Board of Registration for each of our four areas of specialization. One of the volunteers will be asked to serve as Secretary for the Board of Registration.

As of January 2020, Zhong Zhang, as VP of Academic Affairs, is the Chair of the Board of Examinations. We have one volunteer to represent each of the four areas of specialization: Zhuping Sheng for groundwater; Kara Morris (Oregon Department of Water Resources) for hydrologic technician; David Williams (David T. Williams & Associates) for surface water; and John Gray (Gray Sedimentology) for water quality. We're seeking a total of four additional volunteers for the Board of Examinations, to gain an additional member in each of the four speciality areas, as noted above.

If you have an interest in or questions related to serving on one of those Boards, please contact me, one of the other Executive Committee members, or send a message to the AIH management office (admin@aihydrology.org). There is a lot that can be done as a Board member, as well as other activities that can help to promote AIH, so let us know if you want to help out.

> **" The Institute is growing - yes, slowly, but it is growing. "**

With regard to AIH examinations, we are making efforts to update the examination questions to make them relevant to the professional practice of hydrology. We want to have a large set of questions to draw from in exam preparation. Last year, we sent out a request to the membership to assist with the development of questions, and we received some good input from members. We are hoping to continue to reach out to our membership to help populate our examination question database.

Additional initiatives for the Board of Examinations, to support improvements to our examination procedures, include: improvements to administration of web-based examinations, exam preparation webinars, study guides and practice examinations for each of our areas of certification, and updates to the list of recommended reference materials. Another innovative idea suggested by EC members includes the establishment of an AIH YouTube channel with video training resources to help with studying for the examinations.

Work continues to progress on our comprehensive review and update of the AIH bylaws. The update is being conducted to bring about consistency and accuracy in the bylaws, as well as to support EC strategies and reflect changing conditions. This effort is being led by Jamil Ibrahim, with the assistance of Nick Textor, Rahul Ranade, and Past-President, Rao Govindaraju (Purdue University). Prior to adoption, the bylaws revisions will be reviewed by an attorney when complete, and then the revised bylaws will be shared with our members for evaluation and approval.

One last item before closing. For the past three years (2017-2020), AIH contracted association management company services to the Adept Group, based in Denver, Colorado. We have now transitioned to a new association management company, Smith Moore & Associates (SMA), located in Sacramento, California. I, and the members of the Executive Committee, want to thank Nicole Singleton of Adept Group for the management of AIH over these past few years. We look forward to working with our new Executive Director, Sarah Erck, and her team at SMA.

It is truly gratifying to see the enthusiasm that members have for AIH. We want this to be an organization that provides tangible benefits to its members and is run by its members and their elected representatives.

John L. Nieber, P.H., P.E., Ph.D.

2019 SEDHYD Conference, Reno, Nevada

During June 24 to 28, 2019, former Chair of the Board of Registration, David Williams (David T. Williams & Associates) and President-Elect, Jamil Ibrahim (Stantec) participated in the Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference in Reno, Nevada, on behalf of AIH. SEDHYD Conference organizers generously provided wonderful opportunities to engage with the over 500 conference participants in discussion about the background of AIH and benefits of being certified as a Professional Hydrologist or Hydrologic Technician. SEDHYD conference organizers provided AIH time for a presentation to all conference attendees during the Opening Plenary session, pro bono exhibit booth space during the conference, as well as the opportunity to participate in a panel discussion during a special session on Professional Development and Engineering Ethics: Advancing Your Career Through Board Certification.

" The tag team of David and Jamil tactfully engaged SEDHYD Conference participants and generated a lot of interest at AIH's exhibit booth. "

At the Opening Plenary session, Jamil was introduced by Chandra Prathak (U.S. Army Corps of Engineers, Hydrology, Hydraulics and Coastal Community of Practice) and provided a presentation to introduce AIH, announced discounted AIH membership fees for all SEDHYD conference participants, and invited conference attendees to visit AIH's exhibit booth at the conference. Jamil also announced and honored AIH's 2018 awardees: John Gray (Gray Sedimentology) recipient of the Robert G. Wetzel Award for Water Quality and Thomas Dunne (retired from the University of California, Santa Barbara), recipient of the R.K. Linsley Award for Surface Water Hydrology. John Gray attended the conference and was congratulated on his award by the crowd. Dr. Dunne was not able to attend SEDHYD to receive his award because he was previously committed to a conference on water in Africa.

The tag team of David and Jamil tactfully engaged SEDHYD Conference participants and generated a lot of interest at AIH's exhibit booth. David lured attendees to the booth with his smile (and because it seemed that everyone at the conference knew him and wanted to talk with him) and Jamil then pitched them on the benefits of AIH membership and hydrologist certification - great execution.

During the special session titled, Advancing Your Career Through Board Certification, Jamil and David participated in small group discussions alongside two representatives

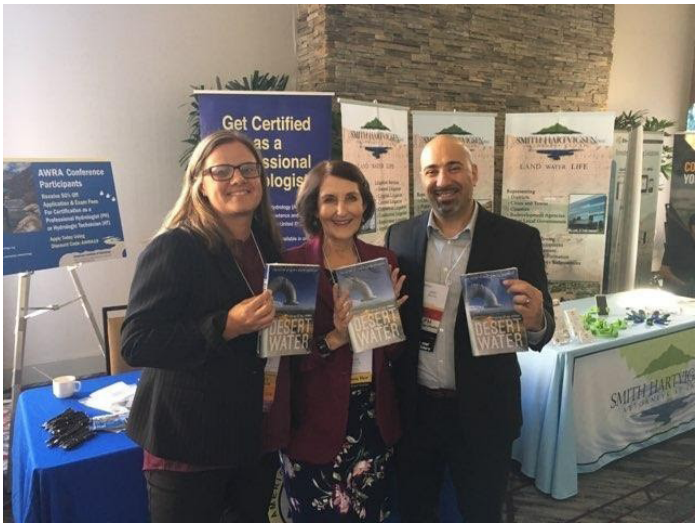
from the American Academy of Water Resources Engineers (AAWRE) -- Joe Mannous and Jim Barton, as well as one representative from the American Society of Civil Engineers (ASCE) Environmental and Water Resources Institute -- Rollin Hotchkiss. You can view the Institute's abstract for the session https://www.sedhyd.org/2019/openconf/modules/request.php?module=oc_program&action=view.php&id=351&file=1/351.pdf.

The next SEDHYD conference will take place in either 2023 or 2024, and AIH will be there. A big thank you goes out to the SEDHYD conference organizers for their support.

2019 AWRA Conference, Salt Lake City, Utah

For the third consecutive year, AIH was a sponsor for the American Water Resources Association's (AWRA) Annual Conference. The conference was held in Salt Lake City, Utah, November 3 to 6, 2019. VP for Institute Development, Julé Rizzardo (California State Water Resources Control Board) and President-Elect, Jamil Ibrahim (Stantec) participated on behalf of the AIH leadership team, along with former VP for International Affairs, Zhuping Sheng (Texas A&M University), who participated as a member of the Board of Directors for AWRA. As a Gold-level sponsor for the conference, AIH provided a brief presentation during the Opening Plenary for the conference, exhibited AIH's materials across from the conference registration desk, sponsored the Opening Reception for the conference, and provided a presentation at the Annual Awards Luncheon.

Similar to the SEDHYD conference, Jamil provided a presentation at the Opening Plenary Session to over 400 conference attendees to introduce AIH, announce discounted AIH membership fees for AWRA conference participants, and invite conference attendees to visit AIH's exhibit booth at the conference.



At the AIH's exhibit booth, Julé, Jamil, and Zhuping engaged in conversation with longtime members (e.g., Steven Burgess; University of Washington), new members (e.g., Laura Keefer; Illinois State Hydrologist), and many prospective members about AIH, our recent initiatives, and solicited feedback on what could improve the stature of AIH and professional certification for hydrologists across the water resources community in the U.S.

During the AWRA Annual Awards Luncheon, Julé announced and honored AIH's 2019 awardees: Bridget R. Scanlon (University of Texas), recipient of the Charles V. Theis Award for Groundwater; Christopher B. Burke (CBBEL), recipient of the R.K. Linsley Award for Surface Water; Susan Hubbard (Lawrence Berkeley National Lab), recipient of the Robert G. Wetzel Award for Water Quality; and Rao S. Govindaraju (Purdue University), recipient of the Founders Award for Institute Development. Although none of AIH's 2019 awardees were able to attend and receive their awards, a ½ page ad was included in the Conference Program Booklet that provided information on the awardees and Julé shared photos of each of the award recipients with their plaques during her presentation.

While at the conference, Jamil, Julé, and Zhuping engaged AWRA leadership in discussion on continued collaboration between AIH and AWRA at future conferences. Stay tuned for information in the future on partnership activities between our organizations.

" While at the conference, Jamil, Julé, and Zhuping engaged AWRA leadership in discussion on continued collaboration between AIH and AWRA at future conferences. "

ARTICLE PHOTOGRAPHY

1. Jamil Ibrahim presenting about AIH and and AIH awardees during SEDHYD opening plenary. (page 2)
2. Jamil Ibrahim, David Williams, and recently PH certified member Laura Keefer (State of Illinois, State Hydrologist) (left to right). (page 3)
3. Julé Rizzardo, Lisa Beutler (2019 AWRA President), and Jamil Ibrahim (left to right) at AIH booth holding AIH book prize (page 3)
4. Julé Rizzardo presenting 2019 AIH award winners during AWRA Awards Luncheon. (page 4)
5. Julé Rizzardo engaging conference attendees at AIH exhibit. (page 4)

Comparison of Numerical Model Results for Flow in a Constriction

P. Rao (1) and T.V. Hromadka II (2)

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(2) Professor, Department of Engineering-Mathematics, United States Military Academy, West Point, NY

Abstract

The performance characteristics of the Diffusion Hydrodynamic Model (DHM) have been analyzed, with a focus upon its ability to predict the head loss for flow in a constriction. DHM has been in use since the late 1970s and was published by the USGS as a technical report in the mid-1980s The end DHM result is compared with the published data of three widely used hydraulic models (MIKE 21, TUFLOW and HEC-RAS 2D). For the purpose of verifying all the model outputs, the baseline data is obtained from the equation provided by the Federal Highways Administration (FHA). The comparison, along with the grid sensitivity test, underscores the reliability of the DHM.

Introduction

Numerical modeling of free surface flow requires the application of models that can be broadly placed under two categories – first and second-generation models. The first generation models, developed before the 1990s, focused on solving basic flow equations with few input parameters. These equations are based on the conservation of mass and energy principles. The rise in computational power and the need to capture phenomena at the microscale level brought the advent of second-generation numerical models that solve the higher dimensional shallow water or Navier Stokes equations (or its variants) since the 1990s. Characteristic features of these models include millions of cells or nodes in the computational domain, complex flow equations to predict various phenomena (i.e., turbulence, surface tracking, mixing length, air entrainment, simulation of eddys) across varying spatial and temporal scales, high-performance processors to reduce the computational time and colorful visualization tools. While some of the applications in hydraulics and hydrology require using these complex models, there are other applications where the results from first-generation models will suffice.

The Diffusion Hydrodynamic Model (DHM) is one of the first computational solutions of the Navier-Stokes equations written in the diffusion routing form and is formulated as an integrated control volume mass balance set of equations in matrix form [1]. Using an integrated finite difference numerical scheme, up to 250 nodes and cells were defined for use. The DHM soon served as a foundation for other finite-difference algorithms [2], resulting in computational programs for solving a variety of transport problems. As the first such computational program, the application of the DHM today serves the additional role as a baseline analysis that can be used to examine the performance of newer computational modeling algorithms in comparison to the computational results from the long-term tested DHM.

In this work, results from DHM are compared with the published results [3] of MIKE 21, TUFLOW, HEC-RAS 2D, and the baseline FHA equations for predicting the head loss from two-dimensional flow through a constriction in a rectangular channel. The close agreement in the results underscores the reliability of the freely available DHM.

Model Descriptions

DHM solves the two-dimensional overland flow coupled with one-dimensional open channel flow equations and includes an interface between these two flow regimes through using source and sink term approximations. It is one of the first general-purpose computational solutions to a 2D formulation of the Navier-Stokes equations. The model is capable of approximating such hydraulic effects as backwater, drawdown, channel overflow, storage, and ponding. DHM was upgraded to EDHM (Enhanced DHM), with the primary focus of the enhancement being to increase the array size of variables from 250 to 9999. The model's companion website (www.diffusionhydrodynamicmodel.com) has the source codes and documentation, along with various applications for which the model was applied.

> **" HEC-RAS 2D is one of the most widely used models in the hydraulics community. "**

MIKE 21 solves two-dimensional free surface flows where stratification can be neglected. It was originally developed for flow simulation in coastal areas, estuaries, and seas. The various modules of the system simulate hydrodynamics, advection-dispersion, short waves, sediment transport, water quality, eutrophication, and heavy metals. [4]

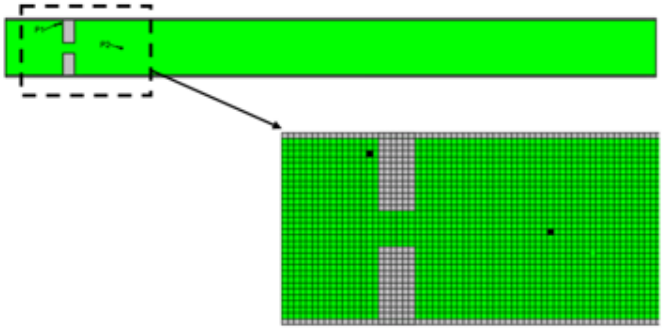
Two-dimensional unsteady flow (TUFLOW) solves the two-dimensional depth-averaged shallow water equations by using a structured grid system with an alternating direction implicit scheme (Stelling Finite Difference). The model incorporates the 1-D hydrodynamic network software ESTRY, or quasi-2D modeling system, based on the full one-dimensional free surface flow equations. [5]

HEC-RAS 2D is one of the most widely used models in the hydraulics community. RAS 2D (5.0.1) solves the two-dimensional Saint-Venant equations [6] for shallow water flows using the full momentum computational method. The equations can model turbulence and Coriolis effects. For flow in sudden contraction, which is accompanied by high velocity, using the full momentum method in RAS 2D is recommended. The model uses an implicit finite volume solver.

DHM Development

Figure 1 is the definition sketch of the test problem. The rectangular channel was 3100 ft long and 320 ft wide. The constriction was 60ft x 60ft. The channel length before constriction was 310 ft and its length after constriction was 2730 ft. The computational domain in DHM had 10 ft square cells, and the total number of cells was 9920. The longitudinal slope was 1%, the transverse slope was zero, and the model ran for a total of 1 hour. The upstream inflow was 1000 cfs. Since there were 30 cells at the upstream end, a uniform steady inflow of 33.3 cfs was specified at each of the cells. At the downstream end, a free overall boundary was specified. Constricting the flow area resulted in loss of energy. This loss of energy was reflected in a rise in energy gradient line and energy upstream of the constriction. What was of interest was to estimate the head loss that occurs between points 1 and 2 (shown in Figure 1). The head loss (HL) was equal to WSE2 – WSE1, where WSE is the water surface elevation.

Figure 1. Definition sketch of the test problem along with the location of the two points (P1 and P2)



Results

Table 1 shows the comparison of the head loss value obtained from each of the models, along with the published data of other models. It is noted in this paper that the computational models are compared with respect to head loss (as given in [3]) through the constriction and this is the primary form of assessment. The DHM WSE change value is within the range of predictions from the other models, although all of them are above the FHA value. Sensitivity analyses on DHM cell size were performed to check the effect of varying cell size on water surface elevation change and energy loss (Table 2). Since the maximum number of cells in enhanced DHM is limited to 9999, the cell size was increased from 10ft to 20ft, which resulted in 2635 cells in the domain. The results showed that the DHM output is not sensitive to cell size. Figures 2 through 4 are plots of velocity flow vectors in the vicinity of the flow constriction. Figure 4, which is the normalized velocity vector plot, was generated using the quiver function available in matplotlib library of python.

" the DHM not only provides a computational approximation to the modeled flow equations, but it is also an approximation of the governing flow equations themselves. "

Table 1. Comparison of Change in Water Surface Elevation at Constriction between DHM and Published Modelling Results*

MODEL	WSE CHANGE (FT)
MIKE 21	1.28
TUFLOW	0.99
HEC-RAS 2D	1.27
DHM	1.16
FHA Equation	0.81

*Except for DHM, all other results were obtained from the literature [3]

Table 2. Effect of Cell Size on Change in Water Surface Elevation & Bernoulli's Energy Loss

DHM DOMAIN CHARACTERISTICS	CHANGE IN WATER SURFACE ELEVATION (FT)	BERNOULLI'S ENERGY LOSS (FT)
Number of cells = 9920 (10ft grid)	1.16	1.08
Number of cells = 2635 (20ft grid)	1.20	1.14

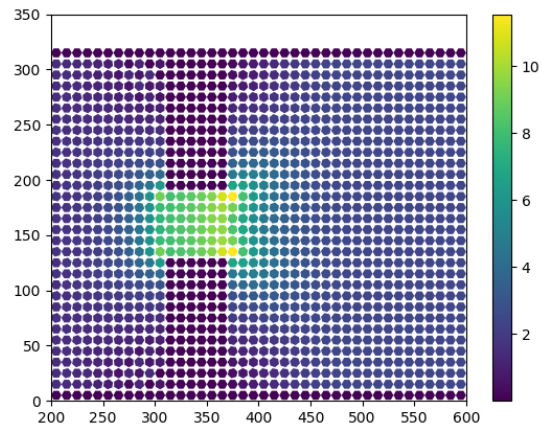


Figure 2. DHM predicted flow velocities at the center of the cells in the vicinity of the flow constriction

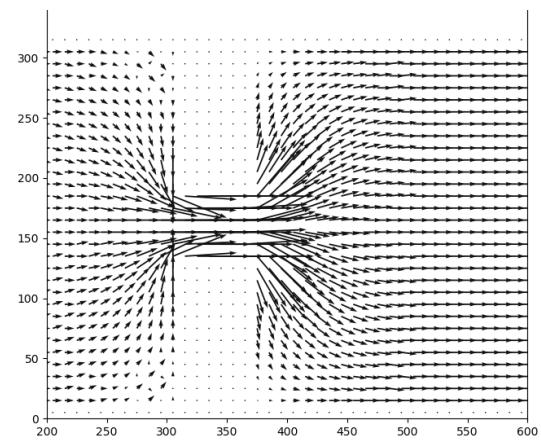


Figure 3. DHM predicted velocity vector plot

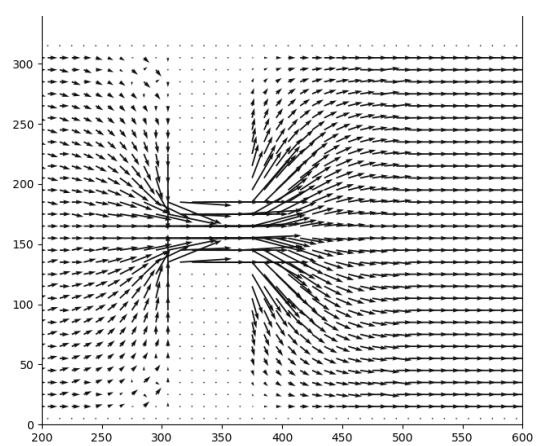


Figure 4. DHM predicted normalized color-coded velocity vector plot

Conclusions

The primary goal of this paper was to evaluate the performance of DHM against more popular hydraulic models and to compare their predicted head loss value for flow in a constriction at a constant mesh size. Our intent was not to determine if one model is better than the others or to recommend any particular model. Instead, it was to demonstrate the ability of DHM, which solves simplified flow equations and, as such, is an approximate solution to the governing boundary value problem under study. Consequently, the DHM not only provides a computational approximation to the modeled flow equations, but it is also an approximation of the governing flow equations themselves.

Having a baseline modeling outcome, such as one produced by the DHM, provides a link that spans across the modeling technology evolution that depicts computational outcome variation with modeling technology growth. Currently, some of the most computationally intense outcomes are developed by application of CFD type technology, which entails tens of thousands to millions of computational cells being involved in the computational solution. Such intensity is beyond practical quality control without the use of still more computational software applications which, in turn, are subject to their own quality control issues. Having the early computational capability available provides another path towards quality control and validation of the computations. Continued work is still needed in connecting computational solutions to actual flow regime characteristics for even some of the more fundamental hydraulic situations. For example, the fundamental junction structure in storm drain systems involves multiple inflow pipe or channel inlets into a junction structure that contains properties of elevation drops and angle points, among other features. Although there are several computer programs that purport to solve the energy and pressure-plus-momentum equations for that situation, there still is yet to be a general solution that provides a high-precision computation. Other complicated hydraulic situations exist, as well. Currently, there appears to be more attention and investment being given to computational detail and visualization techniques, while the need to develop closed-form mathematical solutions continues to be a challenge. Consequently, having other computational options for solving complicated situations, such as the example use that was given for the DHM technology, provides another venue for examining quality control of computational modeling.

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AIH Partners With Smith Moore & Associates

As many of you may know, AIH has recently undergone a transition to a brand-new staff and a new office in Sacramento, CA. In addition, AIH is thrilled to be partnering with Smith Moore & Associates (SMA) to bring a new level of operational efficiency to our organization. AIH's history of providing education and networking opportunities to members, informing communities about the importance of hydrology and cultivating careers aligns with the values and passions of the individuals at SMA. A little more about Smith Moore & Associates:

Founded in 2006, SMA's philosophy is to provide clients with unmatched services and expertise in administration, governance, accounting, meeting planning, strategic planning and communication services, going above and beyond client expectations by:

Tailoring services to the specific needs of our association clients;

- Ensuring our clients' leadership can focus on the vision of the association while remaining confident that the day-to-day operations are running smoothly;
- Striving to realize growth potential for each client; and
- Working closely with clients' volunteer leaders to assess the needs of their membership.

SMA's team of association management experts effectively manages the day-to-day operations of a wide-variety of associations with the goal of positioning the association for future success. Recognizing the importance of associations being responsive and nimble to create value for members, SMA has developed an infrastructure that focuses on enhancing client membership, education and events as well as effective member communications. SMA's goal is to expertly manage each client's business and develop and/or maintain a strong financial foundation that will allow Board members and volunteers to fulfill their purpose.

The SMA Team can be reached via phone or e-mail at: 916-231-2149 / admin@aihydrology.org, and their mailing address is:700 R Street, Suite 200 Sacramento, CA 95811

Your SMA Team:

Account Executives (AEs) are the key point of contact between clients' and SMA and are responsible for managing a client's overall operations to ensure client and member satisfaction. AEs are responsible for overseeing membership management, event management, accounting, boards and committees, design and communications, general customer service and administration. As lead of the client's team, AEs rely on their collaborative skills and communication to ensure client needs are effectively translated and addressed. Representing SMA's core services, AEs are carefully selected based on proven skills and a positive attitude as well as demonstrated enthusiasm. Below is an overview of SMA's Account Executives.

Account Executive: Sarah Erck, Certified Meeting Professional (CMP) joined SMA in 2013 after serving as a co-owner of a local family business.

Account Coordinators (AC) are a key member of a client's team. ACs are responsible for numerous work processes on behalf of clients. Providing direct support to AEs, ACs perform autonomous tasks relating to membership renewal, database maintenance, exhibitors and sponsors, accounting, marketing e-blasts and boards and committees. ACs work directly for the AEs and oversee the work of Account Assistants.

Account Coordinator: Zach Seals As an AC, his responsibilities include database and member account management, communications, event assistance, and committee support.

Account Assistants (AA) are members of the core association management team. Working closely with ACs, AAs closely manage the membership database for clients and coordinate with accounting on invoicing, event registration, dues renewal and post event accounts receivable. They play a key role on event preparation, including creating name badges, packing collaterals and materials for onsite services and support to facilitate timely, effective events.

Account Assistant: Kristina McKittrick Kristina focuses on responsive communications and problem solving for clients.

SMA Communications Team (SMA Launch) supports the membership and events' teams in developing and distributing effective communications. With a focus on providing marketing support and sterling design and communications, Launch includes employees focused on marketing strategies, branding, graphic design and layout, web design, photography and more. SMA believes transparent, efficient and compelling communication is a core client service.

David Blue Garrison is the SMA Director of Marketing and Design Development. He is responsible for the design and layout of marketing and communication materials for client conferences and education events as well as branding.

Audie Whitt is the SMA Communications Director. With experience in graphic and web design, he is responsible for providing clients with innovative publication designs and website updates. Audie serves as the liaison between communication and IT to ensure the client's brand remains cohesive.

Dayna Dixon is the Senior Graphic Designer/Marketing Coordinator. \ With a focus on working with client exhibitors and sponsors, Dayna ensures consistency of design with branding.

SMA Information Technology Team (SMA Drive) is responsible for supporting the technological needs and objectives of the client by staying abreast of the best practices and tech trends.

Amanda Rae Smith, SMA's Information Technology Coordinator is a key member of SMA's information technology infrastructure, which is led by executive leader, Justin Lewis. Amanda is SMA's Information Technology Coordinator and focuses on the development of client websites, databases, email systems and software solutions.

Justin Lewis is SMA's Chief Information Officer. Justin has worked in the IT field for 20 years and has experience with installation, configuration and support for Internet connections, networks, websites, listservs and more. He has experience in programming languages Python, R and the Web framework Django. \

Finance Team is responsible for GAAP compliance, accounting procedures, creation of financial reports and budgets, tax and audit oversight, investment policies and AR reports.

Sandy Goree is SMA's Controller.

Joanie Bockus is an SMA Accountant

In Memoriam: Helen Fox Moody, P.H., Hydraulic Engineer

Helen Fox Moody passed away on Sunday, December 8, 2019. Helen worked as a hydrologist/hydraulic engineer for the Natural Resources Conservation Service for 41 years and retired in 2016. Most recently she was hired as an ACES retired employee, so her work continued with the NRCS until very shortly before she passed away. Helen began her career with the Soil Conservation Service in 1974 after earning degrees at the University of Michigan (B.A. Physical Geography, B.S. Astronomy) and The Johns Hopkins University (Ph.D. Fluvial Geomorphology). In 1976, she met Edwin Moody, and they were married on January 24, 1978, thus she became Helen Fox Moody. Helen lived in Maryland with her husband and is survived by one son, Seamus A. Moody, who teaches at Fishburne Military School in Waynesboro, VA.

In 1989 she transferred to the Hydrology Unit in Washington, D.C. Following the agency reorganization in 1995, she became a member of the National Water and Climate Center staff and was realigned into the West Technical Service Center in 2005. Helen worked in various aspects of hydraulics and hydrology. In Maryland she worked on Watershed Planning Projects and Environmental Assessments, Floodplain Management Studies, FEMA Floodplain Delineation Studies, regional unit hydrograph development, stormwater management pond evaluation, and Detention Pond Projects. She was involved in the development of the SITES, WinTR-20, WinTR-55, EGEM, and EFH2 computer programs as a developer and as a tester, and she supported rainfall frequency and distribution studies.

Helen was a Professional Hydrologist and an early member of the American Institute of Hydrology (#268). She was also a member of the American Geophysical Union (AGU) and the American Association of Geographers (AAG).

- Jolyne Lea, P.H. (Adapted from U.S. Department of Agriculture, Natural Resources Conservation Service (2020): https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/quality/tr/?cid=stelprdb1043576

In Memoriam: L. Douglas James, Former President of AIH

A former President of AIH has died after a month-long battle with COVID-19, according to his wife. L. Douglas James died Friday, April 3, 2020. He was 83. His wife, Zhida Song-James, told friends and colleagues that the couple contracted the virus while on a Nile River cruise. The couple was living in the Washington, D.C. area.

Doug (BS '57, MS '58, PhD '65, Stanford University) dedicated his life to serving the water resources and hydrology communities and leaves a renowned contribution in the field. He began his professional career on the faculty at the University of Kentucky and then was a professor with the Environmental Resources Center at the Georgia Institute of Technology. He was a Utah State University professor of civil engineering and director of the Utah Water Research Laboratory from 1976 to 1992 where he championed several important initiatives, including the Sustained Drought Project on the Colorado River, a program that still impacts Colorado water issues today. After leaving Utah State, Doug served from 1992 to 2009 as director of the National Science Foundation's Hydrologic Sciences Program where he managed federal funding to support and expand research in hydrology and water resources management.

After AIH was founded on March 27, 1981, Doug was one of the first leading hydrologists recruited by his mentor at Stanford, Ray Linsley, and became Vice President for Academic Affairs from 1981 until 1988, leading an effort in organizing examinations for demonstrating merit. He was also an organizer of the 1987 AIH conference in San Francisco. From 1989 until 1991, he served as Senior Vice President of AIH in management of Institute affairs and funds. From 1992 until 1994, Doug was the President of AIH. It was a time of significant growth of AIH as the hydrologic community recognized the value of AIH certification programs and promotion of science and technology through conferences and publications. It was also a time of explosive growth of State Sections as well as AIH Foreign Sections. Thanks to Doug's efforts, AIH has also matured through the years and has become recognized for

certifying excellence of practicing surface and groundwater professionals. Doug was an influential leader in all these initiatives, and he leaves a rich legacy in strengthening hydrology as a science and as a profession. Doug was awarded the AIH Founders Award in 1994 and R.K. Linsley Award in 1997.

Doug was also a prolific author. He published many research studies, including a 1965 manuscript that was published in the very first edition of Water Resources Research, which today is the leading journal in the field. He also wrote an authoritative 1971 textbook titled "Economics of Water Resources Planning", a 640-page book that became a standard text in the field for more than 20 years. Doug also edited the influential 1974 text "Man & Water: The Social Sciences in Management of Water Resources". The text was among the first to bridge the social sciences and hydrology toward a better understanding of water resources management. Even after retirement he was still active in the field and published an important paper (James & Shafiee-Jood, 2017), suggesting the new paradigm for an interdisciplinary information platform to incorporate science and knowledge to achieve both water security and sustainability.

Doug was a gentleman and a scholar, so thoughtful of the field and of people. By nature, he was a quiet man with wisdom, grace, humility, respect and kindness. He will be remembered by many colleagues and friends.

- Roman Kanivetsky, P.H., Ph.D.

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