



Message from the President

AIH is here to serve the profession and the members

- AIH is the only organization that certifies professionals in the fields of surface water and groundwater hydrology, and water quality both nationally and internationally.
- AIH provides educational training venues to the professionals in the field of hydrologic sciences.
- AIH speaks to lawmakers on behalf of you and the profession as an advocacy



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Dear AIH Members:

My two year term as the President of AIH has come to a close. During this period, with the support of AIH Exec. Com. (EC) and several members of AIH, we have accomplished a lot. AIH is now a financially healthy organization with increasing membership. Several projects that would benefit our members have been initiated and some are concluded. We have installed a new EC with productive members who are willing to contribute to AIH. Our new and old professional members are also willing to contribute to the activities of AIH and are asking the AIH administration how they can do this. These are all good signs for the health of a professional organization. As a final request, I would like to mention one such activity that can be taken up by our members.



We have initiated the AIH Mexico Section during 2016. We would like to extend these AIH Sections to other countries in South America, Africa, Asia and Europe. Currently we have numerous members in USA who are originally from the countries at these continents. As a contribution to AIH, I would encourage the AIH/USA members to initiate the formation of AIH Sections in their home countries through their contacts. I am sure the AIH Executive Committee and the next President of AIH (Prof. Rao Govindaraju, Purdue Univ.) would like to hear your opinions in that effort and they will provide the groundwork and support to initiate this activity as we did for the Mexico Section. Professional Registration of the members of these International AIH Sections in the field of hydrology will benefit the professional careers of these members at their home countries.

As I have mentioned in my earlier communications, AIH is the founding member of Network of National Hydrological Associations (NHA). This organization represents 25 countries from all continents of the world under its umbrella. Among the members of this international organization AIH is the only member organization which provides professional certification of hydrologists. In that sense the organization of AIH Sections at these countries may also be initiated through NHA. To facilitate that, we at AIH administration can provide you with the contact name and email address of these contacts if our members are willing to pursue this activity. Please contact Exec. Dir. or me directly for this request. The list of NHA member organizations was provided to our members in an earlier AIH bulletin. (...continued)

Message from the President (...continued from Page 1)

During my term we have laid the groundwork for the development of AIH sponsored Short Courses, Field Courses and Webinars organized by AIH members for our members. I am sure you will hear more about this activity during the coming years. We are hoping that you will pass the word among your colleagues for them to benefit from this service by becoming a member of the AIH community. In that sense we are looking at this activity as a win-win effort for both AIH and also our members.

As I have indicated earlier, through these activities our goal is to make AIH a valuable organization to join. We at AIH are open to your suggestions and recommendations and we seek your support. Please do not hesitate to contact our Executive Director or me (directly) or the next President to share your ideas and recommendations.

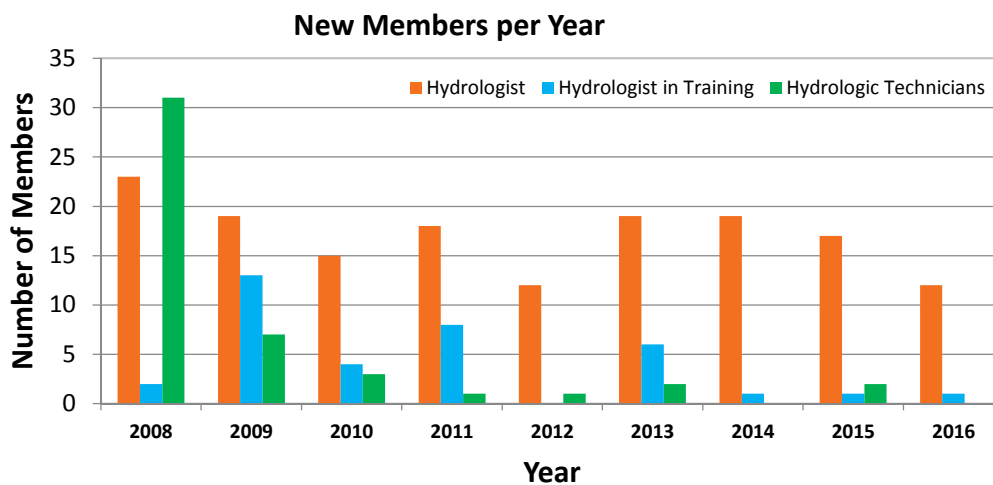
I would like to take this opportunity to thank all of you for your contributions and the support you have shown throughout my two year term.

I wish productive careers to all of you. My best regards.

Mustafa M. Aral
 President AIH
 maral@ce.gatech.edu
 December 30, 2016

From the Executive Director's Desk

One more time from your headquarters at SIU Carbondale, it is a great honor for me to write this note for the Winter 2016 Bulletin. In this issue, I would like to report the status of new membership until October 15, 2016. The chart below shows the change in new members per year since 2008. We are still processing five new applications and the numbers for 2016 could change.



As you are aware, we have 6 different types of certifications. The distributions of each type of certification among the membership is denoted in parentheses: Hydrologist (54%), Hydrologist Ground Water (13%), Hydrologist Water Quality (5%), Hydrogeologist (19%), Hydrologist in Training (4%), Hydrologic Technician (5%).

From the second quarter of 2016 up to October 15, 2016, we have welcomed 13 new members and two reinstated members.

HYDROLOGIST			
Name	Certification	City	State
Baldwin, Kimberly B.	16-H-8003	Denver	CO
Borum, Erica	16-H-8004	Glenwood Springs	CO
Iopollo, Ben W.	16-H-8005	Raleigh	NC
Greco, III, James L.	16-HIT-103	Tampa	FL
Horstman, Marc T.	16-H-8006	Raleigh	NC
Welsh, Adelheid M.	16-H-8007	Denver	CO
Joiner, Jeremy A.	16-HG-8008	Beltsville	MD
Gannon, Shaun B.	16-H-8009	Utica	NY
Jones, Jonathan E	16-H-8010	Denver	CO
Woolfolk, Michelle	16-HWQ-8011	Durham	NC
Collar, Mark R.	16-HGW-8012	Goleta	CA
HYDROLOGIC TECHNICIAN			
Johnck, Charles Cutting	16-HT-1063	Dobbins	CA
Rudolph, James P.	16-HT-1064	St. Paul	MN

As of October 15, 2016, 472 members (90% of the total number of members) have already paid their 2016 dues, of which 330 did it using the AIH website.

We continue to include some articles from our members in this Bulletin. Please continue sending the material you would like to publish in our future Bulletins. The articles should be related to the practice of hydrology and should not be already published elsewhere. Please try to keep it short and informative, appropriate for AIH membership. An extended abstract with no more than three pages is suggested. All prospective articles will be reviewed by our VP for Communications. If there is not enough room for all the articles submitted, we will publish them in the following issues. Moreover, we would like to include some personal news related to promotions, moving, new hiring, new grants or contracts, presentations on professional topics, etc. in our newsletter. If you are interested to share this information with the AIH members, please send it to me.

It is quite important to maintain our records updated. Therefore, please send an email to your headquarters if you are changing your affiliation and/or your contact information. Maintaining our communication is paramount.

Any requests or suggestions to improve our services would be greatly appreciated.

Respectfully,
Rolando Bravo

Technical Paper

Rainfall-runoff sediment characterization models of the Escobar Sink using GIS and HEC-HMS programs

David Zúñiga de León and Oscar Javier López de la Rosa (Corresponding author: dzuniga@uacj.mx)

Summary

Capacity of hydraulic structures like sinks, dykes and drainage systems deserve special attention in order to provide security to people who live around them. For instance, the Escobar sink which is located in a large urbanized area of Juárez City in Mexico is facing flooding risk as well as reduction of its capacity. During summer, high intensity storms lead to high flows and sediments which are transported and stored at the sink. Briefly, this paper focuses on the relation between rainfall intensity and sediments rate derived from runoff events. Characterization was performed in order to assess the quantity of sediments as a function of precipitation events, based on which we answered the question: what is the influence of sediment runoff on the capacity of the sink?

Introduction

Ciudad Juárez (Juárez City), Chihuahua, México is located near the northern boundary of México with the United States, separated by the Bravo River (Rio Grande) from the city of El Paso, Texas. As shown in Figure 1, the main features of the study area are the Escobar sink, Juárez mountains and valley, and urbanized areas of the city. Juárez City is located in a desert environment with few rainfall events that are usually of short duration and high intensity. The average annual rainfall in the city is nearly 254 mm. During summer, high intensity storms lead to high flows and sediments which are transported and stored at the sink, causing loss of storage capacity.

Briefly, the research exercise was focused on three important subjects. Firstly, evaluation of spatial and morphological parameters involved in the rainfall runoff model using Arc-Gis 10.2 program. Secondly, the use of HEC-HMS rainfall-runoff program to assess water storage as well as runoff. Finally, soils deposited into the sink for different storms were analyzed in order to assess the volume of fine sediments and their influence on Escobar sink capacity.

Methods & Results

Firstly, in order to assess morphometric parameters such as basin areas, a digital elevation raster model was prepared based on a point dataset. These Lydar points are separated every 1m which provides enough resolution to prepare a surface of the study area. Once the Lydar points were collected from UACJ (2011) and imported to ArcGIS 10.2, a raster data set was prepared. After that, spatial analysis tools were used to perform sub basins and drainage systems routines such as flow direction, flow accumulation, flow length, basin area, stream order, and stream features. Finally, once the raster models were completed, they were converted into features and saved in (.shp) format. The attributes of basin area were recorded into the program for three sub-basins (see Figure 2). In addition, the drainage network suggested a clear polarization between the drainage and the urbanized area; i.e., streets and channels were easy to distinguish. Finally, the Lomas del Rey sub-basin (shown in red in Figure 2) is the concern of the present research.

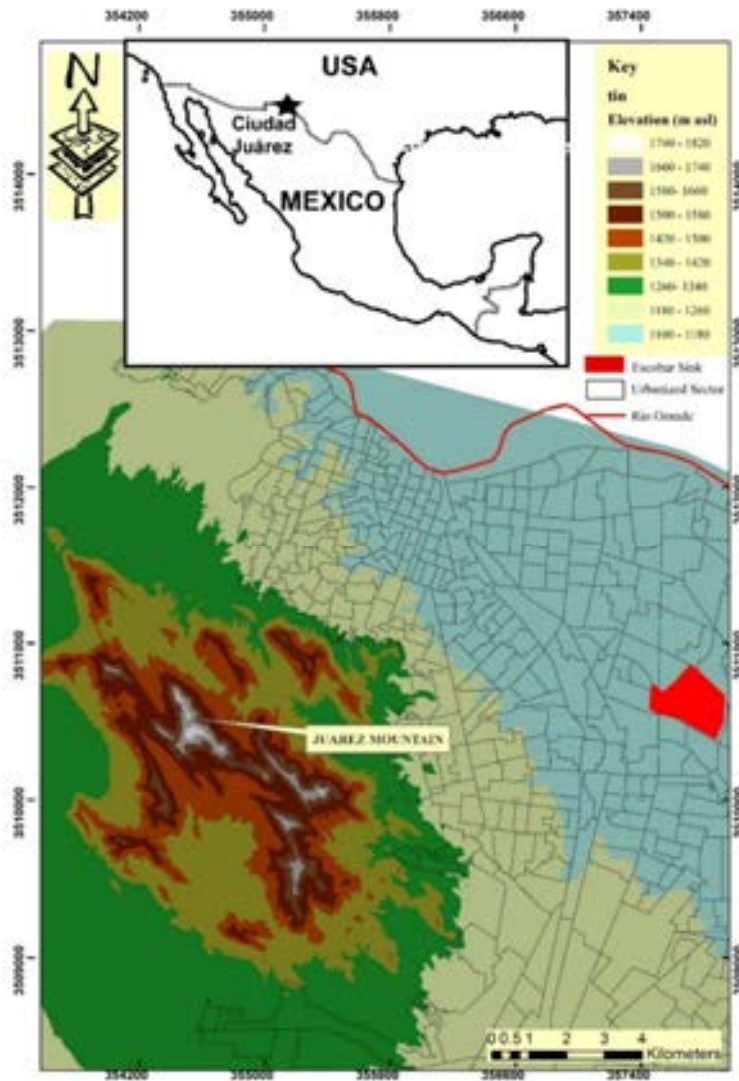


Figure 1: Location of the study area. Escobar sink, the subject of the study, is represented by a red polygon while the Rio Grande is represented by a red line. UTM datum WGS 1984.

Secondly, rainfall runoff analysis was performed using the US Army Corps' of Engineers' Hydrologic Engineering Center's Hydrology Modelling System program (HEC-HMS). See HEC (2000). This program is used to model direct runoff associated with rainfall storm events for several return periods. In the present study, a rainfall return period of 100 years was used, so a design storm depth of 55 mm was considered. See Zuñiga (2013). Once the morphometric parameters of sub-basins such as area, perimeter, and length of drainage system were assessed, HEC-HMS program modelling was performed. A field inventory for the sub-basins was performed to assess CN runoff coefficients. These parameters were researched in accordance with land-use and infiltration rates for hydrologic soils classified as A, B, C and D. In addition, parameters such as impervious areas and main stream lengths were defined in order to calculate concentration time (T_c) for each sub-basin. To calculate direct runoff for sub-basins, the following steps were taken: a) Initial abstraction of 0.2 was discounted in order to consider rainfall losses, b) impervious areas such as streets and parking lots were defined as such, and c) length of the main streams, slopes and manning coefficients (n) were estimated. The key findings of the HEC-HMS analysis were: 220,500 m³ of water was stored in the Escobar sink, while a peak discharge of 57 m³/sec of discharge was received in the sink (see Figure 3).

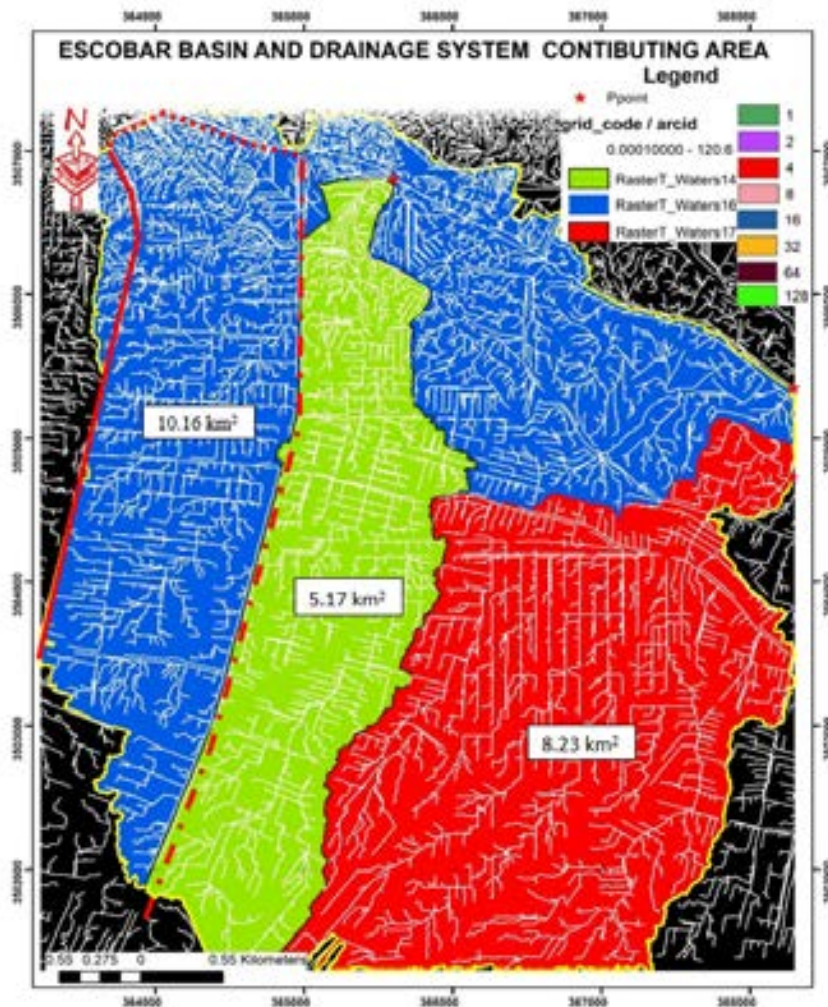


Figure 2: Sub-basins identified for the study were Lomas del Rey Basin (represented in red), West Basin (blue), and Center Basin (green). UTM datum WGS 1984.

Finally, fine soils deposited in the Escobar sink were assessed by during three rainfall events: One ($0.689 \text{ kg/m}^3=1\text{mm}$) recorded on March 17, 2015, from 14:20 to 15:20, other ($0.455 \text{ kg/m}^3=0.8 \text{ mm}$) recorded on August 10, 2015, from 23:45 to 00:45 and the third ($1.6 \text{ kg/m}^3=1.8 \text{ mm}$) recorded on August 24, 2015, from 1:15 to 2:15. Therefore, deposits of 1.13 kg/m^3 for every 1mm of rainfall were measured.

Discussion

The Escobar sink is at risk of overflow as well as capacity loss because a great amount of fine sediments that are deposited during storm events. Originally, the sink capacity was $214,000 \text{ m}^3$ (JMAS, 2014). However, the rate of soil deposit of 1.13 kg/m^3 for every 1 mm of rainfall would produce $2,362 \text{ ton}$ of sediments per year, nearly $4,015 \text{ m}^3$. As a result, the Escobar sink would have a useful life of 53 years. On the other hand, the rainfall-runoff model showed that an event of 55 mm (corresponding to 100 years return period) would produce flooding of Escobar sink because $220,500 \text{ m}^3$ would overload its capacity of $214,000 \text{ m}^3$ (see Figure 3).

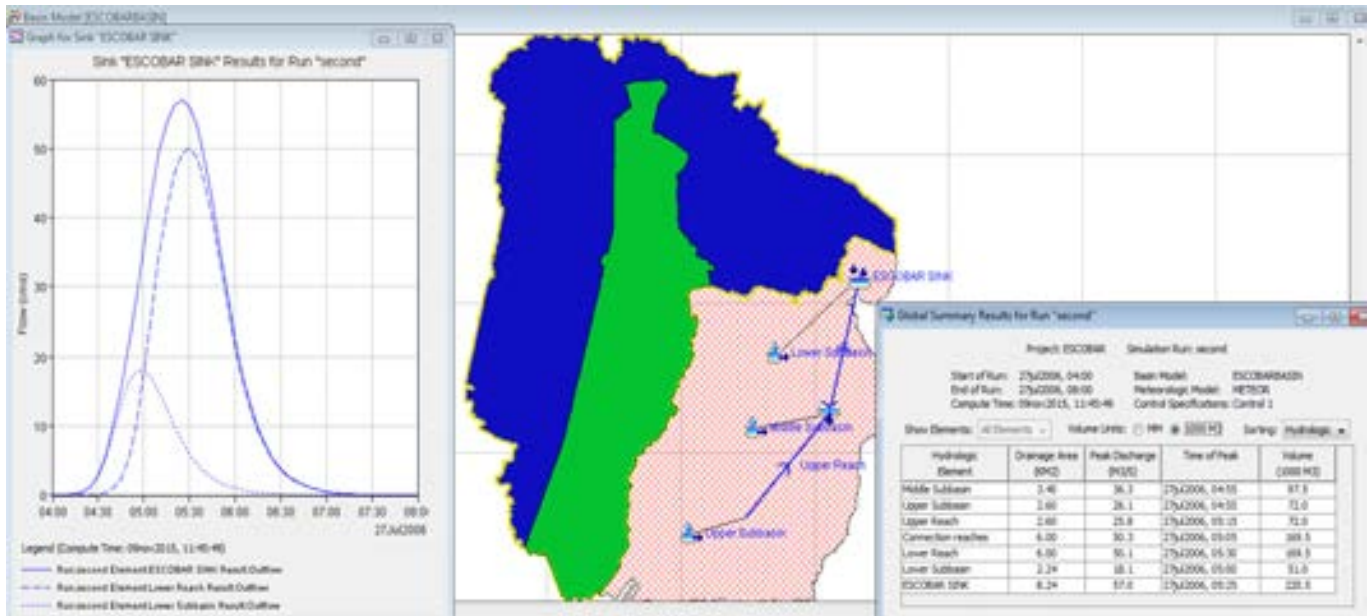


Figure 3: HEC-HMS Rainfall-Runoff model results for Sub-basins

References

- HEC, 2000. Hydrologic Modeling System: Technical Reference Manual. US Army Corps of Engineers Hydrologic Engineering Center, Davis, California.
- JMAS, 2014. Estudio de factibilidad de agua pluvial al acuífero. Junta Municipal de Agua y Saneamiento, Juarez.
- UACJ, 2011. Contour levels offset every 1m using Lidar Technology provided by Juárez University Mexico.
- Zúñiga de León, D., 2015. Análisis de lluvias intensas en Juárez Chihuahua, usando método de Chen Lung Chen y de Gumbel para valores extremos (GEV1). CULCyt/Enero-Abril, 2015; año 12, No 55.
- Zúñiga de León D., 2013. Alluvial fan dynamics with special emphasis on inundation of the Ciudad Juárez area. Ph.D. Thesis, Brunel University, West London.

In Memoriam

The AIH family expresses its sincere condolences to the family and loved ones of the following members and contributors to AIH's growth:



Sandor Csallany, a force behind the formation of AIH, passed away in June 2016. He completed degrees in Civil Engineering, Hydraulic Engineering, and Hydrology at the Technical University of Budapest, and later joined the Illinois Water Survey where he spent most of his career. Csallany's efforts with Alexander Zaporezec and Roman Kanivetsky to build the community of hydrologists in 1979 culminated in establishment of the American Institute of Hydrology in 1981.

James Robert Wallace, a longtime member of AIH, passed away in May 2016. He received both his undergraduate and postgraduate degrees in civil engineering from the Georgia Institute of Technology and completed his doctorate at the Massachusetts Institute of Technology. He served as a professor of Civil Engineering at Georgia Tech while also working as a consultant with Law Engineering and then MACTEC, where he continued his career

until retirement. In recognition of his successful career as an engineer and educator, Dr. Wallace was honored by the Georgia Engineering Alliance with the Lifetime Achievement in Engineering Award in 2006.



Prof. Miguel Marino, past President of AIH, passed away in November 2016. Marino obtained his undergraduate and masters' degrees from New Mexico Institute of Mining & Technology and his doctorate from University of California, Los Angeles. Marino held the position of Distinguished Professor of Water Science and the University of California, Davis, and later the position of Distinguished Professor Emeritus. Marino served as the President of AIH during the term 2005 – 2006.

Hydrology News of Interest

AGU's 2016 Robert E. Horton Medal:



Thomas Dunne, Distinguished Professor of geomorphology and hydrology at the University of California, Santa Barbara, was awarded the 2016 Robert E. Horton Medal at the American Geophysical Union Fall Meeting Honors Ceremony, held on 14 December 2016 in San Francisco, California. The medal is for "outstanding contributions to hydrology." Dunne conducts field and theoretical research in fluvial geomorphology and in the application of hydrology, sediment transport, and geomorphology to landscape management and hazard analysis

News from Washington:



On December 16, 2016, the President signed into law the Water Infrastructure Improvements for the Nation ("WIIN") Act (S. 612). Overwhelmingly passed by Congress on December 10th, the legislation will provide funding for critical water infrastructure improvements. The WIIN Act includes \$170 million to address lead in Flint, Michigan's drinking water and \$558 million to provide relief to drought-stricken California.

Get Involved in AIH!

Are you interested in being a more active participant of the unique community of hydrologists that AIH brings together? Whether you are interested in contributing an article or news item, or interested in representing AIH at professional events, AIH can use your help! For comments, suggestions, or questions, please contact

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