



News From and For the Washington GIS Community

## Rising GIS Stars

### 7th Annual Richard 'Dick' Thomas Memorial Student Presentation Competition and Award at the 2013 Washington GIS Conference

By: Amanda Taub, GISP and Sarah Myers, GISP, Competition Co-Coordinators

**F**our students presented their projects at the seventh annual Richard 'Dick' Thomas Memorial Student Presentation Competition & Award on Wednesday, May 8, 2013 at this year's Washington GIS Conference (May 6 - 8) at the Lynnwood Convention Center in Lynnwood. The Washington State Chapter of the Urban and Regional Information Systems Association (WAURISA) established this award to honor Washington State GIS pioneer and mentor, Richard 'Dick' Thomas by continuing his work of encouraging students to excel in their studies and transition successfully into GIS careers.

This year's four entries presented an array of topics. **Christopher Wright** discussed his work in modeling water infiltration for the City of Bothell. **Solmaz Amiri** presented her work on utilizing georeferenced data and technologies for

crime prediction in a block group in Spokane. **Melissa Kelly** spoke about her work on sourcing and identifying offensive odors in King County's Cedar Grove Road area. **Abdullah Akpinar** discussed his project on assessing the associations among green space type, structure, general mental health, and general health using GIS and FRAGSTATS.

#### First Place: Christopher Wright

**Christopher** is a student at University of Washington – Bothell in Environmental Science. His project was done under the guidance of Dr. Santiago Lopez. Christopher's presentation was "City of Bothell Water Infiltration Modeling".

His abstract is included in his paper, published here in *The Summit* beginning on Page 2.

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## President's Column

By: Heather Glock

**I** hope this message finds you enjoying a beautiful summer in Washington and wherever your summer travel takes you. Since the conference in May, I've been adjusting to my new role as WAURISA president. I owe much gratitude to former president Ann Stark for her generous advice and support. She handled the role with ease, and I'm grateful for her and the rest of the WAURISA board as we as-

similate new board members and organize our work. It truly takes a team to manage WAURISA affairs and make progress on our goals!

I want to use this particular column to give an overview of how WAURISA is organized and share the work we're focused on for the remainder of 2013. The best way to find out more about the information I have

(Continued on page 14)

# Water Infiltration Modeling: Identifying Priority Areas

By: Christopher B. Wright

**A**bstract: Water infiltration is an important component to understanding runoff, erosion, and groundwater recharge. Many factors influence how and where this process takes place. In urbanized areas, growth and development are increasing the amount of impervious surfaces and in turn, decreasing the amount of available area for water infiltration. The city of Bothell is interested in modeling water infiltration within their city planning area to understand the relationship with storm water and runoff. This project incorporates the city

of Bothell's geodatabase and data provided by the USGS in a Multi Criteria Evaluation (MCE) within a GIS framework to determine sites within the city's planning area that could be suitable for water infiltration. Soil water infiltration is determined by the rate and duration of the rain or water event along with the physical properties of the soil, slope, and vegetation. Reclassification of soil data characteristics, slope, land use and land cover allowed me to assign infiltration percentages based on primary literature. Four MCE models were run

*Growth and development are increasing impervious surfaces and decreasing the available area for water infiltration.*

and the results were reclassified and analyzed to determine area sizes. Results showed that suitable water infiltration areas range from 6-24% of the total planning area depending on how the criteria are weighted. The identification of water

infiltration areas will allow city officials to implement community-based programs to increase water infiltration in areas with high priority and determine where on-site water infiltration should be employed for new development projects decreasing the demand on existing storm water infrastructure.

## Introduction

The City of Bothell, located in Washington state (see figure 1), is interested in determining areas that will facilitate natural water infiltration. The city of Bothell is interested in identifying areas where this natural water infiltration can be encouraged and implemented. A community based effort to increase water infiltration in residential areas, combined with the ability to regulate off site rain water dispersal from development, are goals for the city of Bothell planning department. As the city of Bothell expands and develops, we expect to see an increase in impervious surfaces and a reduction in natural permeable land cover. These reductions of permeable surfaces will increase storm/rain water runoff and decrease natural ground water recharge (Carol et al 2013). These impervious surfaces can be defined as parking lots, streets, highways, buildings and anything that doesn't allow water to enter the soil. In addition, water runoff increases the demand on sewers, storm water systems, and streams, increasing urban flooding and elevating levels of pollution in local waterways (Viavattene and Ellis 2013). Understanding the factors influencing water infiltration is integral to this GIS deterministic approach. The depth, permeability, and size of particulates are important to understanding how water infiltrates soils (NRCS 2013). The characteristics of the surface above these soils are another important component to infiltration as well as the slope of the ground (Zang and Schilling 2006). Some background research identified these components as well as infiltration percentages associated with them.

## Research Question/Problem Statement

Using Geographic Information Systems, identify high priority



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water infiltration areas within the city of Bothell's planning area.

## Methods

The initial task was determining what information and data from the city of Bothell's large database would be relevant to my analysis of infiltration. Online search revealed water infiltration models and the types of data used to run these models. See Table 1 for a list of shapefiles used from the city of Bothell's geodatabases. Selected data was clipped to extent of the planning area. The "Landuse" shapefile was determined to be incompatible for my model requirements as it didn't include relevant vegetation and land cover attributes. A USGS Landcover/Landuse (2007) was used in place of the city's data. In addition, A USGS digital elevation model (DEM) was substituted for the "Contours" polyline file. The USGS DEM was in raster form (1/3 acrsecond, 28.44 m cell size). Following this determination of pertinent data, conversion and reclassification would be necessary to process a Multi Criteria Model (MCE). As shown in a flow chart in Fig-

(Continued on page 5)

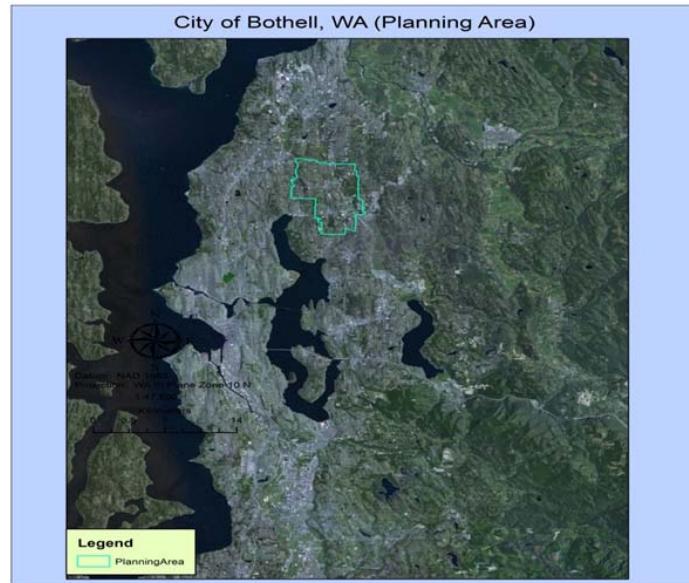


Figure 1. Locator map of Bothell, WA (planning area).

Shapefile	Geodatabase	Use
Buildings	Buildings	Imperv/Perv surface
PlanningArea	Cadastre	Imperv/Perv surface
Soils	Planning	Soil Classification(soil type and particle composition)
Bridges	Street	Imperv/Perv surface
I405polygons	Street	Imperv/Perv surface
I405lines	Street	Imperv/Perv surface
Sidewalks	Street	Imperv/Perv surface
Streetnetwork	Street	Imperv/Perv surface
PrivateRoads	Street	Imperv/Perv surface
River_Sammamish	Surfacewater	Imperv/Perv surface
Rivers_and_Streams	Surfacewater	Imperv/Perv surface
WaterBodies	Surfacewater	Imperv/Perv surface
Wetlands	Surfacewater	Imperv/Perv surface
*n48w123	USGS	DEM/Slope
*g47122	USGS	Landcover/Landuse

Table 1. City of Bothell shapefiles used. \* denotes data from USGS.

# Water Infiltration Modeling: Identifying Priority Areas

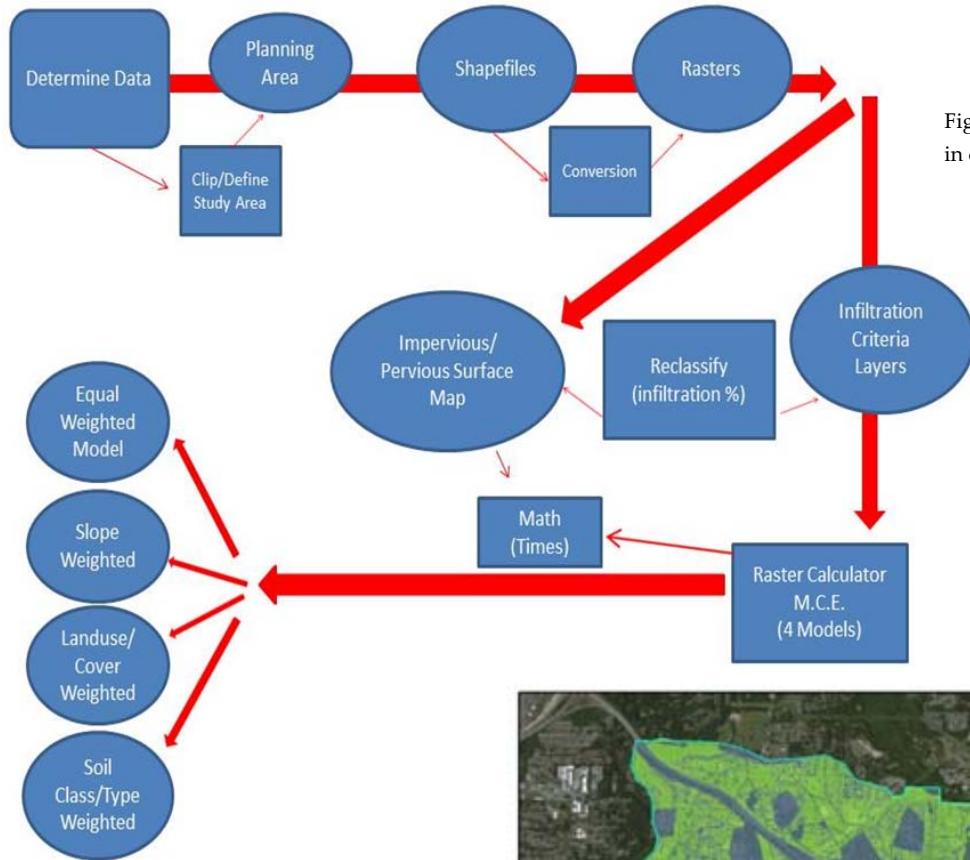


Figure 2. Flow chart for methodology and process in creating a water infiltration model.

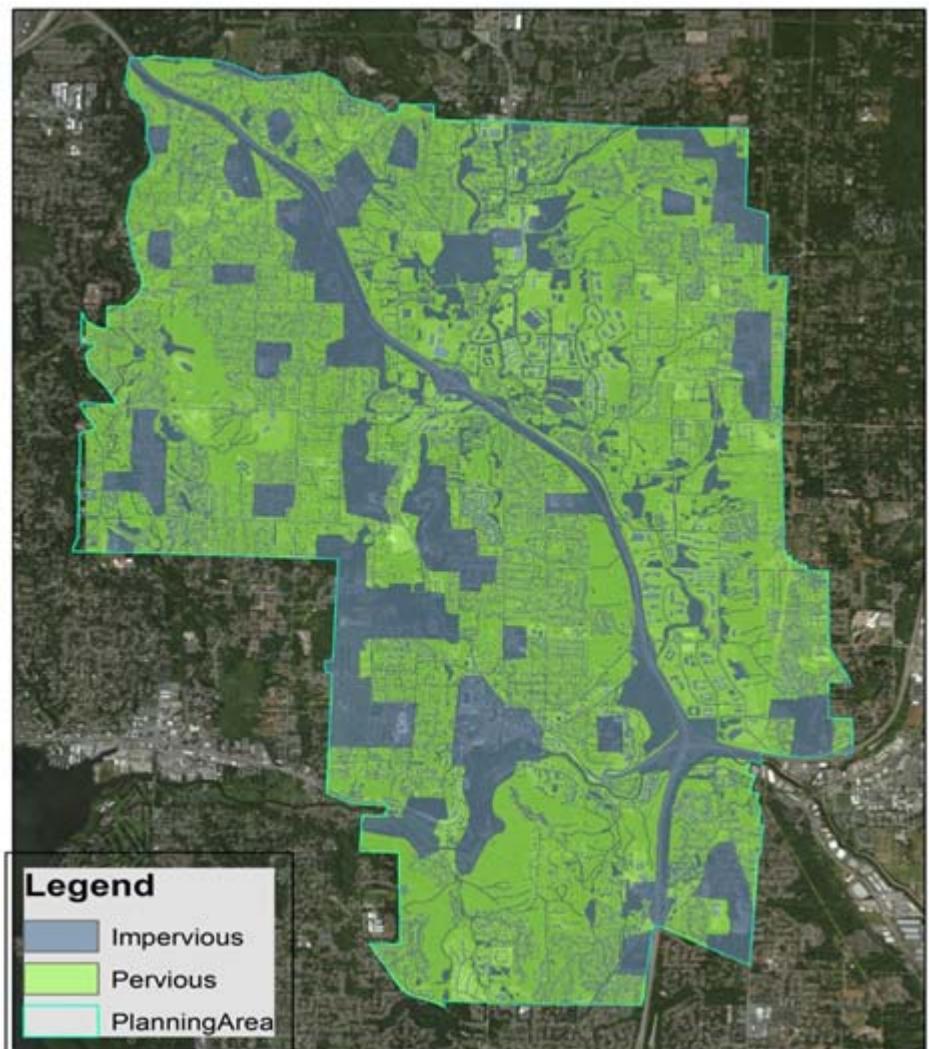


Figure 3. Impervious/Pervious binary surface map used to mask the results of MCE.

# Water Infiltration Modeling: Identifying Priority Areas

(Continued from page 3)

ure 2, this conversion and reclassification was intensive. The "Soils" layer contained a significant amount of information within its attribute table with the Soil Series classification, material composition, and slope, were contained in a single field. I disregarded the slope as we were using a new DEM and would create a new slope model. Following the conversion of the shapefiles to raster format, I created an impervious/pervious surface map. This binary map would be used to

mask the MCE infiltration priority map to remove areas of impervious surface cover (See Figure 3). Using road, building, street and surface features, I merged these features to designate impervious surfaces. As I was primarily interested in identifying soils for water infiltration, I chose to include water features as impervious.

(Continued on page 17)

Soil Particle (size and permeability)	Percent Infiltration
Clay/Muck	0
Silt/loam	25
Sandy/Loam	75
Gravel/Sandy	100
Soil Series Class (depth and permeability)	Percent Infiltration
Water Seattle muck/Tukwila muck/Pits/Urban land/Terric Medisaprists, nearly level/Mukilteo muck/Xerorthe	0
Norma, Custer , McKenna	10
Bellingham, Snohomish , Puget, Bellingham	20
Renton, Earlmont	30
Tokul	40
Alderwood	50
Lynnwood	60
Kitsap	70
Ragnar-Indianola, Sultan silt	80
Indianola	90
Everett	100
Landuse/Landcover	Percent Infiltration
Transportation, communications and services/Other urban or built-up land/Mixed urban	0
Transitional areas	25
Residential	75
Evergreen forest land/Mixed forest land/Cropland and pasture/Other agricultural land	100
Slope	Percent Infiltration
>25%	0
20-25%	5
15-20%	25
10-15%	75
0-10%	100

Figure 4. Tables of infiltration model layers and infiltration percentages assigned to classifications.

# The Scalebars of Justice: GIS in the Courts

Here is a reprint of a press release from URISA titled "URISA notes the California Supreme Court's Decision in Orange County Case".

**O**n Monday, July 8, the California Supreme Court ruled that Orange County must provide spatial databases to outside parties in their original form as complete electronic databases, such as a geodatabase, rather than simply in a readable version, such as a printed copy or a PDF file. The Court also decided that the data must be provided for the cost of distribution, rejecting the County's policy of licensing the data at market prices in an attempt to recover part of the cost of data production. Specifically, the Court said, "Because the [Orange County] Landbase is not excluded from the definition of a public record under section 6254.9(b), and because the County does not argue that the database is otherwise exempt from disclosure, the County must produce the OC Landbase in response to Sierra Club's request 'in any electronic format in which it holds the information' (§ 6253.9(a)(1)) at a cost not to exceed the direct cost of duplication (§§ 6253.9(a)(2), 6253, subd. (b))."

***URISA welcomes any decision that increases the availability of geospatial data for public use.***

URISA welcomes any decision that increases the availability of geospatial data for public use. As noted by URISA Past President Greg Babinski 18 months ago, it is URISA's policy that all units of government should freely provide the means for their citizens to fully participate in their own governance by publishing and otherwise supplying geospatial data to all interested parties. We recognize that the laws governing public records vary from state to state and that some states have provisions in their statutes to authorize state and local government agencies to recover part of the cost of data creation and maintenance through licensing fees. The California Supreme Court has ruled that California is not such a state, thereby clarifying what had been an ambiguous policy situation. As the Court itself said, "the legislative history of section 6253.9 reveals no clear answer to the question before us." Thus, the Court provided the required policy clarification by applying the direction contained in Article I, Section 3(b)(2) of the California Constitution, which says, "A statute, court rule, or other authority, including those in effect on the effective date of this subdivision, shall be broadly construed if it furthers the people's right of access, and narrowly construed if it limits the right of access."

URISA continues to support appropriate funding for governmental geospatial programs and recognizes that there are multiple acceptable mechanisms for such funding. The decision in the California case is based on the policy choices and laws of that state. Other state and local governments may legitimately adopt different policies and funding mechanisms, but it is the policy of URISA that no such funding mechanism should interfere with the rights of the governed to participate in their governance. Where state statutes allow data sales for commercial reuse, URISA encourages state and local government agencies to nevertheless provide other data maintenance funding mechanisms in order to ensure the ready availability of public data. [URISA's Advocacy Agenda](#) supports the nationwide development of high quality, publicly accessible geospatial data. The value of such data increases with its availability.

For further comment from the URISA Board of Directors, contact: J. Allison Butler, AICP, CMS, President of URISA, [abutler@mpzero.com](mailto:abutler@mpzero.com).

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# WAURISA Conference Highlights

**W**AURISA's annual conference was held May 6-8, 2013 with a theme of "The Power of Place". Highlights included:

- 298 conference attendees
- Six hands-on workshops available on the first day
- Keynote speech from Dr. Michael Goodchild
- The Summit Award (WAURISA GIS Person of the Year) presented to Karl Johansen
- Evening social at Big E Ales
- Presentations have been posted online [here](#)

Elections for 2-year terms for vacant Board of Directors positions were held. The 2013-2014 WAURISA Board consists of:

- Heather Glock, President
- Ian von Essen, Vice-President
- Sarah Myers, Secretary

- Don Burdick, Treasurer
- Ann Stark, Past President
- Cort Daniel, Member At-Large
- Joshua Greenberg, Member At-Large
- David Howes, Member At-Large
- Suzanne Shull, Member At-Large
- Josh Sisco, Member At-Large
- Dana Trethewy, Member At-Large

WAURISA would also like to thank the following outgoing board members for their service, as they completed their terms.

- Neil Berry
- Joe Brentin
- Steve Savage
- Amanda Taub



## Category & Criteria

## Winner

### Best Cartographic Design

Efficiency in communication of intended message and maximization of the user's cognitive experience.

**Daniel Coe**, of Oregon Department of Geology & Mineral Industries for "Missoula floods— inundation extent and primary flood features in the Portland metropolitan area".

### Best Analytic Presentation

Communication of the problem/project to be solved and presentation of the analytic procedures.

**Ian Mooser**, of Washington Department of Ecology for Toxics Cleanup Program for "Tacoma Smelter Plume Residential Yard Analysis".

### Data Integration

Relevance and select variety of chosen data sources (surveying, remote sensing, GPS, etc.) and data formats (raster, vector, text, etc.) to the problem-solving and mapmaking processes.

**Mary Ullrich**, of King County GIS Center for "Population Distribution in King County, by US Census Bureau Racial Categories, 2010 Census".

### Best Online Interactive Map

Clear, effective design to maximize user understanding and experience of map interaction and application usage.

**Donnaann Visneski**, of the City of Renton, IT-GIS for "Renton Fire & Emergency Response".

### Best Student Map

Communication of a research project implemented in class with an explanation and presentation of the methodology, steps, and conclusion or results of the project or map creation.

**Minyan Shi**, of State University of New York at Buffalo for "The Suitability Map of Vineyard sites area in Cattaraugus, NY".

### Innovative Scripting Process/Custom Geoprocessing Tool

Compelling use of scripting and geoprocessing tools and workflows to automate complex data manipulation workflows.

**Eadie Kaltenbacher**, of Kitsap County Information Services / GIS for "From STOP to GO: Refining Routing Data for the 9-1-1 Dispatch Map".



Preparing conference materials (L-R): David Wallis, Amanda Taub, Don Burdick, Amber Raynsford, Greg Babinski, Heather Glock. Photo by Ann Stark.

Karl Johansen (right) accepts The Summit Award (WA GIS Person of the Year) from Greg Babinski. Photo by Eadie Kaltenbacher.

## Images from the 2013 WA GIS Conference: May 6-8, 2013



Keynote Speaker  
Dr. Michael Goodchild.  
Photo by Eadie Kaltenbacher.



Workshops conducted on the first day of the conference.  
Photo by Eadie Kaltenbacher.



Attendees at the opening session.  
Photo by Donna Wendt.



Incoming Board Member-At-Large David Howes at the evening social.  
Photo by Donna Wendt.



Judging map contest entries at the evening social (L-R): Ann Stark, Greg Babinski, Patrick Jankanish.

Photo by Donna Wendt.



Newly elected WAURISA President Heather Glock.  
Photo by Donna Wendt.

# Rising GIS Stars

(Continued from page 1)

Christopher's rewards included:

- Dick Thomas Award Plaque
- \$1000
- One year membership in WAURI-SA
- Free registration to the 2014 Washington GIS Conference
- Publication of paper in *The Summit*

In addition, his professor, Dr. Santiago Lopez, was awarded a cash prize of \$250.

**This award honors Dick Thomas by encouraging students to excel in their studies and transition successfully into GIS careers.**

ies have measured the degree of NS in two ways: either objectively in two dimensions without taking into consideration the height and surveillance characteristics of surrounding structures, or subjectively based upon retrieved researchers'/residents' judgments of whether or not a dwelling can be seen from other dwellings.

This study utilizes georeferenced data and technologies to expand the objective approach into the 3rd dimension. To this end, in a residential neighborhood, data on the position and size of openings (i.e. doors, windows, etc.), vegetation and visual barriers are gathered from georeferenced oblique aerial imagery and complemented by site surveys. Openings are enumerated and mapped. Then, ArcGIS 3D Analyst tools has been utilized to create a three dimensional model of this site. Sight-lines are generated from each opening to openings in all other residential structures on the same street segments. Sight-lines that are too distant or that are obstructed by vegetation and barriers are removed and intensity of NS for each opening are calculated. Next, the entry point of burglars for the actual burglarized dwellings from the Spokane Police Department reports are compared to the NS intensity for each opening. A multi-level analysis will reveal which openings might be more targeted by burglars, and whether significant mean differences exist for NS between burglarized and non-burglarized housing units.

## Second Place: Solmaz Amiri

**Solmaz** is a student at Washington State University. Her advisor was Kerry R. Brooks and her presentation was on **"Utilizing Georeferenced Data and Technologies for Crime Prediction in a Block Group in Spokane, WA"**.

Here is her abstract:

One of the main desires of human beings is to live in crime-free environments. The design of the built environment can influence fulfilling this desire. One of the main qualities of physical configuration postulated to promote freedom from crime is natural surveillance (NS). NS is facilitated by physical design that offers residents/guardians opportunities to survey non-private spaces of their residential settings. Previous research have acknowledged a relationship between NS and the distribution of crime incidents, hypothesizing that crime is more reduced in eye-policed streets. However, stud-



Christopher Wright, First Place Winner.



Second Place Winner Solmaz Amiri (center) with Competition Coordinators Sarah Myers (left) and Amanda Taub (right).

Her rewards included:

- Dick Thomas Second Place Award Certificate
- \$300
- One year membership in WAURISA
- Publication of paper in *The Summit*

### Third Place: Melissa Kelly

**Melissa**, with the GIS Department at Green River Community College, presented “**King County Cedar Grove Road Area: Odor Identification and Sourcing**”. Her advisor was Sabah Jabbouri.

Here is her abstract:

For well over a decade, residents in the Cedar Grove Road area in King County have been plagued by nuisance odors in their neighborhoods. A number of lawsuits and penalties have yet to resolve the situation.

At the center of the situation are two Cedar Grove Composting (CGC) sites. Local residents are convinced that the CGC

**For well over a decade, residents in the Cedar Grove Road area have been plagued by nuisance odors in their neighborhoods.**

sites are the source of the odors. However, a reclamation facility and the King County Regional Sanitary Landfill lie next to CGC, thereby complicating the identification of odors.

The regulatory agency responsible for the situation is the Puget Sound Clean Air Agency (PSCAA). Unfortunately, they have been somewhat ineffective because they are required to be accurate in any indictments they may make. In addition, CGC claims that they are not the source of the odor complaints but instead point to the county landfill and the materials site next door.

CGC requires and deserves accurate and timely odor source identification. In collaboration with Atlas, a non-profit organization for the Four Creeks Unincorporated Area Council (FCUAC), and local residents, the objective of this project is to develop a system to effectively identify the source of nuisance odors.

Once originated, odor particles are at the effect of meteorological forces and physical blockage including vegetation, topography, and man-made objects. Wind, humidity, and temperature are among the forces that influence the direction and disbursement of odors. The outcome will be to perform multiple analyses including mapping odor complaints and

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# Rising GIS Stars

(Continued from page 11)

the facilities in question, topography analysis, and Spatial Analyst modeling using weather station data for various weather parameters. Geostatistical Analyst will be used to produce predictions of weather phenomena for the unsampled locations. Hot Spot analysis will be generated using all complaint addresses. Several GIS maps will be created for comparison of days with and without odor complaints.

Her rewards included:

- Dick Thomas Third Place Award Certificate
- \$200
- One year membership in WAURISA
- Publication of paper in *The Summit*

## Honorable Mention: Abdullah Akpinar

**Abdullah** is a student at Washington State University and his advisor was Kerry R. Brooks. His presentation was on **"Assessing the associations among green space type, structure, general mental health, and general health using GIS and FRAGSTATS"**. This year we tried something new when **Abdullah** was unable to attend the conference in person, so **Abdullah** gave his presentation via Skype.

Here is his abstract:

Today many people suffer from mental health problems such



Abdullah Akpinar received an Honorable Mention.

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as depression and anxiety. The prevalence of depression and anxiety are 16.1% and 12.3%, respectively. The WHO reports that mental health disorders are expected to be one of the major contributors to illnesses by 2020. Another important phenomenon that affects/decreases mental health is stress, which is estimated to affect 75-90% people. In this study, "General Mental Health" was adopted to describe stress-depression-anxiety. Previous research reveals that green space (GS) has positive effects on general mental health (GMH) and general health (GH) and GS may mitigate GMH problems and improve GH. However, research has not demonstrated which types of GS are better to mitigate GMH and improve GH. Therefore, my project is about identifying appropriate green environments using existing nationally collected survey and geospatial information.

Objectives of my project were to fill the gap in existing knowledge in the literature and create recommendations for policy makers/planners/designers regarding where/how to design, create, preserve or restore GS that people can reduce GMH problems and improve GH. This research was conducted at zip-code levels in Washington State employing NLCD and BRFSS data. The purpose was to explore relationships between types and structures of GS, and people's GMH and

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# President's Column

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detailed below is to join our monthly Board of Directors' call. It's open for everyone, and other than to announce your presence, you can listen without comment or join the conversation on as many topics as you wish. We welcome everyone and value diverse opinions on the issues we're working on. The meetings are held the second Tuesday of each month from Noon-1:00 p.m. The toll free number is: 1.800.944.8766 access code 20311.

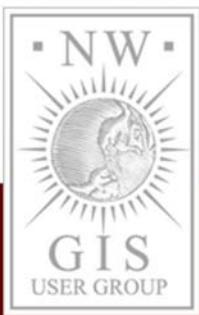
WAURISA has been in existence for 16 years. Our primary activities include developing education-related events such as the annual state GIS conference and workshops. We have an excellent track record of offering high-quality events that provide unmatched opportunities for the Washington State

*We have an excellent track record of offering high-quality events that provide unmatched opportunities to share knowledge and skills.*

and surrounding GIS community to share knowledge and skills. We also endeavor to disseminate current information about the geospatial industry nationally and internationally, especially as it pertains to the GIS community here in Washington. This work is done largely by the active committees that comprise WAURISA. The volunteers working in these committees do the hard work at WAURISA, from organizing a day-long workshop to writing a letter

to advocate the support of a particular piece of legislation. These committees always welcome new volunteers and new perspectives! Here is a brief description of our committees:

- **Technology:** manages WAURISA's website and tasks related to running events and workshops



## 2013 Northwest GIS Users Conference

### Charting a Changing World Through Maps, Web & Mobile

October 14-18, 2013 | Sunriver, Oregon  
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Web and mobile mapping are on the rise; people are consuming maps in their browsers and on their smart phones now more than ever. The 27th annual Northwest GIS Users Conference will help you cultivate ideas for producing rich cartographic products and for making responsive web map services to meet society's demand to consume on the go. We hope to see you there!

#### Keynote Speakers

**Allen Carroll** | Esri Program Manager for ArcGIS Online Content & former Chief Cartographer at National Geographic

**David DiBiase** | Esri Industry Solution Director for Education

#### Call for User Presentations is Open

Tell your GIS story! Members of the GIS user community are invited to share their expertise at the 2013 Northwest GIS Users Conference. Your fellow conference attendees will benefit and you can help them understand the potential of geospatial technology.

The deadline for abstract submissions is August 1, 2013.



#### Sponsorship Opportunities Available

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- **Conference:** organizes our annual GIS conference
- **Education:** develops workshops offered during the annual conference and as stand-alone events
- **Finance:** manages WAURISA's fiscal responsibilities
- **The Summit Newsletter:** produces WAURISA's quarterly online newsletter
- **Marketing:** communicates WAURISA news through various channels including our website, email lists, Facebook, LinkedIn, and Twitter

- **Membership:** manages records of WAURISA membership information
- **Nominating:** organizes recruitment of WAURISA board candidates and manages the election process

Do you see a committee you'd like to learn more about? Drop me a line! [president@waurisa.org](mailto:president@waurisa.org)

As we head into the last half of the year, we've prioritized a list of work to focus on. Some of these projects are long-

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## Rising GIS Stars

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GH, specifically addressing questions of whether general specifications of GS are affirmatively associated to GMH and GH. This was done by adopting a three-tiered, hierarchical approach using GIS and FRAGSTATS: first examining relationships between unitary GS (all GS types) and people's GMH and GH; secondly, assessing relationships between specific types of GS, GMH, and GH; and thirdly, assessing relationships between structures of significant GS and GMH and GH. Results showed that urban green space and forest positively; rangeland and agricultural land negatively affect GMH and GH; less fragmented, less isolated and well-connected GS positively affect GMH and GH. Abdullah received an Honorable Mention certificate for his work.

### Thank you!

Every year the students dazzle us with their projects and dedication. This year was no exception. All of the students did a great job of presenting their work. The future is bright for them and our profession.

We would like to send our heartfelt gratitude to everyone that made possible this year's Dick Thomas Student Presentations. We would like to thank this year's entrants, **Christopher Wright, Melissa Kelly, Solmaz Amiri and Abdullah**



*Richard 'Dick' Thomas*

1947 – 2006

**Akpinar**, for the great work they demonstrated in their abstracts and quality presentations. We would like to thank the judges, Emelie Healy with Aspect Consulting, Deron Smith with Peninsula Light, Winston McKenna with ActioNet,

Walker Willingham with Wilson Engineering, Lane DeLarme, and Rick Lortz with the Lakehaven Utility District for their work judging the abstracts and presentations. Finally, we would like to thank all of the professors who encouraged their students to enter the competition. These presentations would not have happened without your support.

I, Amanda, would like to thank Sarah for joining me as the co-coordinator for this year's competition. This was my last year as coordinator. I have really enjoyed my time coordinating this competition. I know that Dick would be so proud of all the students that have presented through the years. Please be certain to welcome Sarah as next year's coordinator. I know she will do a wonderful job managing the competition.

We hope you will come to the eighth annual Richard 'Dick' Thomas Memorial Student Presentation Competition and Award at next year's Washington GIS Conference (May 12 - 14, 2014) at the Greater Tacoma Convention & Trade Center. Student presentations will be Wednesday, May 14, 2014.

# GIS – More than just a map

SEPTEMBER 30 & OCTOBER 1  
Future of Flight Aviation Center  
Mukilteo, WA



This year's conference is being held Sept 30 to Oct 1 2013 at the Future of Flight museum in Mukilteo, Washington (near Seattle). We ask that you consider attending this fabulous event.

It is important for our GIS Community to remain connected and open to sharing ideas and innovations. Pacific Northwest GITA is committed to provide GIS related education and information. This is our 13th consecutive annual conference and the theme is GIS, More Than Just a Map. Imagine an organization where GIS technology is a key enterprise application, creativity is encouraged, and sharing of information is an expectation. We ask you to come and explore the opportunities for your GIS to deliver greater value to your enterprise. You will meet friends and neighbors from the Pacific Northwest and Canada that are dealing with the same issues and want to share ideas and innovations.

See you at the conference

Best regards,

Pacific Northwest GITA Board of Directors

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## Presentation Topics

Keynote Address: The role of Smart phones and Tablets in mobile GIS - Peter Batty

Mobile GIS Implementation at Benton PUD - Jared Waddell, Benton PUD

Fitting current data into an Emergency Dispatch (911) - Dann Borden, Intergraph Corporation

Asset Re-Alignment Project and conflation issues - Piet Nooij, Fortis BC

PGIS and Society- from anonymity to mainstream - Cameron Shankland, Geodigital International

Oracle spatial – Facts, fiction and Reality - Mike Baker

TBA - Geoff Zeiss, Principal at Between the Poles

**Call For Speakers!** There are still slots open for presentations. If you are interested in presenting, send us an [email](#) with your abstract/topic.

### Registration Fees Include:

- Admission to the conference
- Breakfast, lunch and snacks on Monday
- 1 Drink Ticket for the Monday Night Social
- Breakfast and snacks on Tuesday

### GITA or ASPRS Members

Registration \$225 after July 30, 2013

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## Are you working towards your GIS Professional Certification?

By attending the conference you can earn 0.2 (2 days x 0.1) credits towards your Educational Achievement Component. If you would like to be a presenter at our event email [EHoogenraad@abbotsford.ca](mailto:EHoogenraad@abbotsford.ca) and you could earn 1.0 credit towards the Contributions to the Profession component or if you aren't able to attend or present you can still earn one point in the Contributions to the Profession Component by entering a poster to our poster competition!

# Water Infiltration Modeling: Identifying Priority Areas

(Continued from page 5)

Two separate rasters were created from the original “soils” shapefile. A “soilclass”, and a “soilpart” raster were created to separate the characteristics of depth and permeability (according to soil series classification; ie: Alderwood Series, Everett Series etc.), and particulate size and classification (gravel, sand, silt, clay). A new field was added to these two raster layers and the layers of “landuse/landcover”, and “Slope” called “infiltration”. This new float field was used to calculate infiltration percent based on the properties of the raster layer. Figure 4 shows a collection of these tables and the percentages used to classify the features.

Now that I had raster layers classifying the soils, landuse and slope, and an impervious surface map, I was able to use ArcGIS’s raster calculator to assign weights to individual layers, performing a MCE, and create water infiltration models. The output raster from the MCE was representative of the importance the user felt each layer represented. Following running the model, the output was masked by the impervious/pervious surface map by perform a mathematical multiplication function. Since the impervious/pervious surface map was binary, any area classified as impervious was removed as a suitable candidate for water infiltration. From this new masked layer, I chose to isolate areas that were within the 90<sup>th</sup> percentile of the layer’s value as priority candidate areas for water infiltration.

## Results

Four models were generated, based on assigned weights. See Figures 5-8. The four models represent varying level of prioritization and focus. The weights assigned to layers within each model are listed with the figure description. Areas of these prioritized areas were calculated. The slope-weighted model identified the largest area of priority water infiltration with

*Having a larger target area increases the likelihood of candidates and participation.*

coverage of 12.4 km<sup>2</sup>. The soils-weighted model identified the smallest area with coverage of 2.99 km<sup>2</sup>. See Table 2 for area results.

## Discussion

While these four models identified areas of high priority areas based on understanding of water infiltration principles, the data and classifications used may not accurately represent the landscape and area. One of the primary limitations in my analysis was the lack of a present-day, accurate account of landuse/landcover information. The landuse/landcover map I used was from 2007, and was fairly basic and generalized with its representations of classifications. Infrared aerial photography and remote sensing will provide a much more thorough accounting of what’s happening on these surfaces.

Information on the location and depth of the water table was something that was unavailable. This is another limitation of this modeling project. Areas where the water table is shallow, or close to the surface, will likely have a reduced water capacity. This means that while the other infiltration characteristics evaluated may indicate suitability for water infiltration, the water capacity may be so little that the area is in fact not a good candidate. This particular issue is the case in the North Creek Business Park, located to the east of I-405 and north of 5-22. All four of the water infiltration models ran identify this as an area highly suitable for water infiltration but in fact the entire area used to be a wetland and the water table is so shallow that the area often sees urban flooding and soggy soils.

Another limitation was my use of the impervious/pervious binary surface map. I wanted to incorporate as much information from the city’s geodatabases as I could so I chose to

(Continued on page 18)

Model	# High Priority Pixels	Area (km <sup>2</sup> )
Slope (Highest Weighted)	161586	12.14
Equal Weights	133580	10.04
Landuse/Landcover (Highest Weighted)	154704	11.62
Soils (both layers highest weighted)	39774	2.99

Table 2. Area results of high priority water infiltration within models.

# Water Infiltration Modeling: Identifying Priority Areas

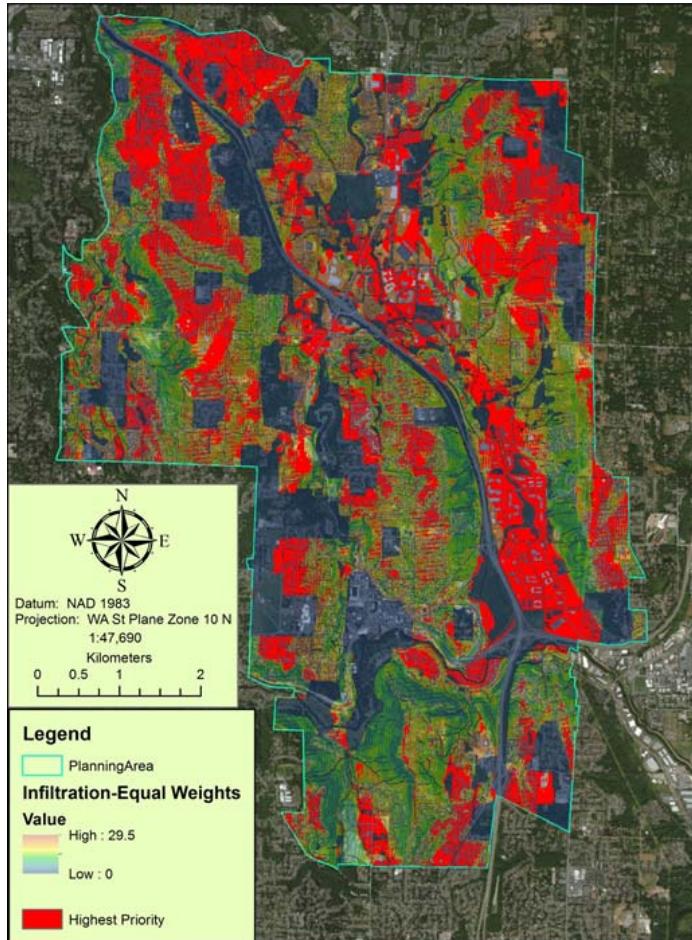


Figure 5. Water infiltration map featuring equal weights assigned (25% assigned to each Landuse/Landcover, Soilclass, Soilpart, and Slope).

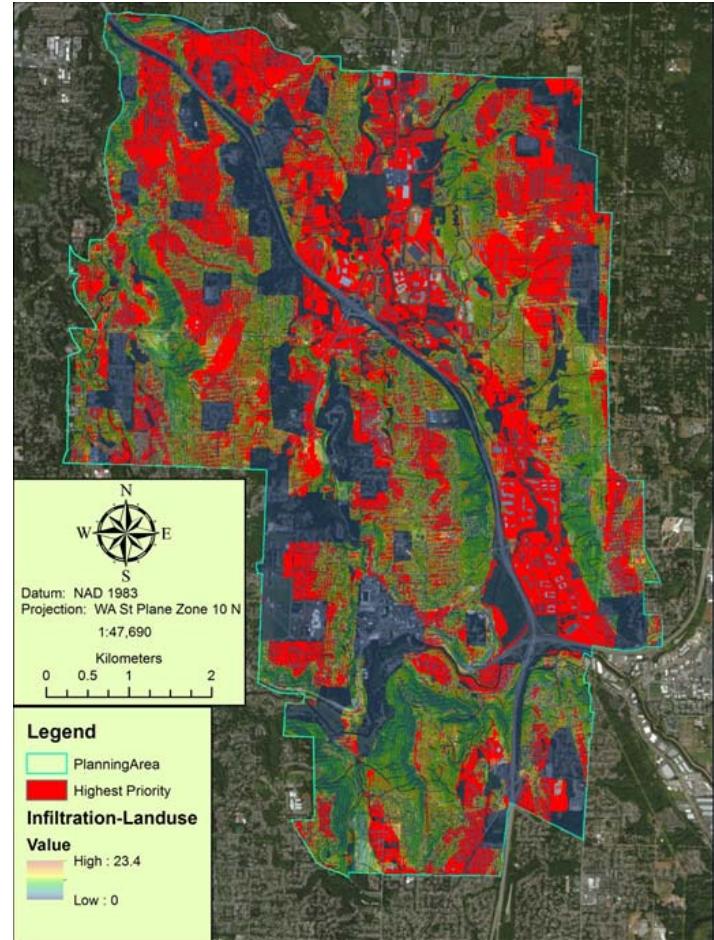


Figure 6. Water infiltration map: Landuse/landcover weighted model (40% Landuse/landcover, 30% Soilpart, 20% Slope, 10% Soilclass).

(Continued from page 17)

undertake the creation of this map. Again, there are limitations with the accuracy and detail of this layer. The conversion and incorporation of some polyline files (StreetNetwork and Rivers\_and\_Streams) that most likely failed to represent accurately the area, width, and extent of the true values.

The areas classified as "High Priority" for water infiltration were quite a bit larger than I had expected before running the models. This, however, is not necessarily a negative. By declaring areas with values that were in the 90<sup>th</sup> percentile or greater, a broad scope of potential target areas was established. In terms of community outreach and getting residents involved in any natural water infiltration project, having a larger target area increases the likelihood of candidates and participation.

A final thought regarding the models that were run is that the weights assigned to each layer represented my evaluations of prioritization. MCEs could be run any number of times manipulating the weights to represent any number of priorities. In my evaluation, landuse and landcover may very well be the most important aspect in this water infiltration analysis. As mentioned earlier, accuracy with regards to this aspect of water infiltration criteria is crucial to understanding how water will react when it hits the surface.

This water infiltration analysis exposed me to the issues facing GIS operators with regard to data management, and understanding classification and values. Identifying relevant data to address a problem statement or question often involves research outside the context of GIS. Metadata associated with a raster or shapefile may not provide enough information to understand its relevance or importance. This experience has given me the opportunity to work with real data

sets, in the context of addressing the difficulties and issues facing city planners.

Recognizing the importance of the water cycle, including infiltration, and how land cover and use plays such an integral role, the identification and preservation of areas with high infiltration will become increasingly important when combined with expansion of impervious surface networks. Through the creation of maps showing areas of high and low water infiltration, areas of priority can be established concerning reducing runoff and increasing infiltration. This type of modeling produces maps that can be important tools in addressing future development and land use change and the impact it may have on our ecosystem.

## References

Carol, E. et al. 2013. Local and Regional Water Flow Quantification in Groundwater-dependent Wetlands. *Water Resources Management*. 27:3, 807-817

Natural Resources Conservation Service. 2013. United States

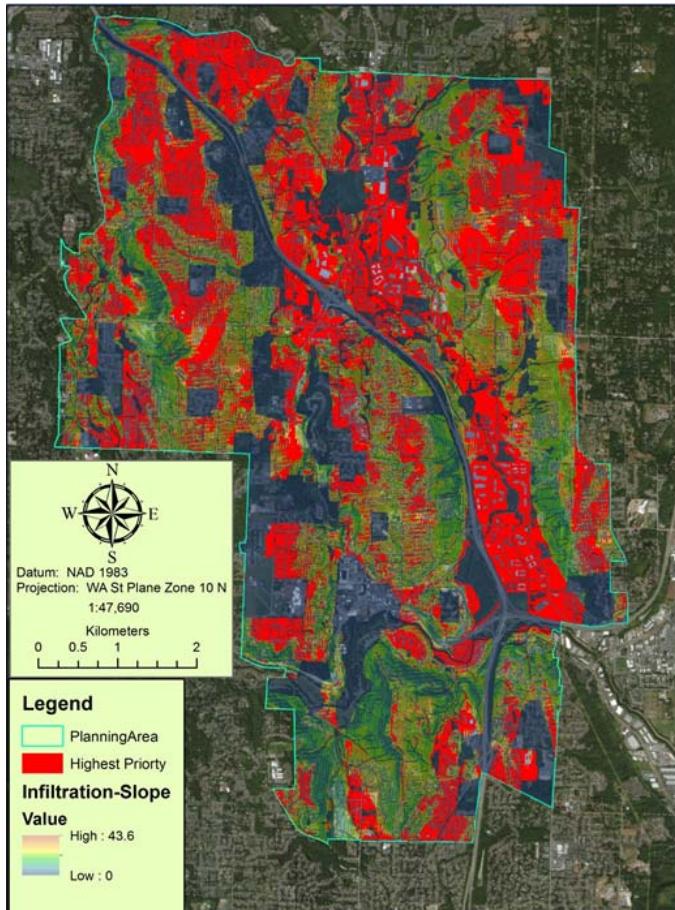


Figure 7. Water Infiltration Map—Slope weighted model (40% Slope, 20% Soilpart, 20% Soilclass, 20% Landuse/Landcover).

Department of Agriculture. [Internet]. Available at <http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/>. Cited March 2013.

Viavattene, C. Ellis, JB. 2013. The management of urban surface water flood risks: SUDS performance in flood reduction from extreme events. *Water Science and Technology*. 67:1, 99-108.

Zang, YK. Schilling, KE. 2006. Effects of land cover on water table, soil moisture, evapotranspiration, and groundwater recharge: A Field observation and analysis. *Journal of Hydrology* 319 (2006) 328–338

## Data Sources

### Landuse/Landcover (g47122)

- USGS. <http://www.usgs.gov/pubprod/DEM/n48w123>
- USGS. [http://www.usgs.gov/pubprod/City of Bothell GIS Base Data FTP](http://www.usgs.gov/pubprod/City%20of%20Bothell%20GIS%20Base%20Data%20FTP)
- <ftp://search.ci.bothell.wa.us/>

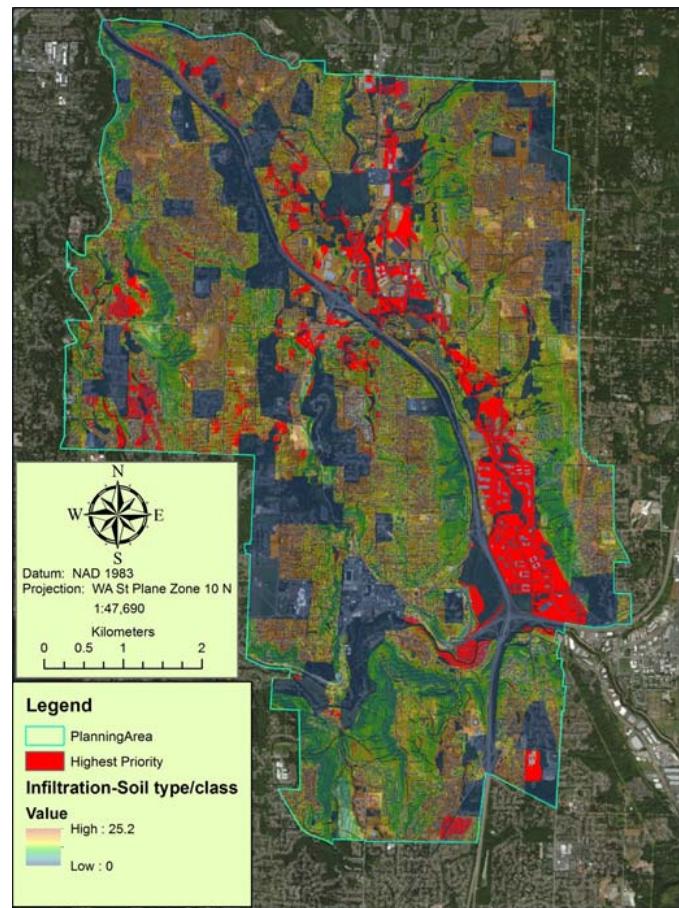


Figure 8. Water Infiltration Map—Soils weighted model (30% Soil-class, 30% Soilpart, 20% Slope, 20% Landuse/Landcover).

# President's Column

(Continued from page 15)

standing ones that are moving forward with new volunteer energy and talents, and others are ones that have percolated to the surface from conversations and activities that took place during our conference in Lynnwood this year. Here is a list of these projects:

A review of our business processes related to membership communication and event management. We expect our work to result in a significant website facelift and easier-to-use tools for managing events and membership information in 2014. Our highest goal with this project is to better harness volunteer ideas and talents, and make WAURISA's goals and objectives clearly understood and easier to achieve.

Along with other state URISA chapters, we'll continue our work with URISA International to develop membership enhancements designed to bring chapters in closer alignment with increased benefits for all members. WAURISA Secretary Sarah Myers and I will head to the GIS-PRO 2013 conference in September to work on this goal during a special session at the conference. While there, Sarah and I will be meeting with many other chapters in order to bring home innovative ideas to benefit our members.

We're looking to revive our Outreach committee. This committee makes connections with other geospatial organizations including K-12 and Higher Education institutions. In its revival, this committee will also connect with skilled volunteers that can help WAURISA achieve its mission.

Speaking of mission, we're also dusting off previous versions of our chapter mission statement to craft an updated one that'll focus our work in the coming years.

As you can see, we have a lot we're working on! I look forward to reporting on our progress in the autumn issue of *The Summit* and our monthly board meetings. In the meantime, please feel free to contact me or any board member with ideas, comments, or issues pertaining to WAURISA and our geospatial community. We are here for you. Thank you, I look forward to hearing from you!

Heather Glock

[president@WAURISA.org](mailto:president@WAURISA.org)

# Public Maps in Washington



Tourists find their way around Gig Harbor with the help of this map series posted around town.

## [ Map-Spotting Contest ]

*The Summit* is pleased to announce our Map-Spotting Contest. Here's how it works: be on the lookout for maps relating to the quarter's theme. Snap a photo, write a one-sentence caption, add your name as you would wish it to be printed, and send it to the [editor](#). The submissions will be judged on an entirely subjective basis, and the winning photo will be published along with the photographer's name. The theme for the Autumn 2013 issue is *Adventure*.

# Editorial

By: Eadie Kaltenbacher, GISP

**C**hristopher Wright's award-winning student paper, published in this issue, nicely covers his use of advanced geographic modeling techniques. However, I was especially intrigued by a passing observation deep in the discussion section. He states, "Identifying relevant data to address a problem statement or question often involves research outside the context of GIS."

Christopher is absolutely correct. In fact, I would take it a step farther, and argue that addressing a GIS problem statement usually involves significant communication and research outside the context of GIS.

Mapping has become more accessible. Thanks to smartphones and tablets, we have maps in our pockets and purses that are constantly updated and personalized. As non-GIS professionals become exposed to maps, they come to desire them. Furthermore, they expect the maps to be of good quality and value.

As a result, GIS professionals are being approached more frequently to provide maps and mapping services to many

***The burden falls on the GIS professional to interpret requirements into technical language and concepts.***

different types of clients. While the client must explain what they need, the burden falls on the GIS professional to interpret the requirements into technical language and concepts. Furthermore, the GIS professional must take these requirements, develop an idea for a solution, estimate the time and effort involved, and submit it back to the client in language they can understand.

As a GIS professional, I find that one of the most important parts of my job is communicating with non-GIS professionals: learning to speak their language and developing an understanding of their business processes. It is essential to establish this communication so we can develop goals, scopes, requirements, and deliverables that work for both parties.

Possessing strong technical skills in GIS is only half the battle. Communicating how these skills can be applied to the client's needs and explaining their value is just as important.

It is heartening to see that Christopher and other students are already learning that they will need to develop these valuable skills as they go through their GIS programs and begin their careers.

## UPCOMING DEADLINES

Submit articles to *The Summit* for publication by the following dates.

**Autumn Issue:** October 11, 2013

**Winter Issue:** January 10, 2014

## Literary Corner

**“A**mong the lessons...geography had not been omitted; I had learned from these the relative situations of the different countries of the earth. You had mentioned Geneva as the name of your native town; and towards this place I resolved to proceed. But how was I to direct myself? I knew that I must travel in a southwesterly direction to reach my destination; but the sun was my only guide.”

-from *Frankenstein*, by Mary Shelley

*The Summit* is the newsletter of WAURISA. To encourage the discussion of issues and ideas of importance to the Washington GIS community, we welcome letters to the editor or opinion essays. Letters should be a maximum of 100 words and essays should be limited to 500 words.

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[www.wss-acsm.org](http://www.wss-acsm.org)

### Cascadia Users of Geospatial Open Source

[groups.google.com/group/cugos](http://groups.google.com/group/cugos)

Contact [Karsten Venneman](#)

### Central Puget Sound GIS User Group

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### Central Washington GIS User Group

Meets the 2nd Wednesday of each month.

Contact [Amanda Taub](#)

### King County GIS User Group

[www.kingcounty.gov/operations/GIS/UserGroups.aspx](http://www.kingcounty.gov/operations/GIS/UserGroups.aspx)

Meets 1st Wednesday every other month at 11:00am at the KCGIS Center, 201 S. Jackson Street, Seattle WA, Conf Room 7044/7045.

### Northwest Washington GIS User Group

[www.wwu.edu/huxley/spatial/nwwgis/nwwgis\\_mtgs.htm](http://www.wwu.edu/huxley/spatial/nwwgis/nwwgis_mtgs.htm)

### Southeast Washington/Northwest Oregon GIS User Group

[web03.pocketnet.com/~sewa-neor-gis/sewa-neor-gis.org/index.html](http://web03.pocketnet.com/~sewa-neor-gis/sewa-neor-gis.org/index.html)

### Washington Geographic Information Council (WAGIC)

[geography.wa.gov/wagic](http://geography.wa.gov/wagic)

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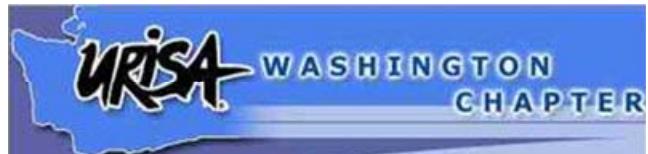
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