



Integrating Urban Agriculture & Urban Stormwater: An Anacostia Pilot

Dwane Jones, Ph.D.

**Director of the Center for Sustainable Development
*College of Agriculture, Urban Sustainability, and
Environmental Sciences (CAUSES)***

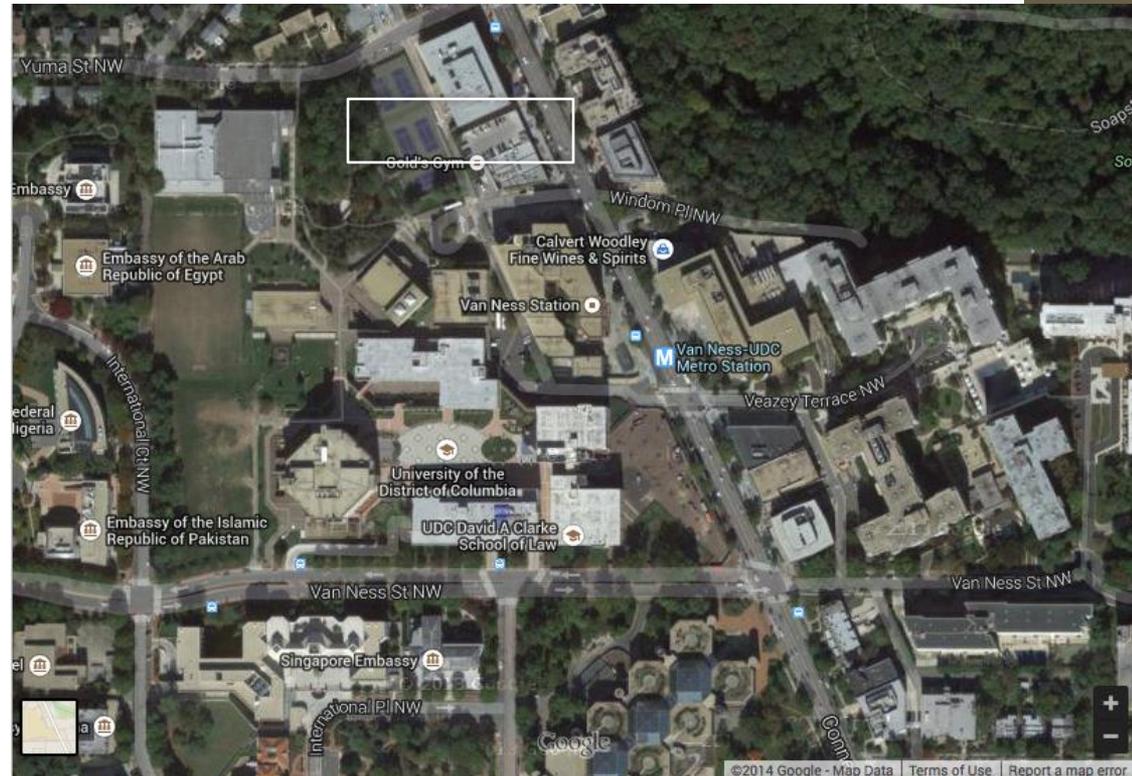
UDC's Center for Sustainable Development provides relevant and innovative applied research and education to students, District residents, and the world in the areas of sustainable infrastructure, sustainable spaces, urban economics and entrepreneurship, and behavioral and social change.

Agenda

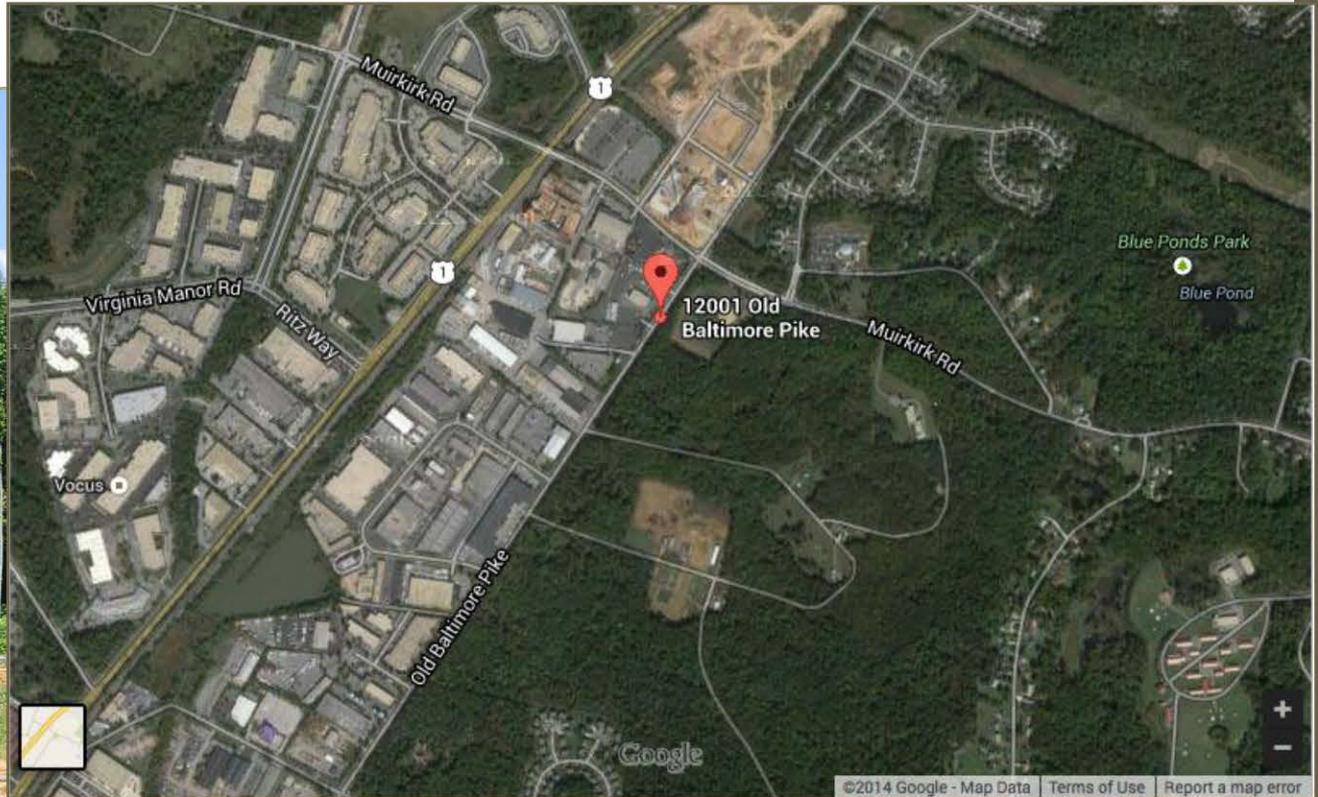
- Context (UDC + Washington, DC)
- Overview: Sustainable DC + Urban Ag. + Urban Stormwater Management
- Anacostia Urban Farm Project Specifics
- Our Approach
- Lessons Learned

University of the District of Columbia

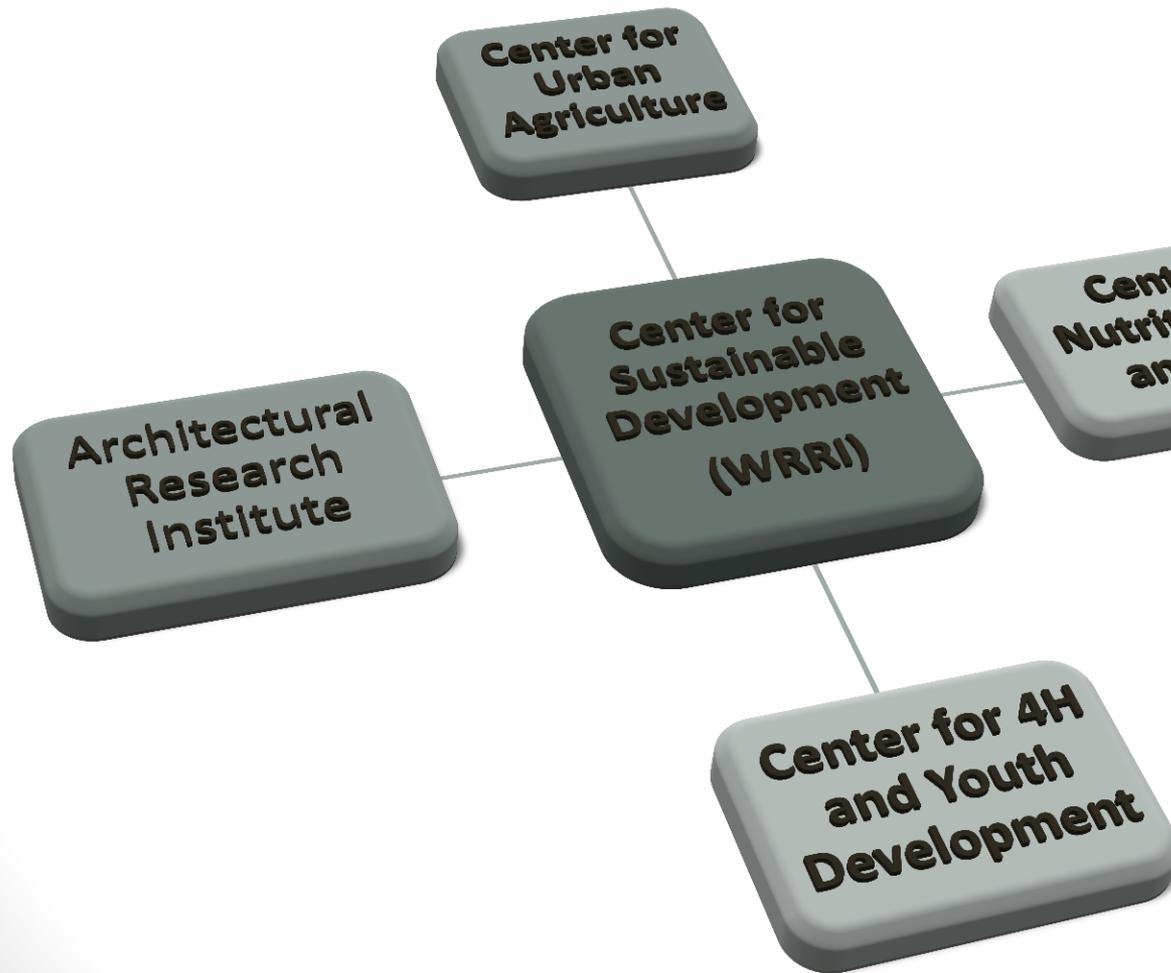
- Urban, land-grant, HBCU
- 50 undergraduate and graduate academic degree programs
- UDC-CC
- 5,400 students



Muirkirk Research Farm



The Center for Sustainable Development Land-Grant Centers & Academic Programs in CAUSES

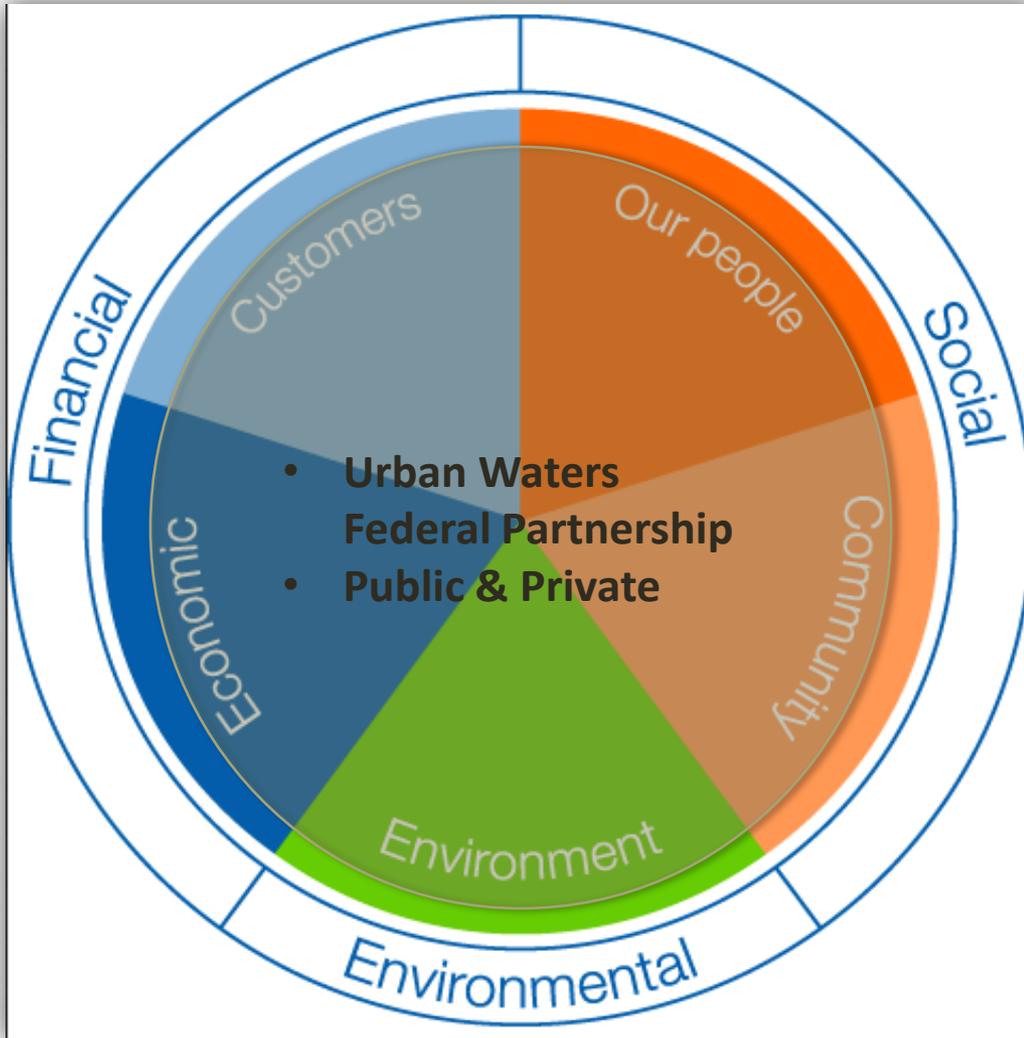


Academic (Degree) Programs

- Architecture & Community Planning
- Nutrition & Dietetics
- Environmental Studies
- Health Education
- Nursing
- *PSM: Urban Sustainability
- *PSM: Urban Agriculture
- PSM: Water Resources Management

UDC CAUSES:

Center for Sustainable Development



- Research
- Academics
- Extension
- Engagement

Graphic: SP AusNet

Urban Agriculture/DCHA



Objectives

- Promote local, urban agriculture
- Promote urban stormwater management
- Promote the value of water
- Minimize fish consumption from Anacostia
- Develop educational curricula
- Create jobs and enhance job skills
- Improve public health
- Support community partners and promote similar initiatives

Fulfilling the Mission

- Promote clean urban waters.
- Reconnect people to their waterways.
- Water conservation.
- Use urban water systems to promote economic revitalization and prosperity.
- Encourage community improvements through active partnerships.
- Be open and honest: listening to communities is the best way to engage them.

Fulfilling the Mission

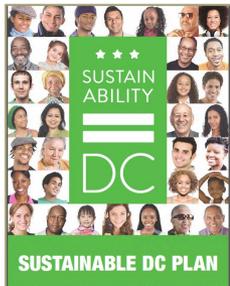
- Focus on measuring results and evaluation to fuel future successes.

Partners (short list)

Federal Partners



District Partners



Partners (short list)

Non-Profit Sector



University Partners



Urban Waters Federal Partnership



Lisa Pelstring

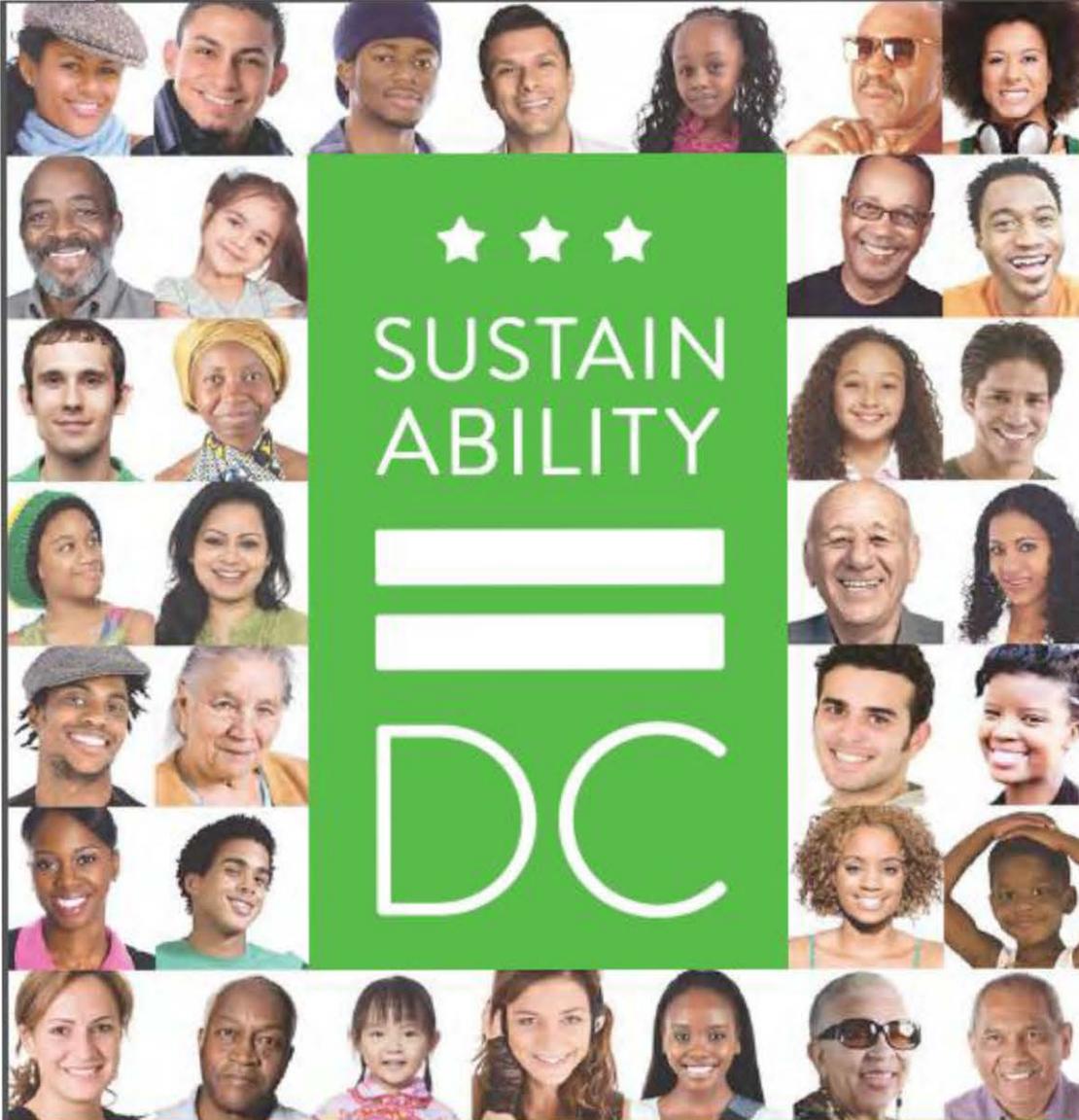
Advisor, Urban Environmental Issues
Offices of Water and Science and Fish,
Wildlife, and Parks
U.S. Department of Interior



Fred Pinkney, USFWS



Dana Robison,
Public Health Service



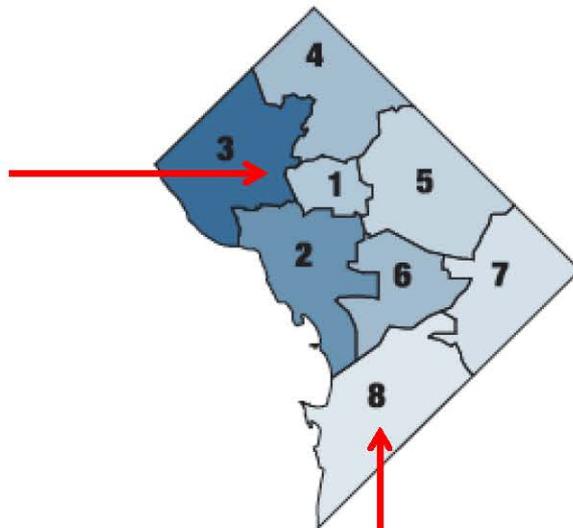
SUSTAINABLE DC PLAN

"Healthy Cities-Healthy People"

Washington, DC

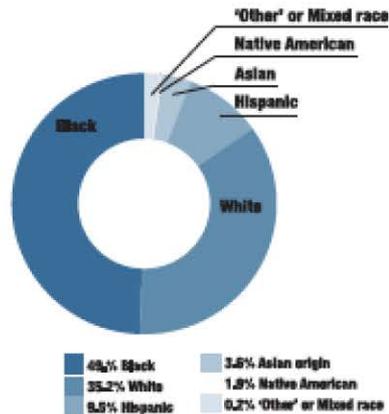
- Washington, DC region ranks fifth among metro areas for year-long population growth (US Census)
- People migrating to DC
- 646,449 in 2013 from 633,427 in 2012
- Growth expected to continue

AVERAGE HOUSEHOLD INCOME BY WARD**



| | |
|--------------------------|-------------------|
| Ward 1: \$98,485 | Ward 5: \$78,559 |
| Ward 2: \$190,692 | Ward 6: \$120,526 |
| Ward 3: \$257,386 | Ward 7: \$54,667 |
| Ward 4: \$116,668 | Ward 8: \$44,076 |

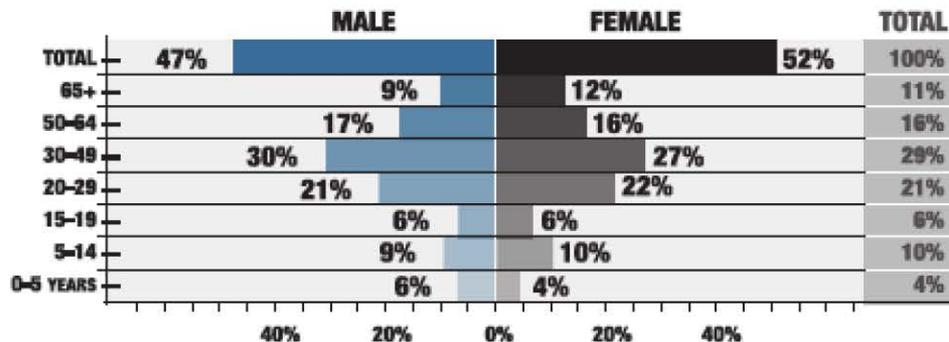
ETHNIC DIVERSITY AS % OF DC'S TOTAL POPULATION**



632,232:
TOTAL POPULATION OF THE DISTRICT*



PERCENTAGE OF RESIDENTS BY GENDER AND AGE (2011)**



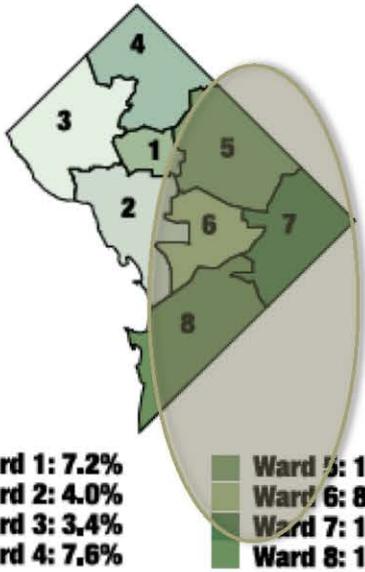
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SUSTAINABILITY

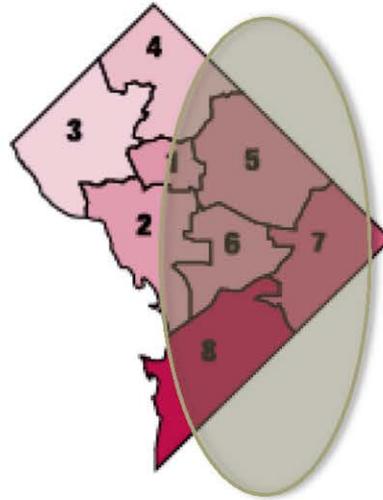


DC

UNEMPLOYMENT BY WARD (2005-2009)



POVERTY PREVALENCE BY WARD (2005-2009)¹



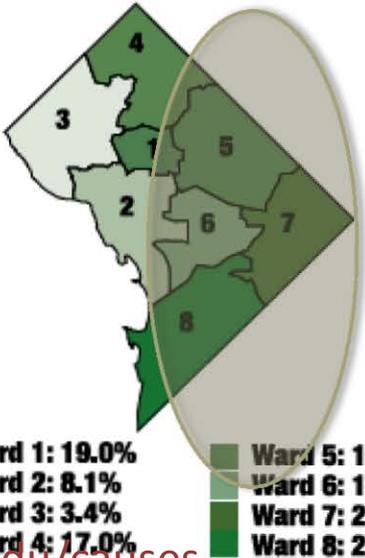
- Ward 1: 16%
- Ward 2: 15%
- Ward 3: 6.9%
- Ward 4: 9.9%
- Ward 5: 19%
- Ward 6: 18%
- Ward 7: 26%
- Ward 8: 35%

SUSTAINABLE DC
28

1 IN 3: DC RESIDENTS AT RISK OF HUNGERTM

49.9%: THE POVERTY RATE FOR CHILDREN UNDER 18 IN DC. THIS COMPARES TO 37.9% NATIONALLYTM

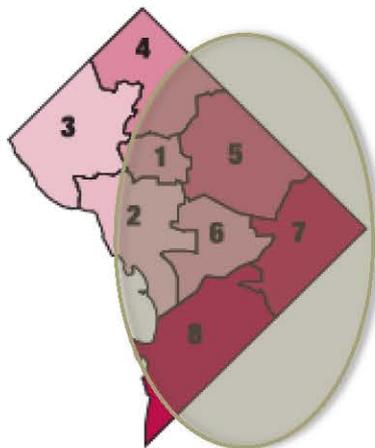
PERSONS WITHOUT HIGH SCHOOL DIPLOMA BY WARD (2005-2009)¹



50% OF JOBS IN DC REQUIRE AT LEAST A BACHELOR'S DEGREE¹

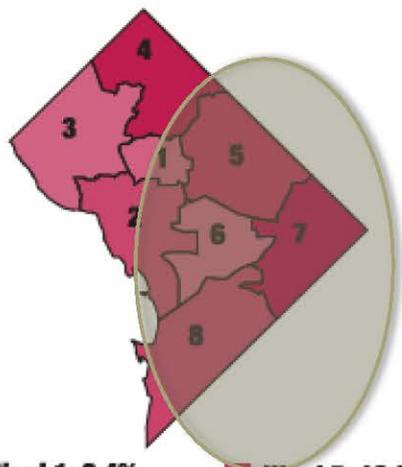
★ ★ ★
SUSTAINABILITY
==
DC

OBESITY PREVALENCE BY WARD (2007)¹¹



| | |
|---------------|---------------|
| Ward 1: 18.8% | Ward 5: 30.1% |
| Ward 2: 12.5% | Ward 6: 19.1% |
| Ward 3: 11.7% | Ward 7: 39.9% |
| Ward 4: 22.0% | Ward 8: 41.9% |

ADULT ASTHMA PREVALENCE BY WARD¹²



| | |
|---------------|---------------|
| Ward 1: 8.4% | Ward 5: 10.8% |
| Ward 2: 9.7% | Ward 6: 8.2% |
| Ward 3: 8.3% | Ward 7: 12.2% |
| Ward 4: 11.6% | Ward 8: 9.9% |



1 IN 3:
DC CHILDREN
AT RISK OF BECOMING
OVERWEIGHT OR OBESE¹³



\$400 MILLION:
TREATMENT COST FOR
OVERWEIGHT AND OBESE
RESIDENTS IN 2004¹⁴



300:
KNOWN **JOBSITES** IN
DC THAT AT ONE TIME
CONTAINED **ASBESTOS**¹⁵

1 IN 6:
DC KIDS AFFECTED
BY **ASTHMA**¹⁶



“Healthy Cities-Healthy People”

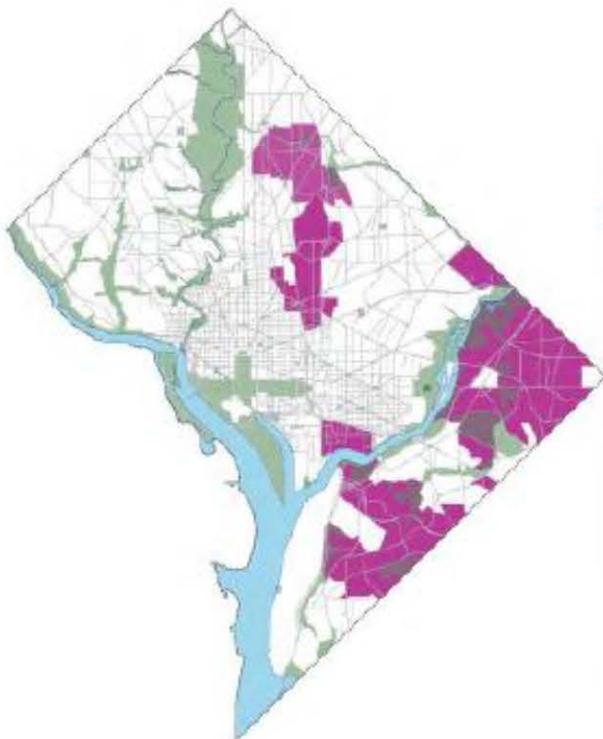


SUSTAIN
ABILITY



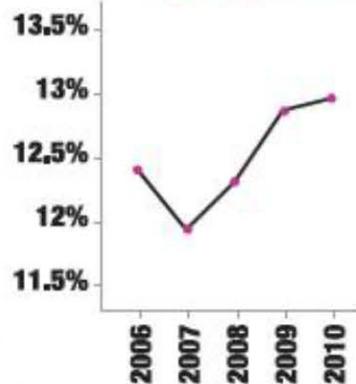
DC

AREAS OF DC WITH LIMITED SUPERMARKET ACCESS (2011)*



 LIMITED SUPERMARKET ACCESS
 NOT LIMITED SUPERMARKET ACCESS

% OF DC HOUSEHOLDS THAT ARE FOOD INSECURE*



26.5 ACRES 
OF COMMUNITY GARDENS ARE GROWING FOOD, WHICH IS LESS THAN 1% OF THE CITY'S TOTAL AREA*



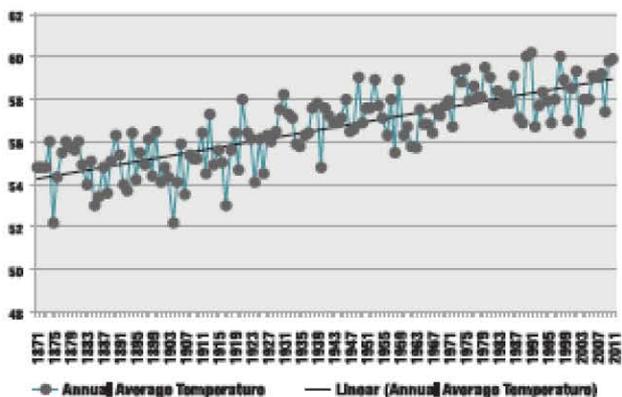
DC RESIDENTS SPEND **\$920 MILLION** ON GROCERIES EVERY YEAR. **\$112 MILLION** OF THAT IS LOST TO NEIGHBORING JURISDICTIONS*

★★★
SUSTAINABILITY

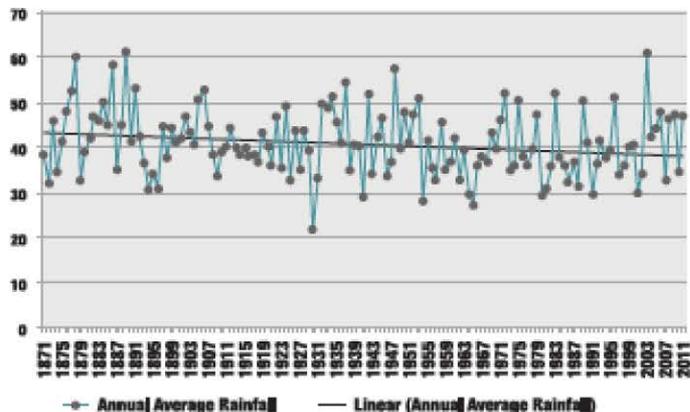


DC

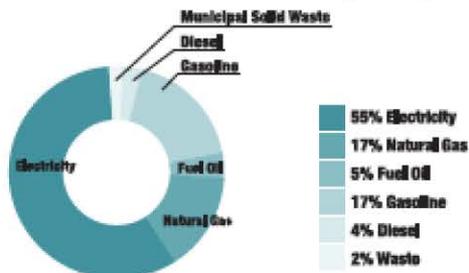
INCREASING AVERAGE ANNUAL TEMPERATURE*



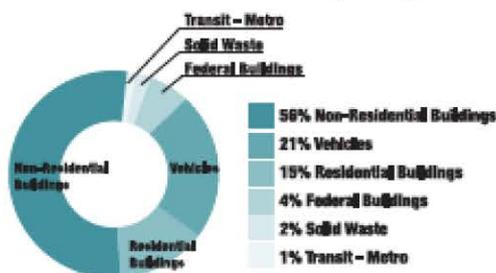
DECREASING AVERAGE ANNUAL PRECIPITATION**



DC GREENHOUSE GAS EMISSIONS BY SOURCE (2011)**



DC GREENHOUSE GAS EMISSIONS BY SECTOR (2011)**



★ ★ ★
SUSTAIN
ABILITY



WATER



We envision a District in which our water resources—all water falling in and flowing through the city—will be clean and accessible to support good health, thriving ecosystems, and an innovative economy. The water we return to the environment will be of equal or better quality than the water we take out. Stormwater will be properly managed through green infrastructure and thriving native ecosystems.

INTRODUCTION

Water brings life to our city, but also washes away dirt and other pollutants that end up in our rivers and streams. The Potomac and Anacostia Rivers—as well as our many smaller streams and creeks—are in poor health and need to be restored. Sustainable DC focuses on the elements of the water cycle that we can improve and influence: flooding caused when sewers and creeks are overwhelmed by water flow from streets and roofs; contamination from road runoff; and the increasing demand our city puts on limited water resources.

Poor water quality makes rivers and streams unsuitable for recreation, threatens wildlife and aquatic ecosystems, exposes people to dangerous contaminants, and requires costly and energy-intensive treatment. The two main waterways in the District, the Potomac and Anacostia Rivers, routinely fall below water quality standards established to protect humans and the environment.

Water consumption in the District is higher than in the average US city.¹⁰⁰ As our population and economy grow and changing weather patterns introduce more variable temperatures and rainfall, future water demand could exceed available supplies. Water efficiency, recycling, and reuse are smart practices that are essential to a healthy city and will ensure this vital resource stays affordable for District residents.

As our city developed and natural landscapes were replaced by buildings and pavement, the ability of the landscape to absorb rainwater significantly decreased. When it rains, hard surfaces send water pouring into sewers and flood-prone neighborhoods. Add to this our location at the junction of the Potomac and Anacostia Rivers and our elevation just above sea level, many low-lying areas of the city will be at increased risk of flooding as sea levels continue to rise. Considering all this, the city must consider—and address—these vulnerabilities in future planning and development or face more costly, dangerous, and wide-ranging damage in the future.

BETWEEN 2 TO 3 
BILLION GALLONS OF UNTREATED SEWAGE OVERFLOWS FROM DC'S COMBINED SEWERS INTO THE ANACOSTIA RIVER EACH YEAR¹⁰¹

20,000 TONS OF TRASH AND DEBRIS ENTER THE ANACOSTIA RIVER EACH YEAR¹⁰²



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SUSTAINABILITY



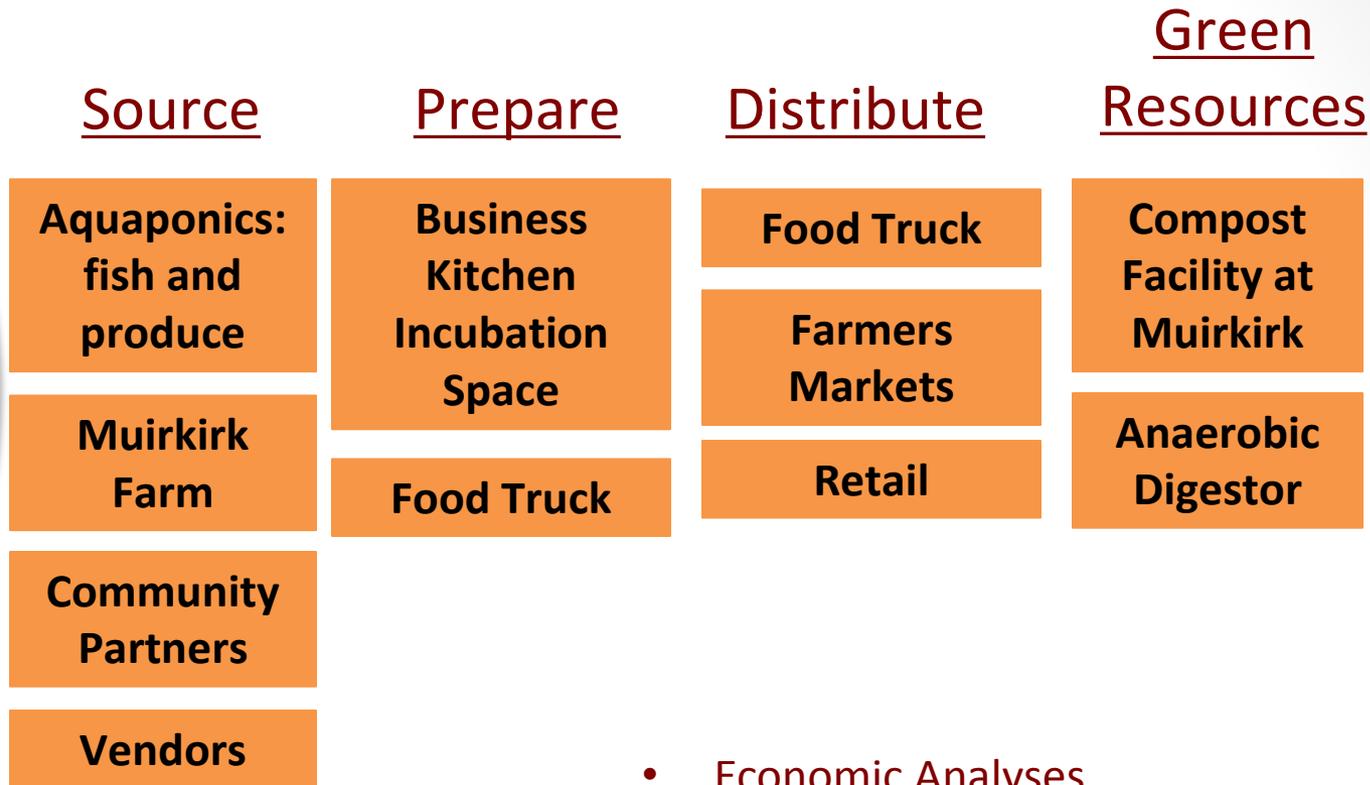
DC

Urban Agriculture

“The future needs an agricultural system that produces about 50 percent more food to feed the world's 9 billion people by 2050; that provides adequate nutrition; that substantially raises the levels and resilience of incomes and employment for most of the world's poor...that provides environmental services such as absorbing carbon, managing watersheds, and preserving biodiversity; and that uses finite land and water resources more efficiently.”

Source: World Bank, 2013

CAUSES Urban Food Systems Model



- Entrepreneurship
- Communications/Marketing
- Business Planning and Management
- Food Preparation
- Policies and Legal Processes

- Economic Analyses
- Environmental Impacts
- Maintenance and Management
- Technical Assistance
- Healthy foods/minimize fishing from Anacostia

Jones & O'Hara© 2013

Muirkirk Research Farm



Urban Agriculture



Aquaponics



Aquaponics



Integrating Urban Ag & Urban Stormwater



Graphics: April Phillips, 2013

Integrating Urban Ag & Urban Stormwater



AN OPPORTUNITY

In 2008 this property was vacant, pending further development, when DST Systems had an idea
PLANT GARDENS

Rain gardens would add beauty to the site while helping manage storm water runoff. Other gardens would be used to grow food for the community's hungry, and to show people how to plant similar gardens at home.

The concept evolved, embracing an integrated approach to urban development and resource management. **18Broadway** demonstrates and tests a wide range of practical solutions for building and living in a healthy environment.

18 BROADWAY

Integrating Urban Ag & Urban Stormwater

water pumped from reservoir to fields via pipes



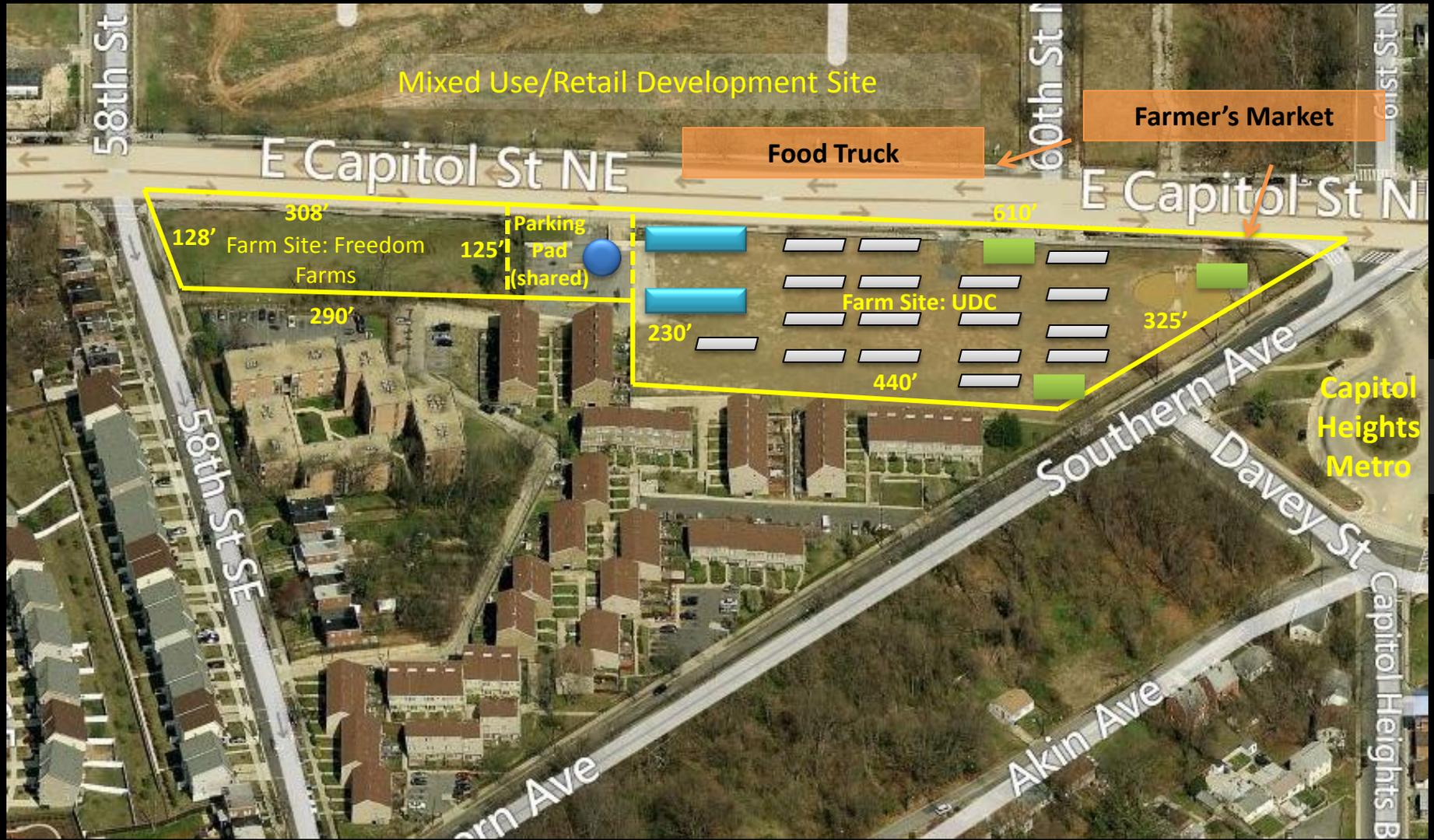
typ. water level

flood overflow

Client: Mary Queen of Vietnam
Community Development
Corporation
Landscape Architect: Spackman Mossop Michaels
Collaborators: Louisiana State University
Urban Landscape Lab
Tulane City Center
University of Montana

Graphics: April Phillips, 2013

Farming Site @ 5900 East Capitol Blvd., NE



*Illustration Purposes Only

- = aquaponics
- ▭ = hoop house
- ▭ = green infrastructure
- ▭ = raised beds

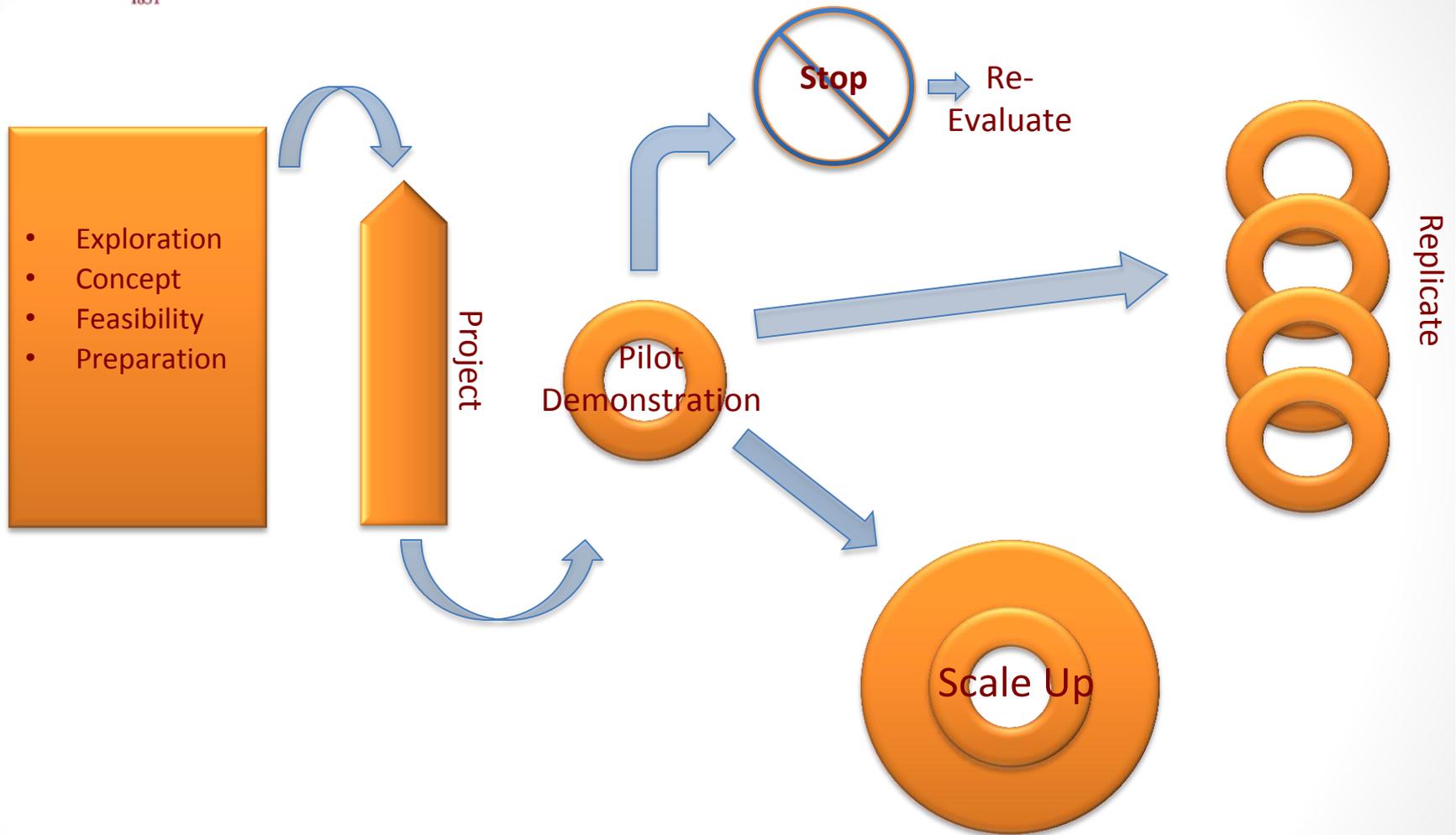
Aerial Photo:
Courtesy of DCHA

Center for Sustainable Development



Jeffrey Catts, Washington Parks and People

CAUSES Demonstration Project Model



Adapted from CCIA

Our Approach

- Constant communication (weekly conference calls, daily emails, etc.)
- Discover linkages between projects and potential partners (align project with mission)
- Quarterly large group meetings with updates
- Develop teams
- Community engagement
- Request financial and technical assistance

Lessons Learned

- Alignment of project milestones with federal (and other) funding availability.
- Be flexible. Consider alternatives.
- Develop a local and/or regional comprehensive strategy with local partners.
- While financial resources may not always be available, technical assistance may be.
- Partner with Universities, particularly land-grant universities.

doi:10.2489/jswc.68.4.337

Advancing water resource management in agricultural, rural, and urbanizing watersheds: Why land-grant universities matter

A.J. Gold, D. Parker, R.M. Washom, J. Dobrowolski, M. O'Neill, P.M. Goffman, K. Addy, M. Barber, S. Batie, B. Benham, M. Bianchi, T. Blewett, C. Eversen, K. Farrell-Poe, C. Gardner, W. Graham, J. Hamilton, T. Harter, J. Kushner, R. Lawrence, J. Lund, R. Mahler, M. McClaran, M. McFarland, D. Osmond, J. Pritchett, L. Prokopy, C. Rock, A. Shober, M. Sillitonga, D. Swackhamer, J. Thurston, D. Today, R. Turco, G. Willids, and L. Wright Morton

Federally funded university water programs have had limited success in halting the degradation of water resources in agricultural, rural, and urbanizing watersheds for the past five decades. USDA-funded university water programs have advanced our understanding of watershed processes and the development of best management practices (BMP); e.g., conservation tillage, nutrient management, alternative and innovative septic systems, and riparian buffers) to mitigate environmental risks from anthropogenic activities, in particular from agriculture, to our water resources; yet water degradation persists and has worsened in many watersheds (Howarth et al. 2000; Mueller and Spahr 2006). The National Research Council (2012) stresses the need for sustainable agricultural practices to reduce changes in flow regimes and water quality.

In this research editorial, we make four points relative to solving water resource issues: (1) they are complex problems and difficult to solve; (2) some progress has been made on solving these issues; (3) external nonstationary drivers such as land use changes, climate change and variability, and shifts in markets, policies, and regulations warrant constant vigilance to assure that presumed improvements are being attained; and (4) we are poised to make substantial progress on these challenges over the next 10 to 20 years if critical steps are taken. Our discussion is framed by identifying and describing four grand challenges that we face in agricultural, rural, and urbanizing watersheds: nutrient management, food

safety, agricultural water use, and groundwater management. These four grand challenge areas were distilled from a listing of over 50 important issues related to agricultural water resource management identified at a workshop of university and government water scientists in November of 2011. Our over-

Arthur J. Gold is a professor in the Department of Natural Resources Science at the University of Rhode Island, Kingston, Rhode Island. Doug Parker is the director of the California Institute for Water Resources at the University of California, Oakland, California. Beagan M. Washom is the director of the Colorado Water Institute/Water Center at Colorado State University, Fort Collins, Colorado. Jim Dobrowolski is a national program leader at USDA National Institute of Food and Agriculture, Washington, DC. Mike O'Neill is an associate dean and associate director at the University of Connecticut Cooperative Extension System, Storrs, Connecticut. Peter M. Goffman is a microbial ecologist at the Cary Institute of Ecosystem Studies, Millbrook, New York. Kelly Addy is a research associate in the College of Environment and Life Sciences at the University of Rhode Island, Kingston, Rhode Island. Michael Barber is a professor in the Department of Civil and Environmental Engineering, Washington State University, Pullman, Washington. Dennis Batie is a professor emeritus in the Department of Agricultural, Food, and Resource Economics, Michigan State University, East Lansing, Michigan. Brian Benham is an associate professor and extension specialist in the Department of Biological Systems Engineering, Virginia Polytechnic Institute, Blacksburg, Virginia. Mary Bianchi is a horticultural farm adviser at the University of California Cooperative Extension, Sea Lake Obispo, California; Tom Blewett is a professor in the Depart-

ment of Engineering Professional Development at the University of Wisconsin-Madison, Madison, Wisconsin; Carl Dreesen is a specialist in the Department of Natural Resources and Environmental Management at the University of Hawaii, Honolulu, Hawaii; KRI Farrell-Poe is a water quality extension specialist and professor in the Agricultural and Biosystems Engineering Department at the University of Arizona, Tucson, Arizona; Cass Gardner is a professor at Florida A&M University, Tallahassee, Florida; Wendy Graham is the Carl S. Shelton eminent scholar in Water Resources in the Department of Agricultural and Biological Engineering at the University of Florida and director of the University of Florida Water Institute, Gainesville, Florida; Joe Hamilton is an animal scientist and extension specialist at Washington State University, Pullman, Washington; Thomas Harter is an extension groundwater hydrologist at the University of California Davis, Davis, California; Jennifer Kushner is an evaluation specialist at the University of Wisconsin-Madison, Madison, Wisconsin; Richard Lawrence is a research ecologist at the USDA Agricultural Research Service, Tifton, Georgia; Jay Lund is a professor and director of the Center for Watershed Sciences at the University of California Davis, Davis, California; Bob Mahler is a professor in the Environmental Science Program at the University of Idaho, Moscow, Idaho; Mitch McClaran is a professor in the School of Natural Resources and the Environment at the University of Arizona, Tucson, Arizona; Mark McFarland is a professor and extension specialist at Texas A&M University, College Station, Texas; Deanna Osmond is a professor in the Department of Soil Science at North Carolina State University, Raleigh, North Carolina; James Pritchett is an associate professor in the Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado; Usha Prokopy is an associate professor in the Department of Forestry and Natural Resources at Purdue University, West Lafayette, Indiana; Cherrish Rock is a water quality specialist and assistant professor at the University of Arizona, Maricopa, Arizona; Amy Shober is an assistant professor and extension specialist in the Department of Plant and Soil Sciences at the University of Delaware, Newark, Delaware; Melissa Sillitonga is an associate professor at Kentucky State University, Frankfort, Kentucky; Deborah Swackhamer is a professor at the University of Minnesota, St. Paul, Minnesota; Jeannette Thurston is national program leader for the USDA National Institute of Food and Agriculture, Washington, DC; Dennis Today is an extension state climatologist at South Dakota State University, Brookings, South Dakota; Ron Turco is a professor of agronomy at Purdue University, West Lafayette, Indiana; George Willids is a professor in the Department of Crop and Soil Sciences at University of Georgia, Tifton, Georgia; and Lela Wright Morton is a professor in the Department of Sociology, Iowa State University, Ames, Iowa.

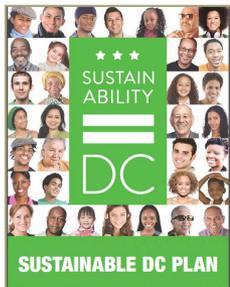
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Partners (short list)

Federal Partners



District Partners

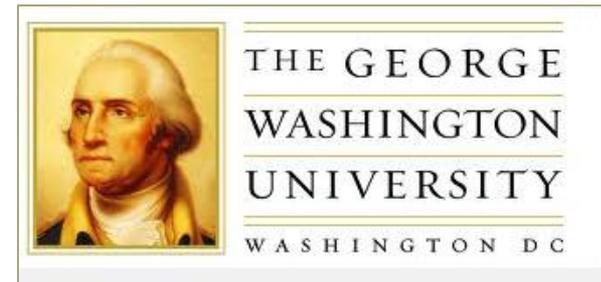


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Questions?

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