

# Improving Diversity in Environmental Engineering and Science

CentrEau

August 6, 2020

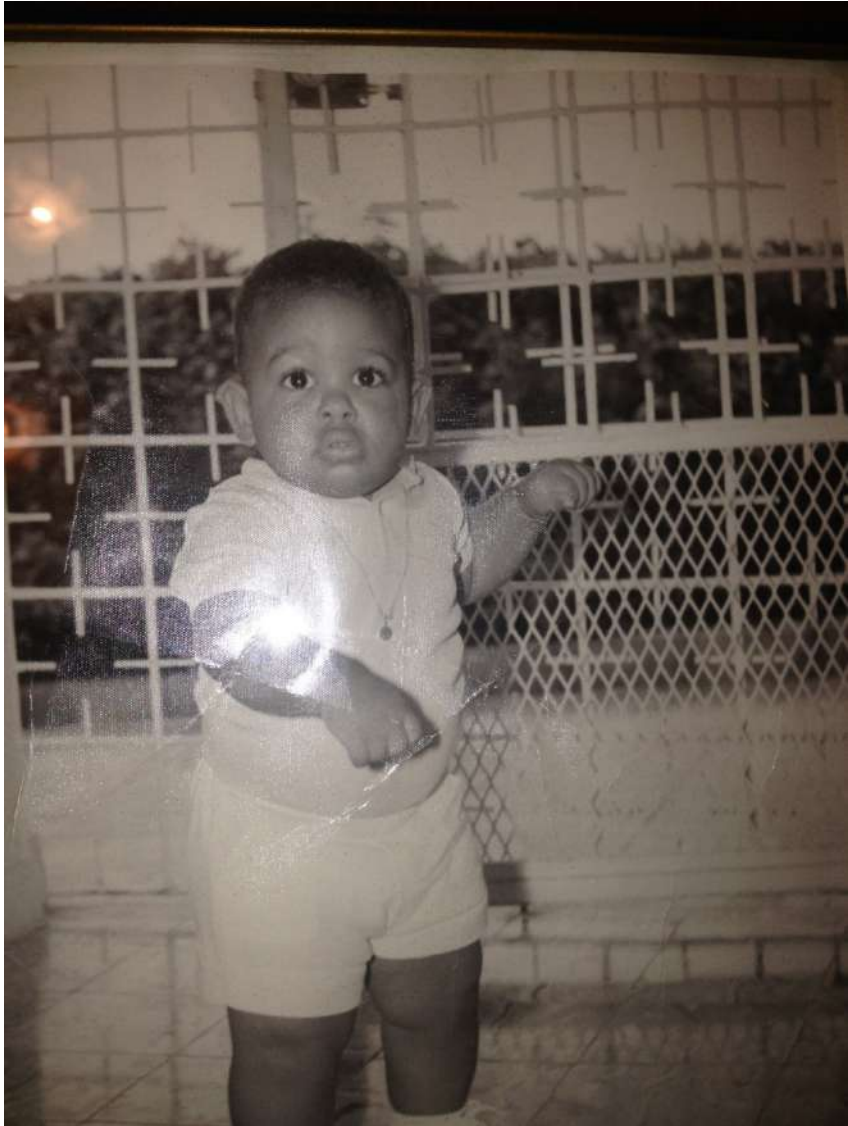
Joel Ducoste, Ph.D., BCEEM  
Professor of Environmental Engineering  
President-Elect AEESP

Let me tell you a story





What did my father see in me? Game changer of the future



# Path to Game Changer



Was McGee in?



E



# Engine







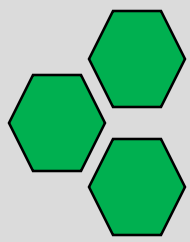


# Ducoste Areas of Research Interest

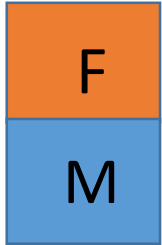
(Diversity produces Disruptive Transformative Solutions)

- Disinfection
  - Chemical disinfectants
  - UV
- Solid separation
- Chemical mixing
- Sewer collection system
- Energy recovery/production
- Algae for biofuels
- Solid Waste Modeling
- Biological Treatment
- Advance oxidation processes
- Fat, oil, grease, removal and roots control
- Natural Systems
- Biosystems, regulatory and metabolic modeling

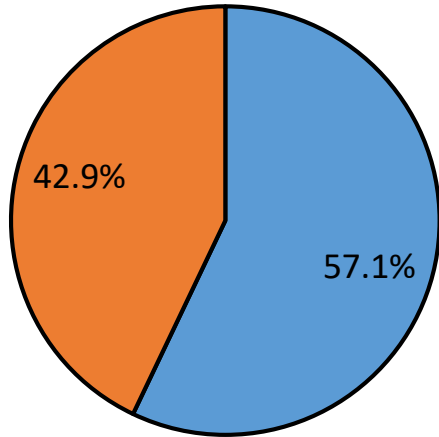
# Who are pursuing Environmental Engineering and Science



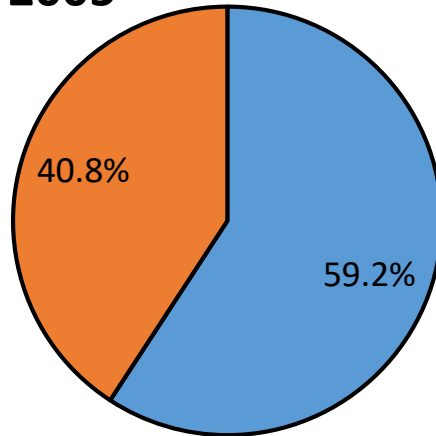
# Env. Eng. Gender demographics data shows improvement at the BS and PhD levels...



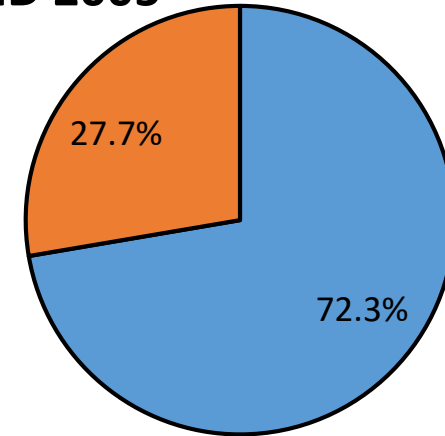
**BS 2005**



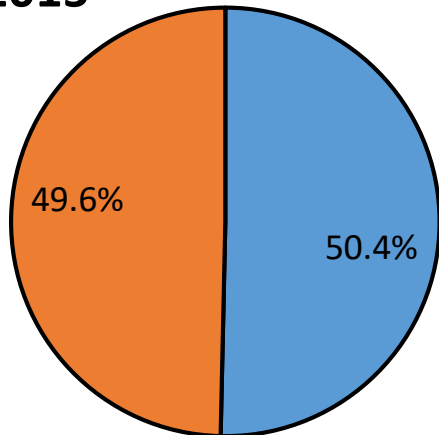
**MS 2005**



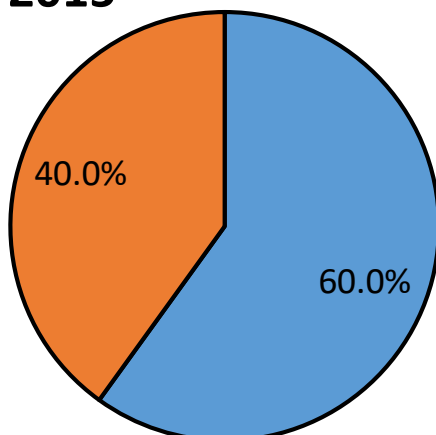
**PhD 2005**



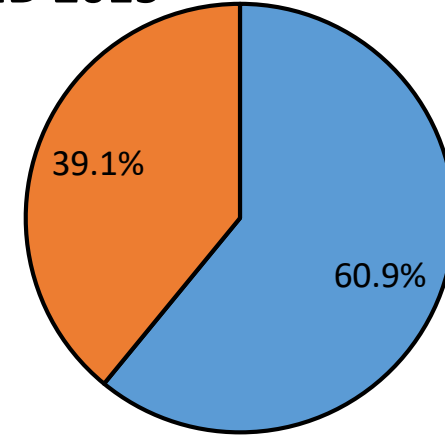
**BS 2015**



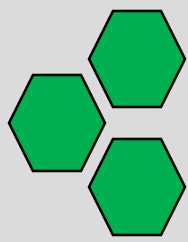
**MS 2015**



**PhD 2015**

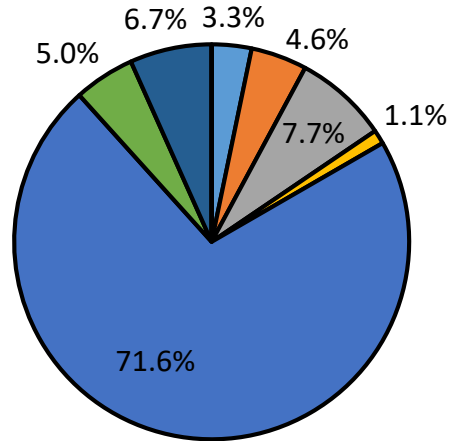




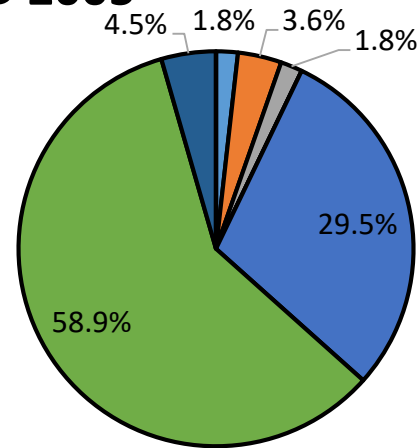


# Env. Eng Ethnicity demographics data shows improvement...but not in all categories

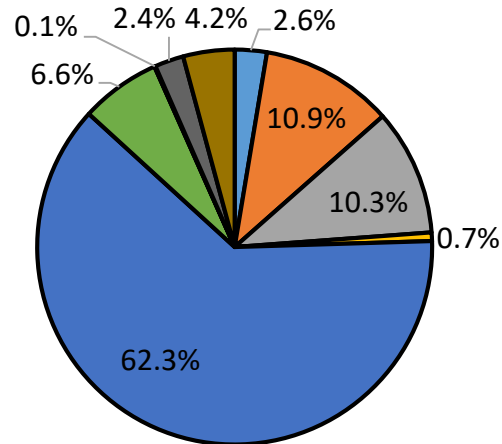
### BS 2005



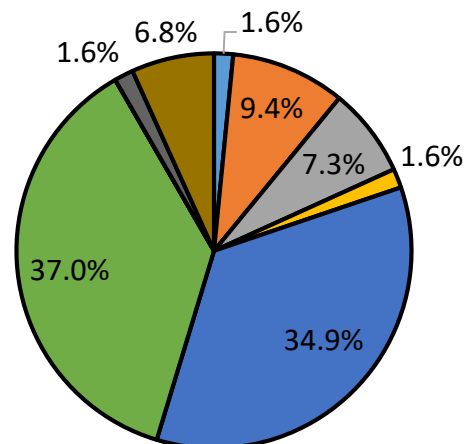
### PhD 2005



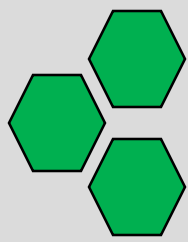
### BS 2015



### PhD 2015

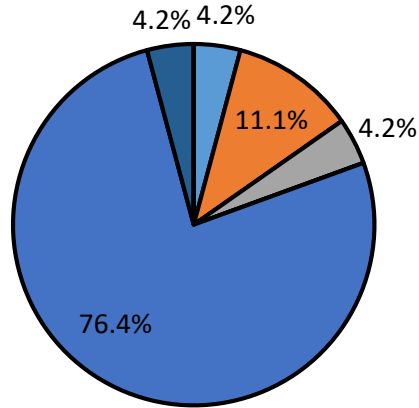


- African American
- Asian American
- Hispanic American
- Native American
- Caucasian
- International
- Other
- Native Hawaiian
- Two or More
- Unknown

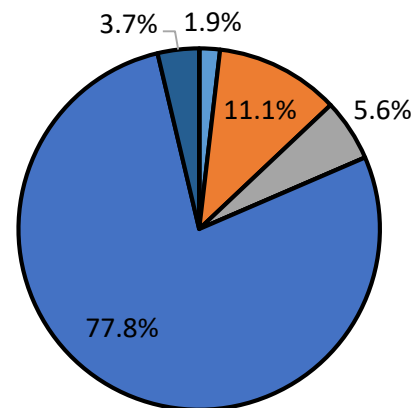


# Env. Eng. Faculty demographics are lagging behind student diversity...

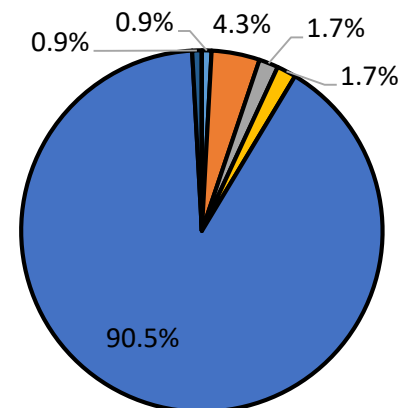
### Assistant 2005



### Associate 2005

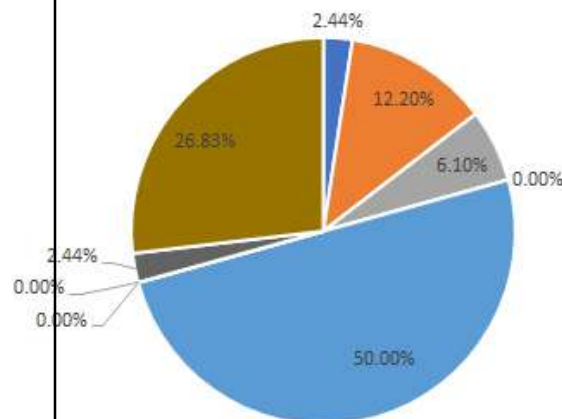


### Full 2005

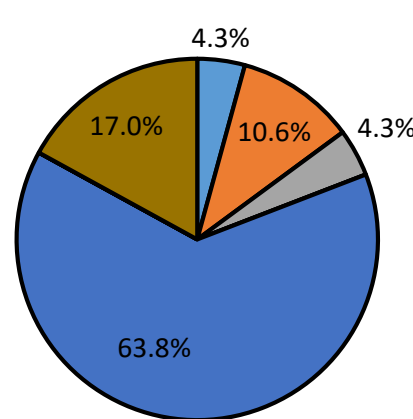


- African American
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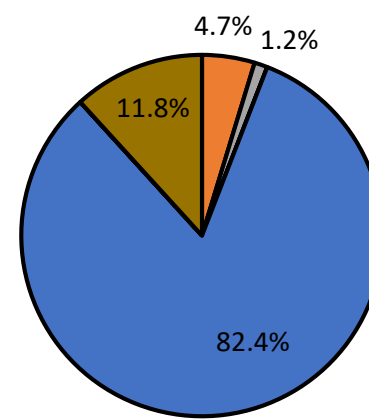
### Assistant 2015

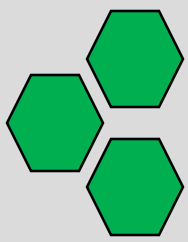


### Associate 2015

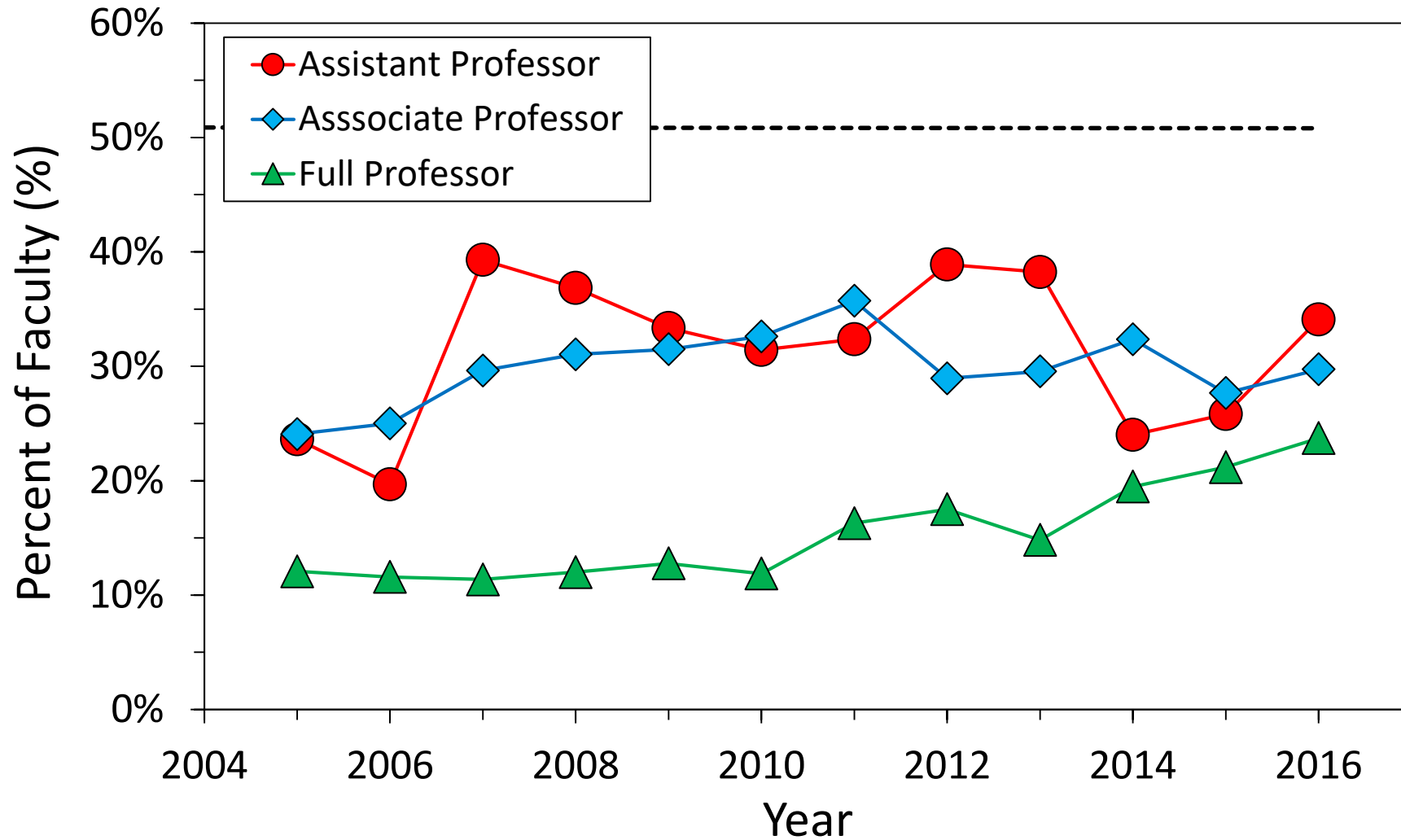


### Full 2015

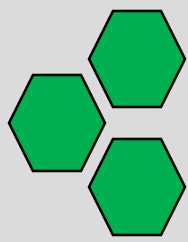




# Gender equality is incrementally happening in senior faculty ranks







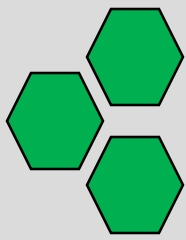
# Given the above data, we took a closer look at gender and demographics

The percent of women earning PhDs and at senior faculty levels has increased. . .

Year	PhD	Assistant	Associate	Full
2001-2004 (four year average)	26.7	29.7	14.5	7.1
2013-2016 (four year average)	42.5	31.3	29.6	20.0

...but there is still work to be done in increasing participation of women from underrepresented groups

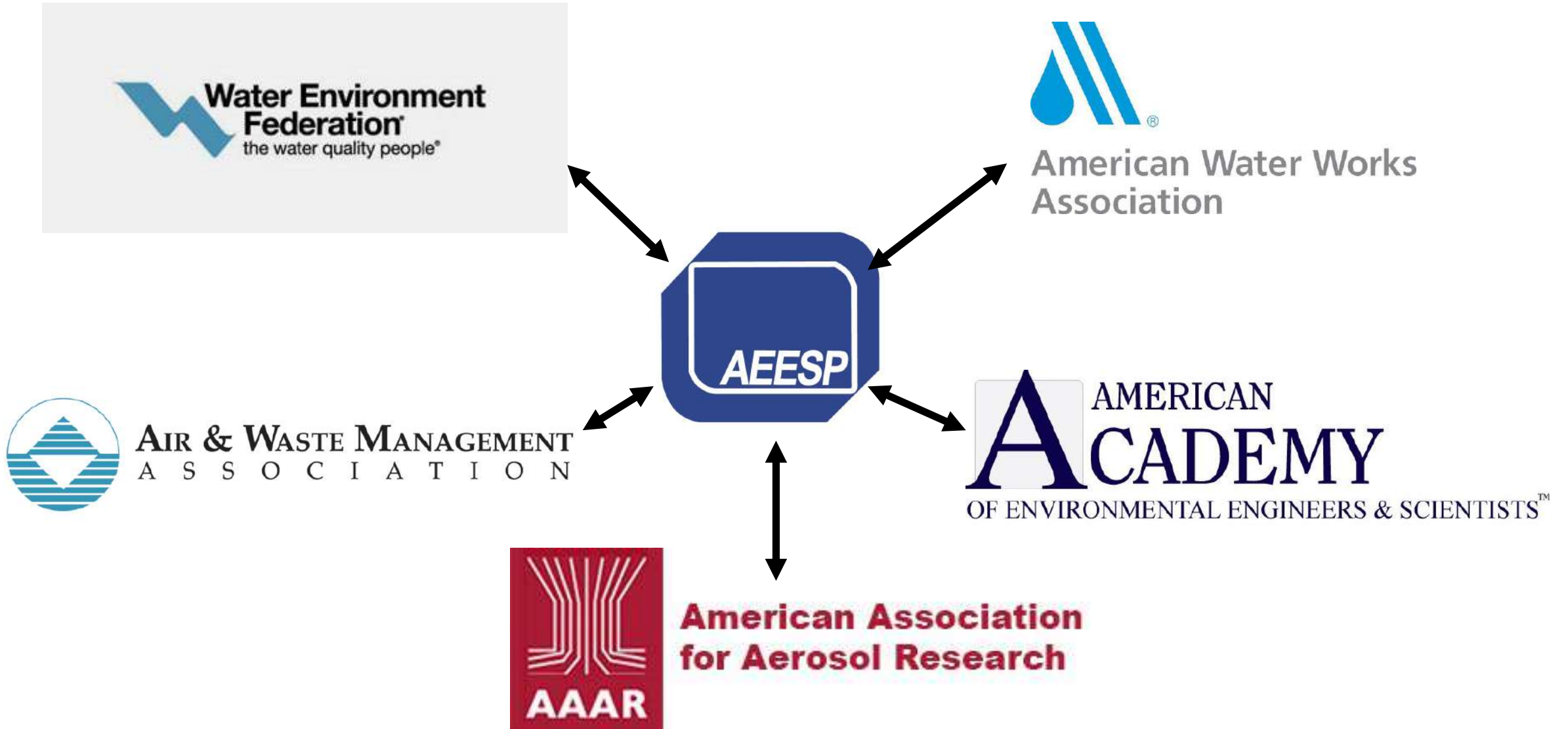
Aggregate of 2005-2016	African American	Asian American	Hispanic American	Native American	Caucasian
Assistant Professor	9.1	38.9	14.8	0.0	31.8
Associate professor	0.0	46.5	30.8	0.0	31.8
Full Professor	0.0	5.2	0.0	0.0	16.4



## Takeaway messages (from available data)

- African American, Hispanic American, and Native American students are underrepresented at the BS, MS, and PhD levels, and no real progress has been achieved in improving representation.
- The percent of degrees awarded to women is 46-47% (2013) at all levels; But this percentage is not uniform across different majors. Even Civil and Chemical eng. are lower than this.
- Faculty are less diverse than students, although modest gains have been made in gender diversity in the last decade. Fewer women from underrepresented groups join Environmental Engineering faculty.

# What am I prepared to do?





# Programs Outlined for COE

- Visible @ appropriate conferences and Universities
- Engage Minority Engineering Programs (MEP) on campus
  - Faculty discussions with student groups on campus
  - How to be more effective in pursuing careers in specific engineering disciplines
- Supporting REU minority students
  - Advertise summer research opportunities

States	University
Georgia	Morehouse College Spelman College Clark Atlanta University
DC, Virginia	Howard, Hampton
Maryland	UMBC Morgan State University
Alabama	University of Alabama-Huntsville Oakwood University Alabama A&M University
Florida	FSU-FAMU, USF, UCF, FIU
North Carolina	NCAT, NCCU, St Augustine, UNC Charlotte

# Programs (COE)

○ Visible @ ap conferences

○ Engage Minor Programs (M

- Faculty disc groups on ca
- How to be m careers in sp disciplines

○ Supporting F students

- Advertise su opportunitie

## Conferences

GEM

SHPE (Society of Hispanic Professional Engineers)

NSBE (National Society of Black Engineers)

AISES (American Indian Science and Engineering Society)

SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science)

NOBCCHE (National Organization for the Professional

Advancement of Black Chemists and Chemical Engineers)

ABRCMS (Annual Biomedical Research Conference for Minority Students)

## Programs

Myerhoff Scholars

McNair Scholars

# Additional Strategies for effective graduate school recruitment

- Encourage undergraduate navigation assistance

## Resume/Curriculum Vitae (CV) Workshop

- The difference and appropriate setting for a Resume and CV
- What should be included in a Resume and CV

## Interview Techniques Workshop

- Interviewing Etiquette
- Interviewing Process

## Graduate School/Scholarship Workshop

- Pros and Cons of Graduate School
- Financial Aid Opportunities for Graduate School

# Additional Strategies for effective graduate school recruitment

- Utilize undergraduate research opportunities



CCEE's (Research Internship Summer Experience)  
RISE program in 5th year continues to grow



# Summary

- **You learned a little about me and my journey to environmental stewardship**
- **You learned a little about the state of diversity in environmental engineering**
- **You learned a little about strategies to broaden participation in environmental engineering**
  - **Now will it be easy? Absolutely not. Why?**
  - **Inclusivity**
    - **Unconscious bias, stereotype threats**
    - **Microaggressions**
  - **Sense of belonging**
  - **What are system related barriers in place:**
    - **Search committees, admission process**
    - **Promotion process, award process**

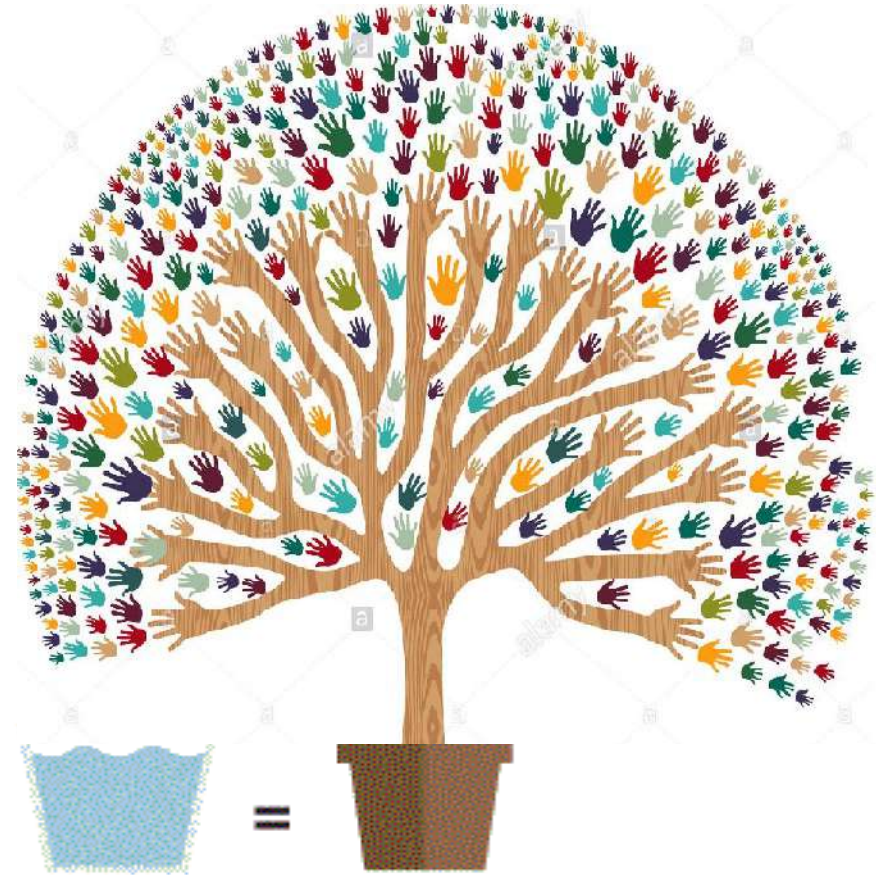


- Promote graduate education to groups not well represented in student population
- Recruit, Retain, Persist, Mentor



**UNFILTERED WATER**

Microaggressions,  
Unconscious bias,  
Stereotype threats



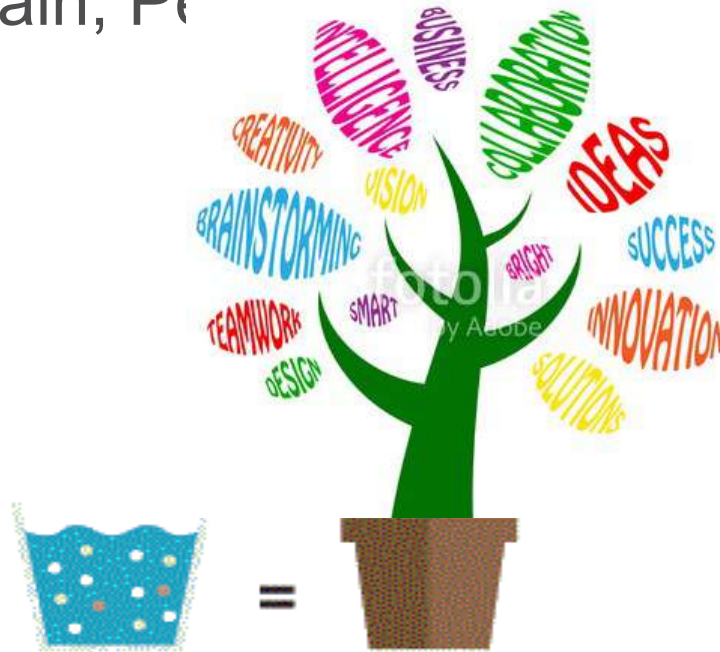
**PURIFIED RO WATER**

Inclusive Environment

# Why are we exploring this?

- Promote graduate education to groups population
- Recruit, Retain, Pe

ent



**UNFILTERED WATER**

Microaggressions,  
Unconscious bias,  
Stereotype threats

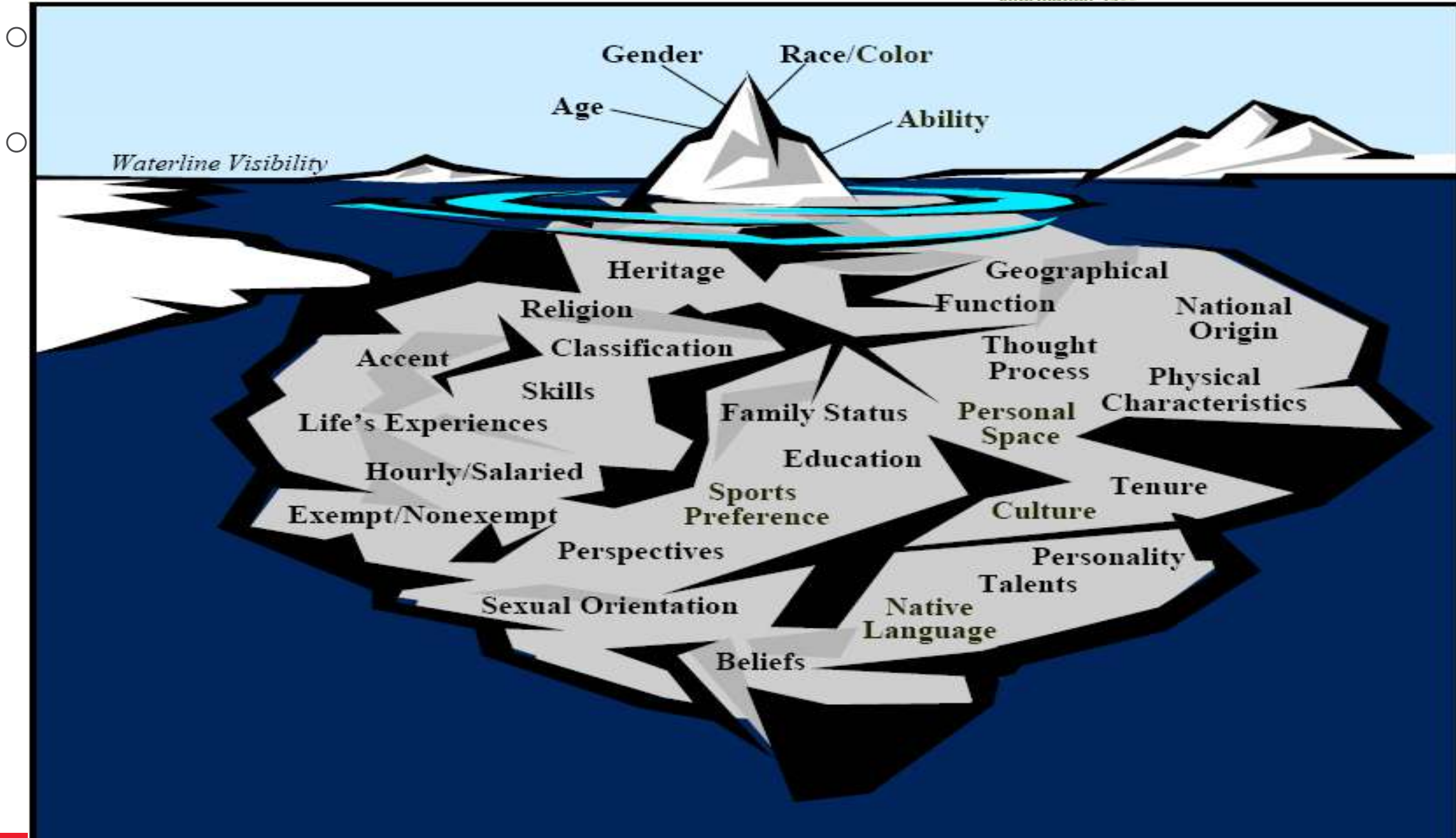


**PURIFIED RO WATER**

Inclusive Environment



# Why are we exploring this?



# Why are we exploring this?

- We want to have the contributions from as many different perspectives that have been trained from similar technical approaches but come from very different backgrounds
- Trick: Consider placing an empty chair in meeting rooms and placing a sign in front of it that says:
  - **Missing Opinion**



# THANK YOU!

## QUESTIONS?

DUCOSTE CONTACT INFO:

- Joel Ducoste, PhD, BCEEM
- Department of Civil, Construction, and Environmental Engineering
- 208 Mann Hall CB 7908
- Raleigh NC 27695
- [jducoste@ncsu.edu](mailto:jducoste@ncsu.edu)

