RAINFALL INTERCEPTION BY TREES IN RESIDENTIAL NEIGHBORHOODS

ELINA INKILAINEN (MC HA LE, J AMES, BLANK)
“Finally, one backyard has a dog that pees in my buckets - I love urban ecology. What is the average volume of pee a large dog produces in one day? Can you estimate the ratio of pee vs. rainwater from the color of the water??”
RESULTS

• In this Urban Forest (66% tree cover) rainfall interception parallels that of rural forests

• Canopy cover and percent evergreen were the most important predictors (LAI failed)
AGAIN PEOPLE MATTER....
LAWN EFFECTS

- Irrigation
- Fertilizers
- Herbicides
- Pesticides
- Mowing
- Lack of wildlife habitat

A beautiful lawn doesn’t happen by itself.

“When you look at a field of dandelions, you can either see a hundred weeds or a hundred wishes...”
INFLUENCES OF LANDSCAPE DESIGN AND LIFESTYLE CHOICES ON ENERGY USE

CARA NELSON (MCHALE, PETERSON)

4 Socio-economic status groups, Home energy use, Building characteristics, Air conditioner type and efficiency, Occupant(s) behaviors, Environmental attitudes, Demographics
### Table 4: Stepwise regression results for standardized energy use (energy use per square foot) in order of increasing R-square value (α=0.10). Dependent variable = kWh/month/sq. ft. This model explains 42.25% of the total variation. Percent tree cover within 18 m of the home was not significant in the model.

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Coefficient</th>
<th>S.E.(^a)</th>
<th>R-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.648</td>
<td>0.585</td>
<td>---</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Education level</td>
<td>-0.065</td>
<td>0.037</td>
<td>0.1608</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Inside temperature</td>
<td>-0.024</td>
<td>0.007</td>
<td>0.2162</td>
<td>0.0006</td>
</tr>
<tr>
<td>Home size</td>
<td>-0.0002</td>
<td>0.00004</td>
<td>0.2843</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Type AC unit</td>
<td>0.417</td>
<td>0.106</td>
<td>0.3054</td>
<td>0.0238</td>
</tr>
<tr>
<td>Number AC units</td>
<td>0.147</td>
<td>0.058</td>
<td>0.3433</td>
<td>0.0020</td>
</tr>
<tr>
<td>Home age</td>
<td>-0.003</td>
<td>0.001</td>
<td>0.3596</td>
<td>0.0400</td>
</tr>
<tr>
<td>Home 18+ hours</td>
<td>0.157</td>
<td>0.062</td>
<td>0.3741</td>
<td>0.0499</td>
</tr>
<tr>
<td>Race</td>
<td>0.153</td>
<td>0.090</td>
<td>0.3870</td>
<td>0.0624</td>
</tr>
<tr>
<td>Comfort level</td>
<td>-0.138</td>
<td>0.067</td>
<td>0.4011</td>
<td>0.0500</td>
</tr>
<tr>
<td>Number trees NW(^b)</td>
<td>-0.031</td>
<td>0.015</td>
<td>0.4284</td>
<td>0.0834</td>
</tr>
<tr>
<td>Percent cover 18 m</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>&gt;0.1500</td>
</tr>
</tbody>
</table>

**Model R-square 0.4225**

\(^a\) S.E. = Standard Error

\(^b\) Trees taller than 6 m and within 18 m of the home
ENVIRONMENTAL JUSTICE ISSUES?

![Bar chart showing mean energy usage for different PRIZM groups: Brite Lites Li'l City, Up-and-Comers, City Startups, and Park Bench Seniors. The x-axis represents mean energy usage (kWh/sq), ranging from 0.1 to 1.3. The bars show varying energy usage levels for each group.]
URBANIZATION IS A PROCESS

• Drivers of Urbanization

• “The City” as the climax condition – western idea

• Study the urbanization process
URBANIZATION IN SUB-SAHARAN AFRICA

12-Fold Increase in Urban Land Cover by 2050

By 2030
770 million Africans living in cities - more than the total # of city dwellers in the western hemisphere today
IS OUR CURRENT UNDERSTANDING OF URBANIZATION RELEVANT HERE?
URBANIZATION IN SUB-SAHARAN AFRICA

By 2030 770 million Africans living in cities - more than the total # of city dwellers in the western hemisphere today

12-Fold Increase in Urban Land Cover by 2050
URBAN GROWTH IN AFRICA?

• Permanent migration to cities is decreasing (Ferguson 2007, Potts 2009)

• Urban population growth = high birth rates (Cohen 2004, Potts 2010)

• Urbanization = Reclassification of rural settlements (Potts 2012)

• Rural migration toward smaller towns and cities (Collinson et al. 2007)
RURAL IS THE NEW URBAN

Low resource availability, poor services, little manufacturing, dependent on local natural areas, bustling centers of activity, informal economic production, high density of people.
THE URBAN GRADIENT / CONTINUUM

Urban/Rural “Connectivity” – Spatial or Temporal or Economic or?
• Family and Kin relations
• Migration patterns
SOUTH AFRICA – ENVIRONMENTAL JUSTICE AND CONSERVATION

• **Challenges** - Unemployment, Extreme rural poverty, Political corruption, Xenophobic violence, HIV/AIDS, post-apartheid legacies

• **Advantages** - large economy, progressive constitution, heterogeneous and diverse, Kruger national park, urbanizing populations
THE IMAGINE PROGRAM

DEVELOPING SCIENCE FOR THE WELL-BEING OF COMMUNITIES IN-NEED

http://urbanecologylab.wikispaces.com/IMAGINE
INTERNATIONAL GRADUATE TRAINING AND LONG-TERM SOCIO-ECOLOGICAL RESEARCH?

Benefit-Sharing

Comparative Relevance

Urban gradient

Student Centered Co-Learning

Resilience

Long-term Capacity Building

Sustainability

Research

Training
To establish a trans-disciplinary research and education program that contributes to the sustainability and resilience of the greater Kruger National Park socio-ecological system.

Through co-learning and benefit-sharing we will develop research that enhances the well-being of people living in the region.

Our collaborative research network will expand comparative understanding of complex socio-ecological systems located along a rural-urban gradient.
2012 IMAGINE RESEARCH TEAM
INTERDISCIPLINARY APPROACH

Socio-ecological assessment of water availability, reliability, and quality

DISCIPLINES
- Governance and policy
- Human livelihoods
- Education
- Psychology
- Ecosystem dynamics
- Hydrology

WATER
- Water availability
- Water reliability
- Water quality
RQ - What are the limitations associated with water resources that people have to cope with?
RQ - How do people cope with limitations on their water resources?
RQ - Based on what we can predict of future water quality and availability, what coping strategies will be the most useful for these communities as they adapt to socioecological changes?

Environmental Monitoring:
Water Quality and Availability
RQ - What is the water quality of the different water sources in these villages?
RQ - How reliable are the highest water quality sources?
RQ - What is the water availability in the region?
RQ - How can we expect the water resources to change in the future?

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Reliability of Resources and Adaptation to Change

SES Assessment of Water

Collective Coping, Decision Making, and Governance

Policy and Governance:
Governance Structures, Rules, and Public Perceptions
RQ - How do key coping strategies align with decision making structures?
RQ - How do past and future perceptions of water quality and availability relate to current coping strategies?

Education/Psychology: Coping Strategies
RQ - How do people evaluate and measure happiness and well-being in their communities?
RQ - What do people identify to be the main risk factors they must cope with?
RQ - What resources are protected and valued by different gender and age classes?

RQ - How does the reliability and quality of different water sources overlap to inform people's perceptions of their current water supply?
RQ - How do perceptions of past, current, and future water quality align with actual data?
RQ - How do perceptions of past, current, and future water availability align with actual data?

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SOUTH AFRICA Summer 2015
Water Woes: People, Parks, and Pollution

Program Dates:
May 17 - June 7, 2015

Cost:
$4,100
Cost includes: non-refundable application charge, tuition, housing & meals, inti health insurance, field work & park entrance fees.
Airfare not included.

Courses:
Participants will enroll in one of the following courses for a total of 6 credits.

• NR 595 Socio-Ecological Research Methods
• ET 495
• ADN 495 Art and Design International Studio: Documentary Digital Film
• LAR 565 International Landscape Architecture Design Studio

Designed for undergraduate and graduate students interested in sustainability, environmental technology, conservation, public health, environmental justice, policy, planning, and urbanization - participants will explore and gain a more nuanced understanding of how conservation areas and communities struggle to find balance in maintaining ecosystem health and integrity with human health and well-being. In one of the world's most biodiverse areas, Kuger National Park, this experience will allow participants to engage with the wonders of the savanna in a meaningful way while developing the expertise needed to become successful sustainability scientists and practitioners.
Application Deadline: February 15
Applications will be reviewed on a rolling basis.

Apply at studyabroad.ncsu.edu

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make the world your classroom
The University reserves the right to alter the program format and/or costs in case of conditions beyond its control. See Study Abroad Office policies.

Program Contact Information:
Dr. Melissa McHale
Dept of Forestry
mrmchale@ncsu.edu

http://urbanecologylab.wikispaces.com/2015+How+to+Apply
QUESTIONS?

HTTP://URBANECOLOGYLAB.WIKISPACES.COM