Urban Forest Research in the Anthropocene

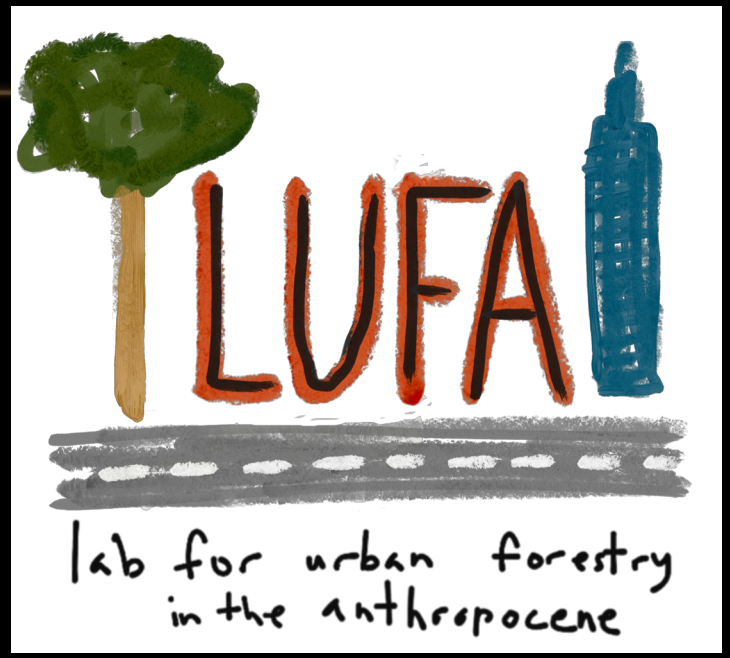
Tree Talk at the Morton Arboretum, November 19, 2018

Dr. Jess Vogt jess.vogt@depaul.edu

Assistant Professor
Environmental Science & Studies
DePaul University

Principal
Lab for Urban Forestry in the Anthropocene

DEPAUL UNIVERSITY



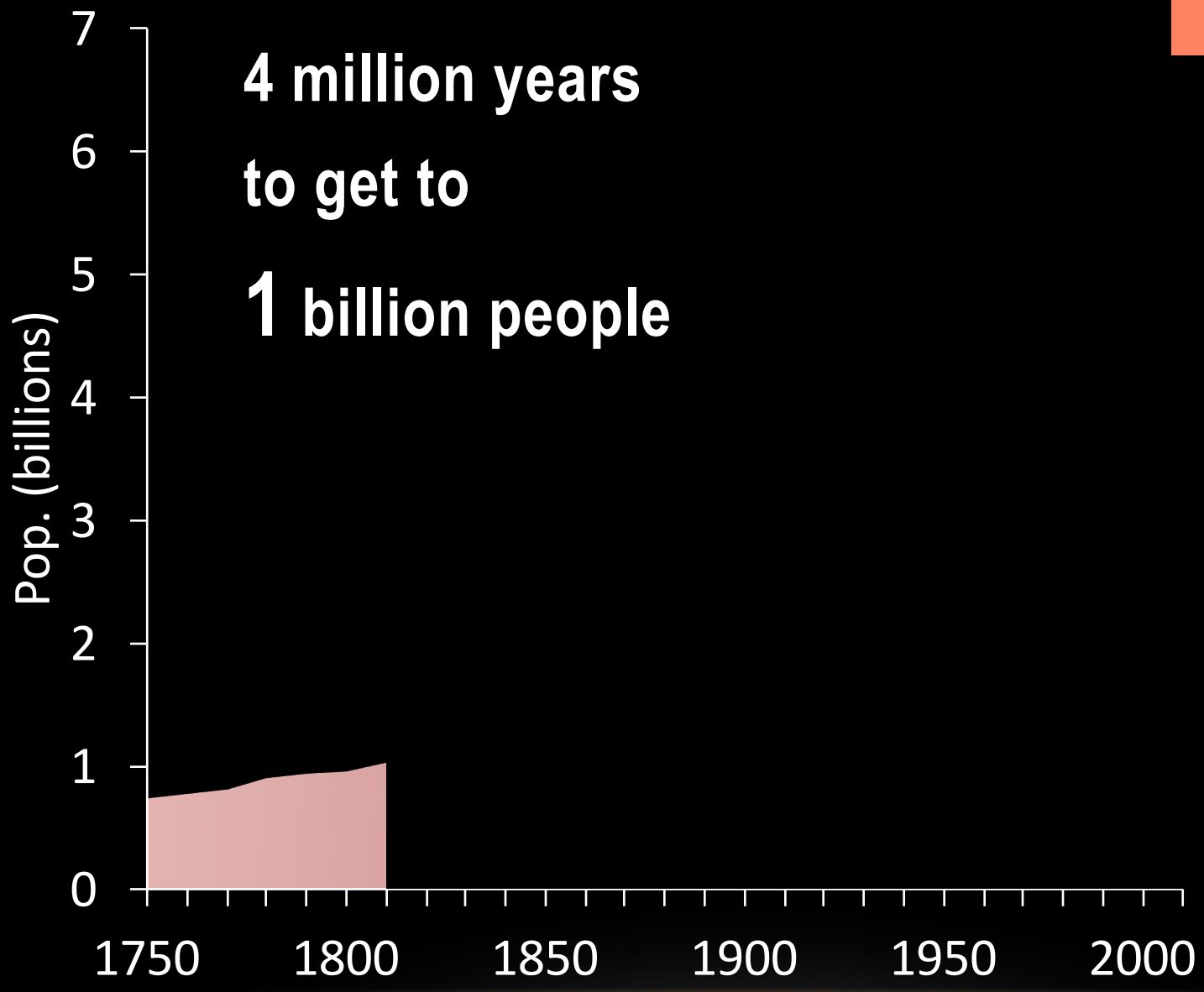
Upshot

The drastic impacts of human activities on the planet require new ways of thinking about & doing research on the urban forests. At the Lab for Urban Forestry in the Anthropocene (LUFA), we do transdisciplinary research

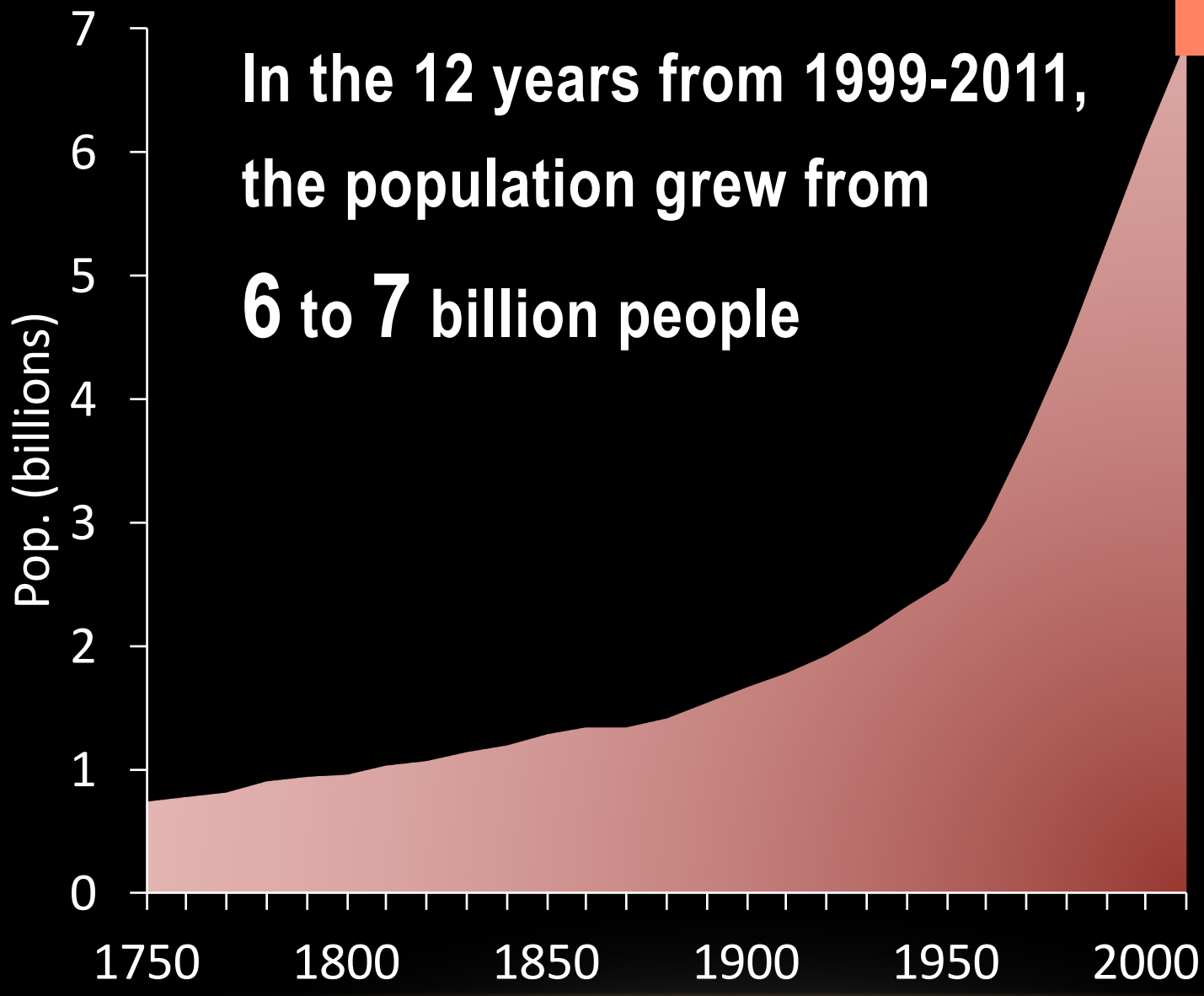
Presentation Outline

1. Key context
    - Anthropocene
    - Transdisciplinary research
2. LUFA's transdisciplinary research
    - Urban foresters response to climate change
    - CommuniTree: Evaluating tree planting in NW Indiana

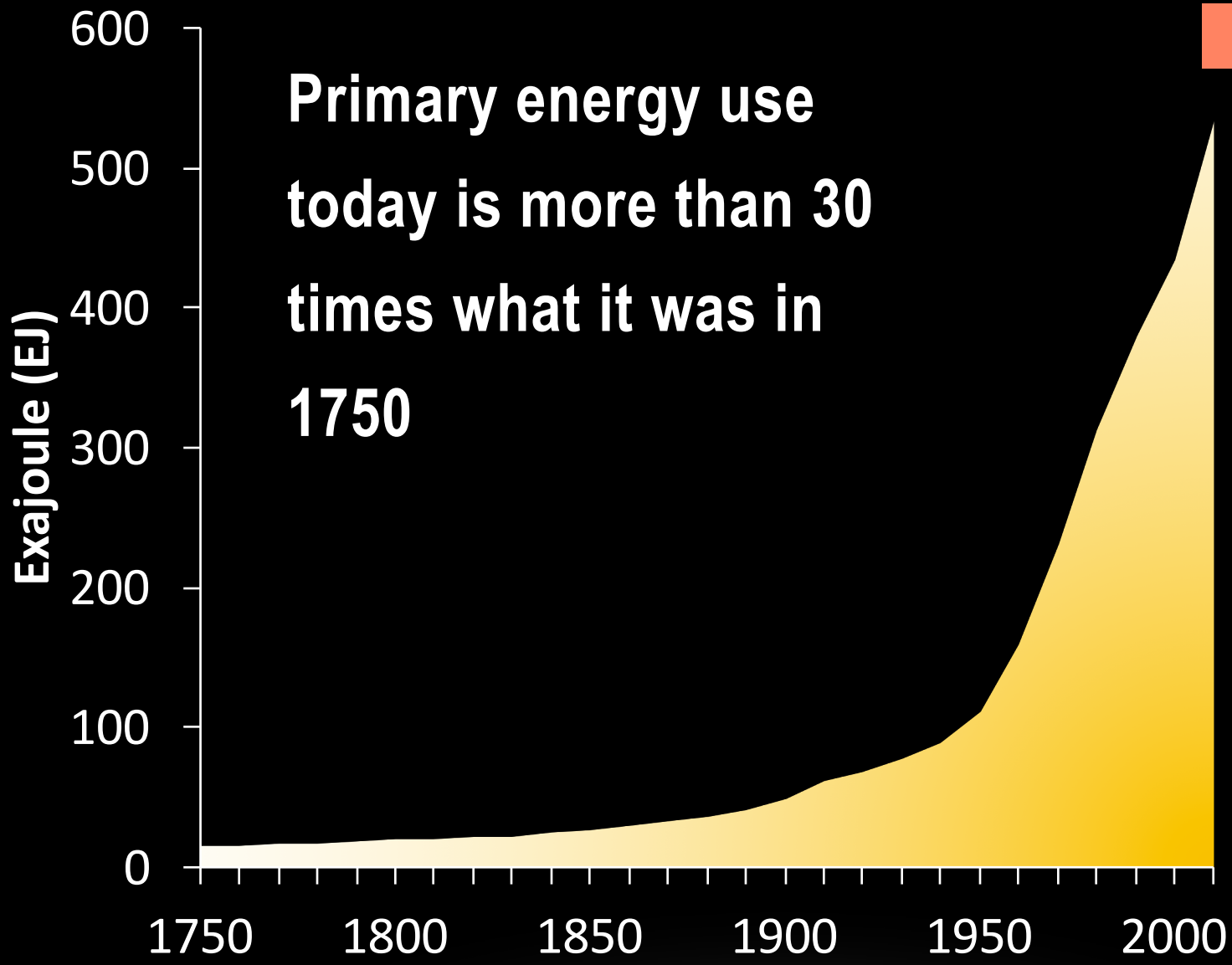
What is the “Anthropocene”?



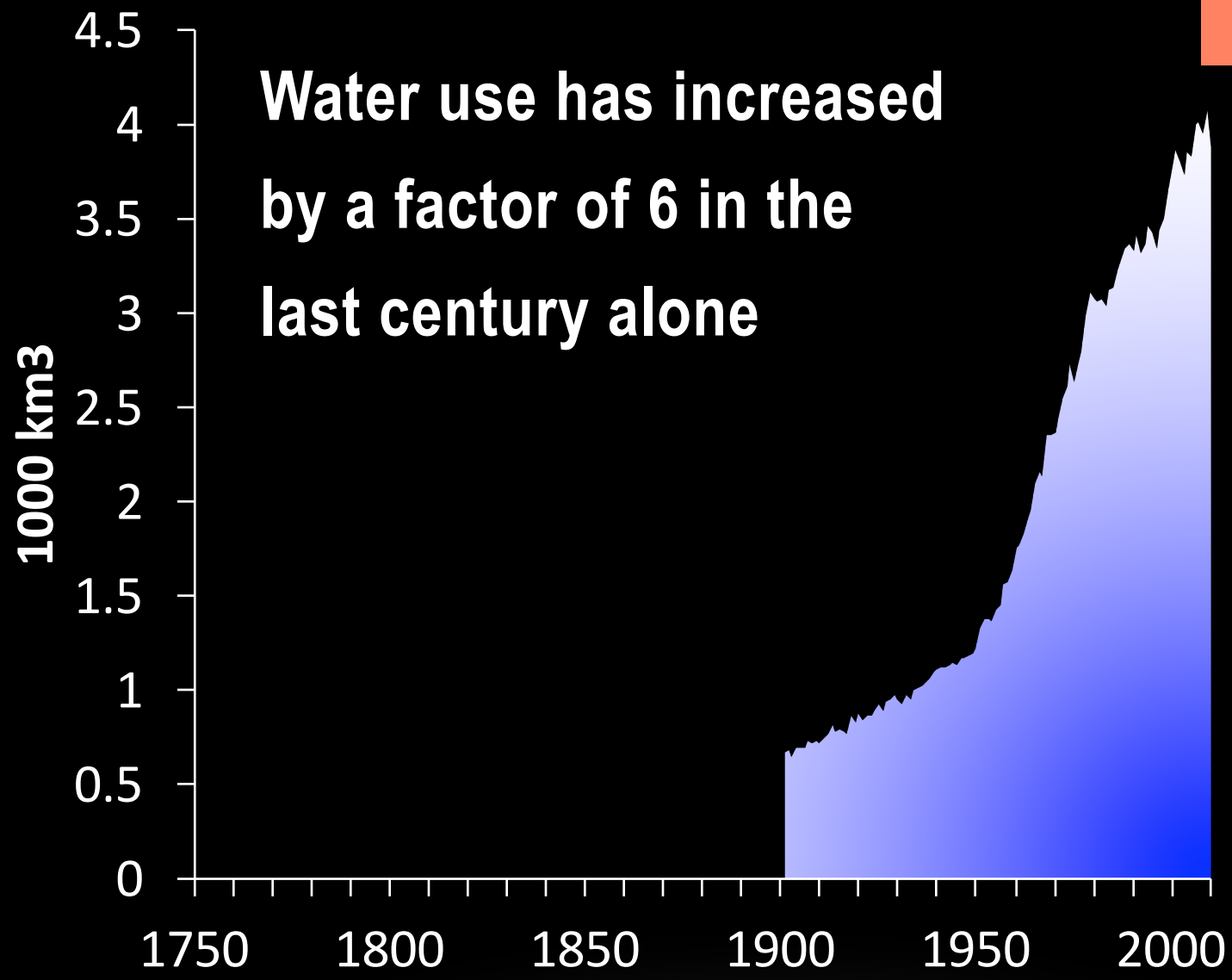
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785



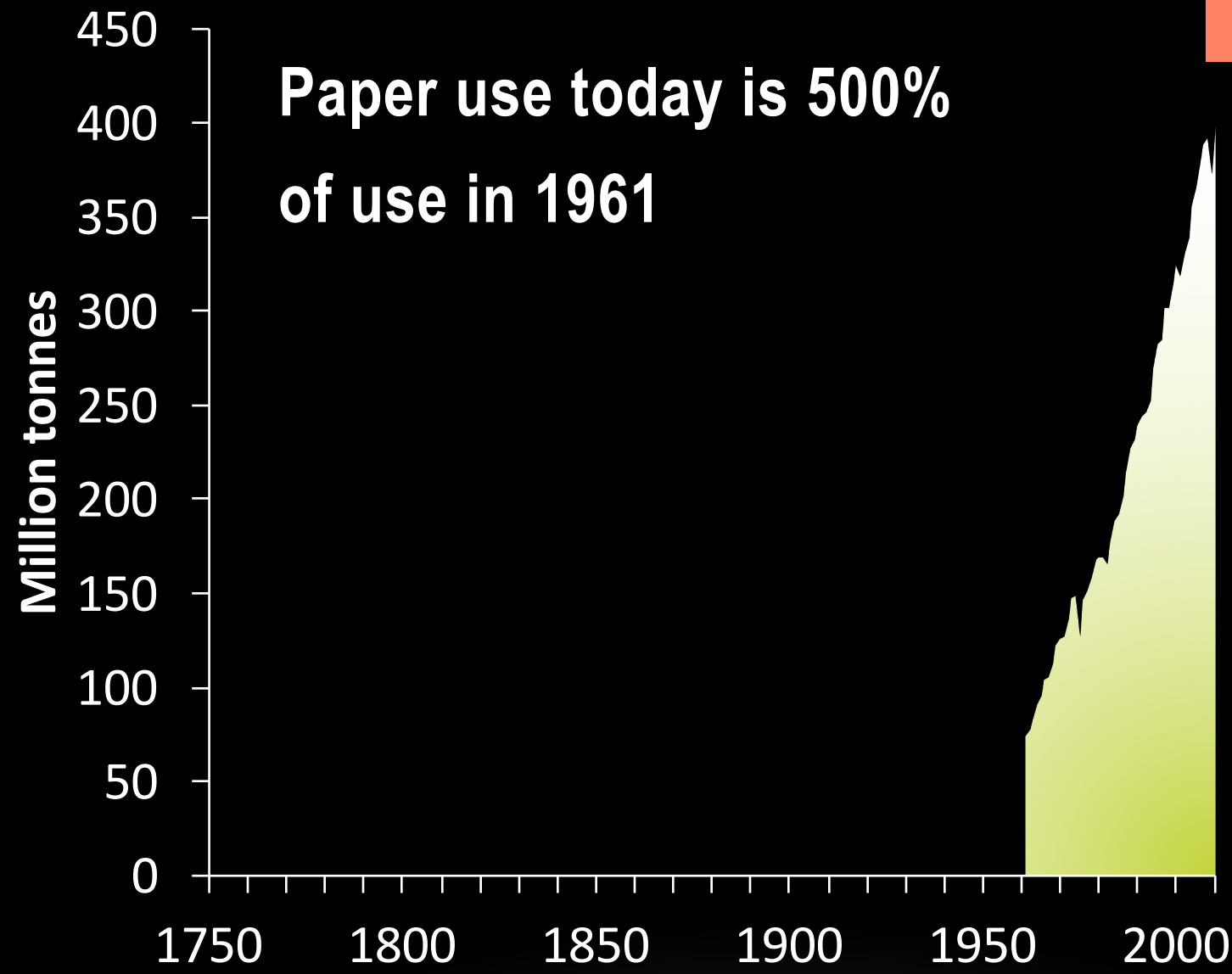
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785



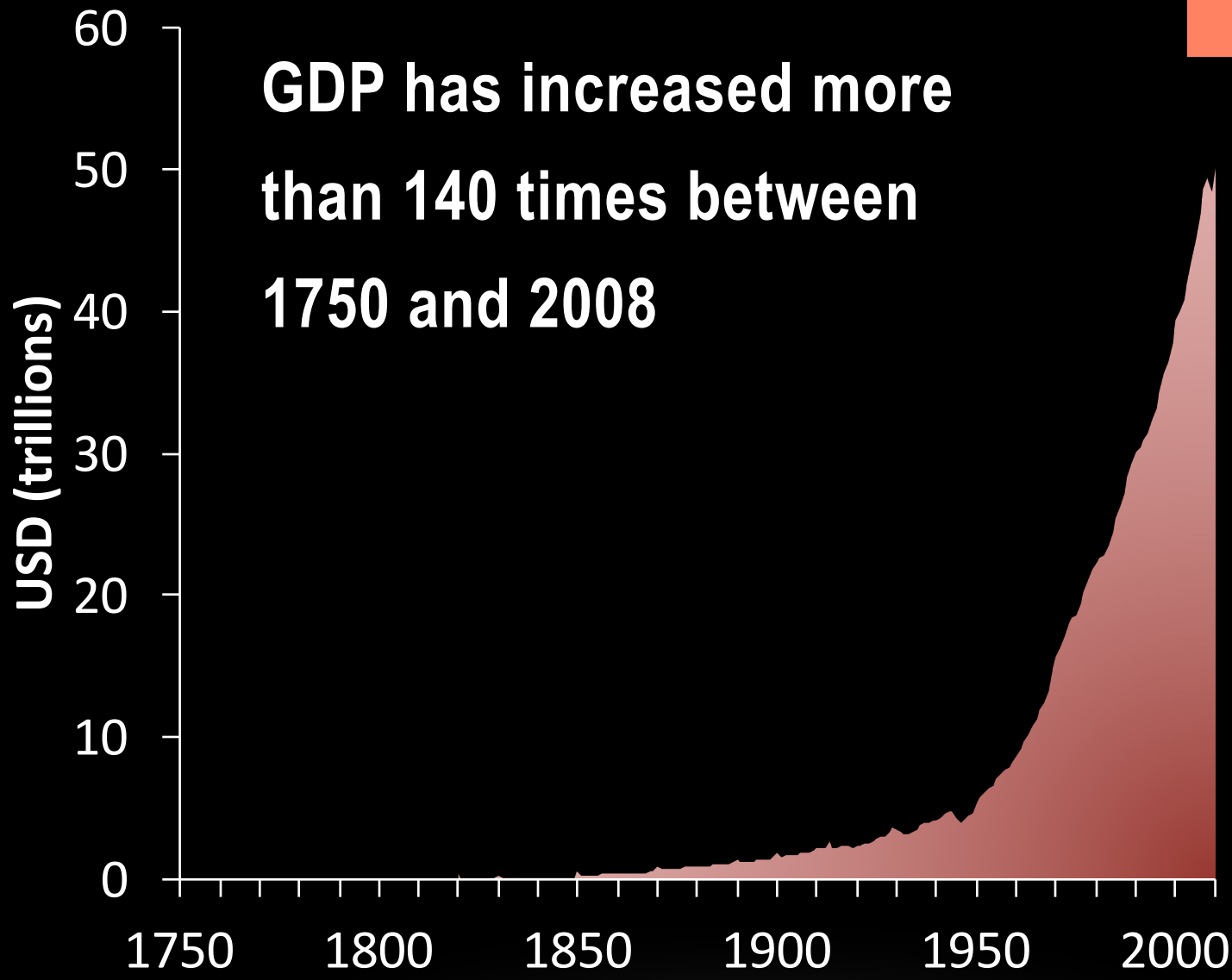
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785



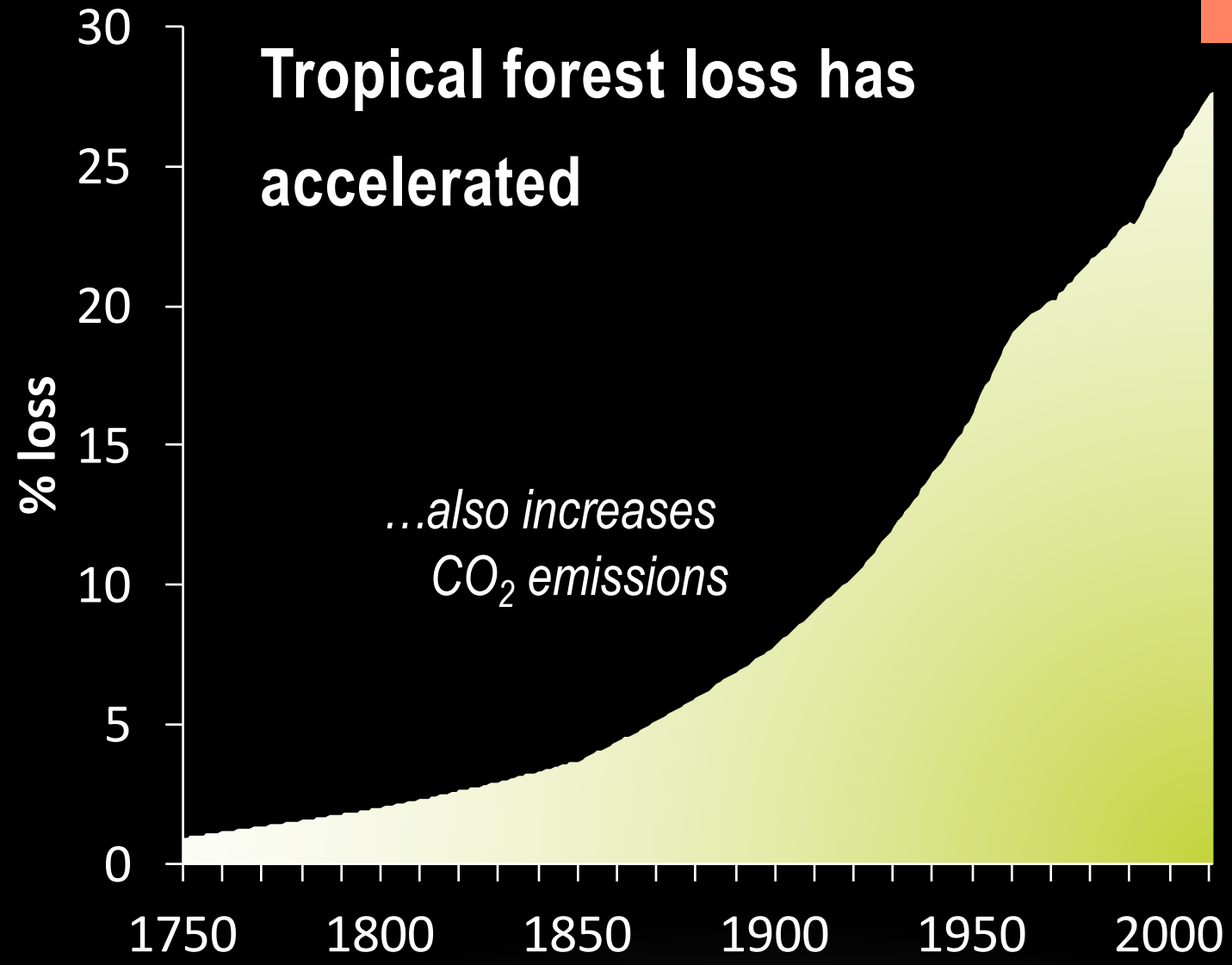
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785



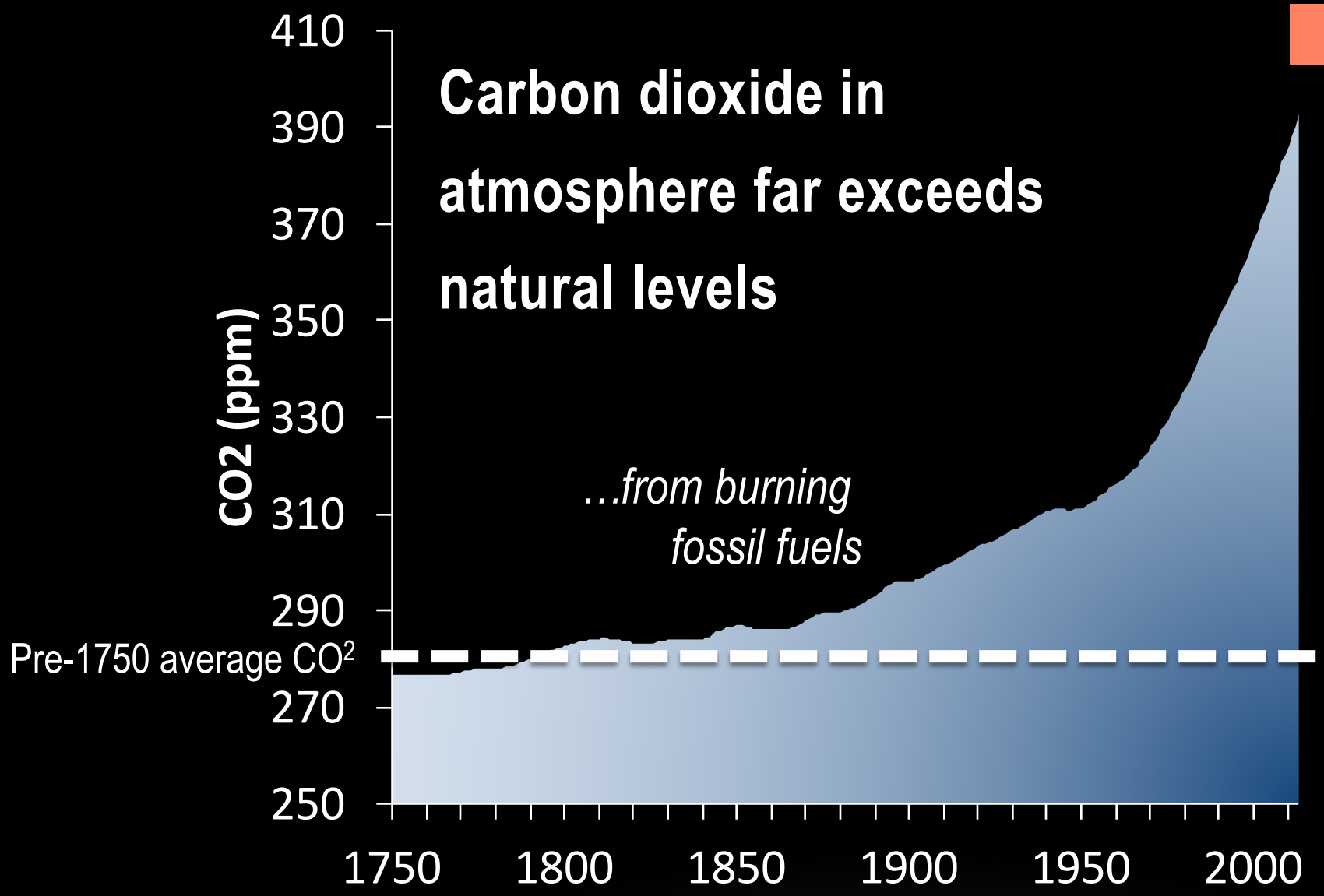
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: · 10.1177/2053019614564785



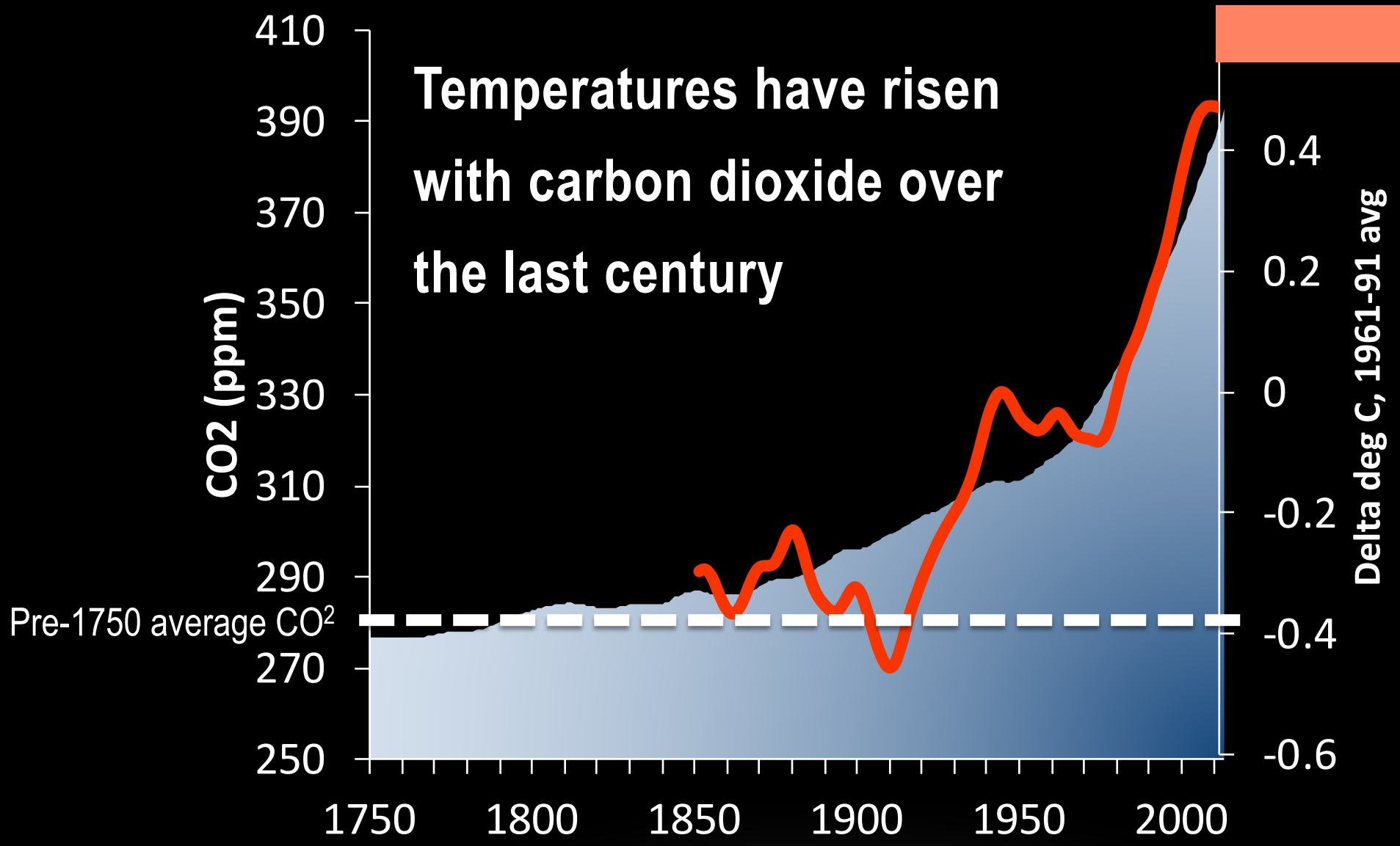
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785



Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785

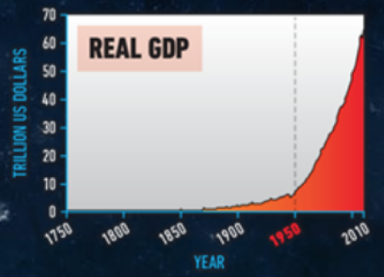


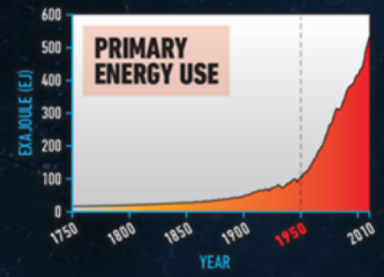
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785

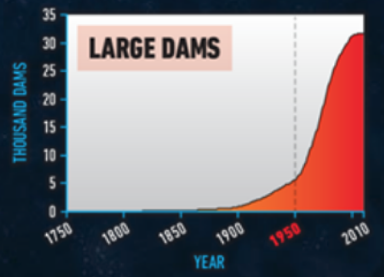


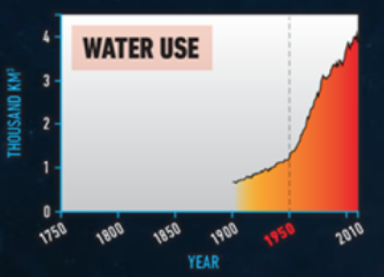
Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785

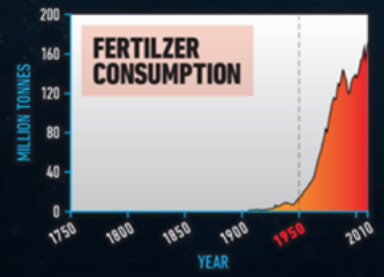
SOCIO-ECONOMIC TRENDS

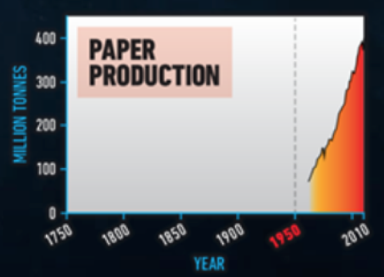


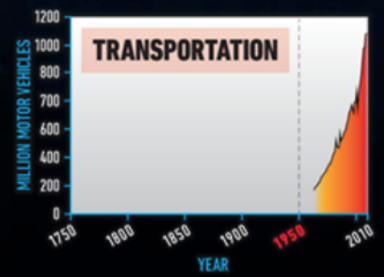


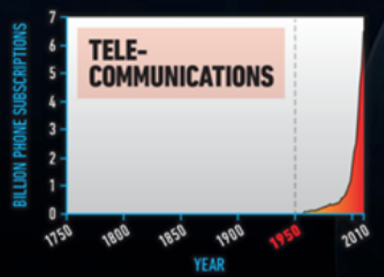


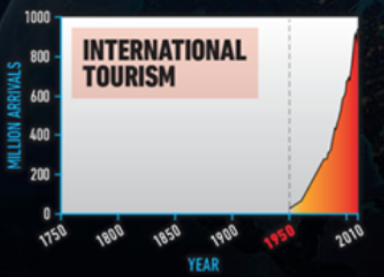




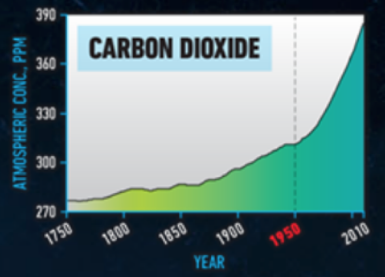


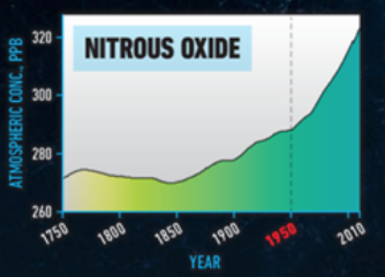


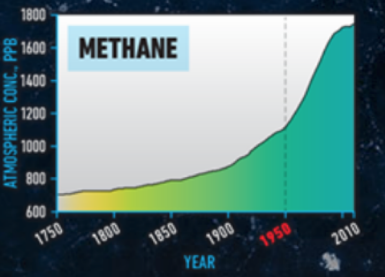


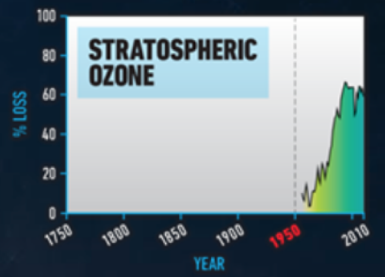


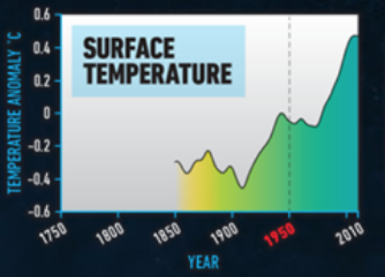
EARTH SYSTEM TRENDS

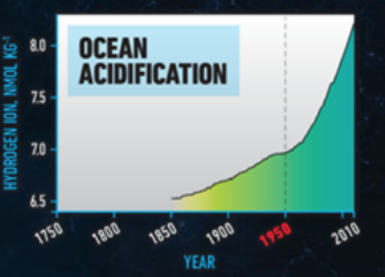


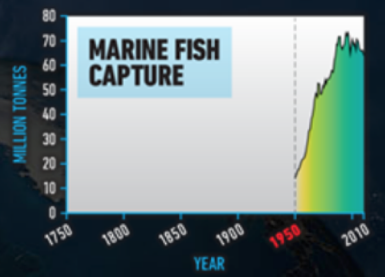


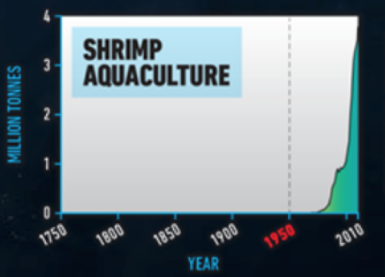


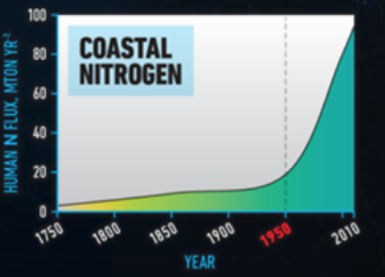


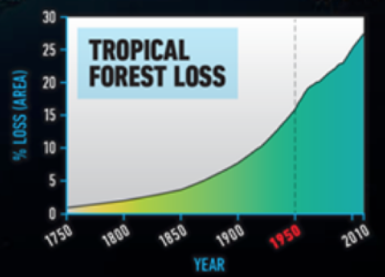


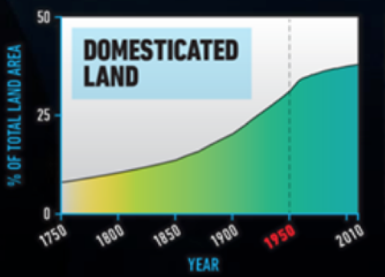


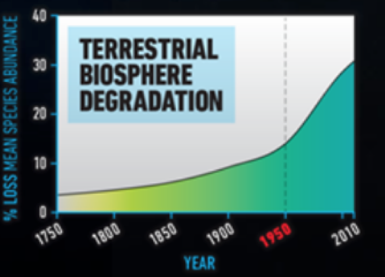




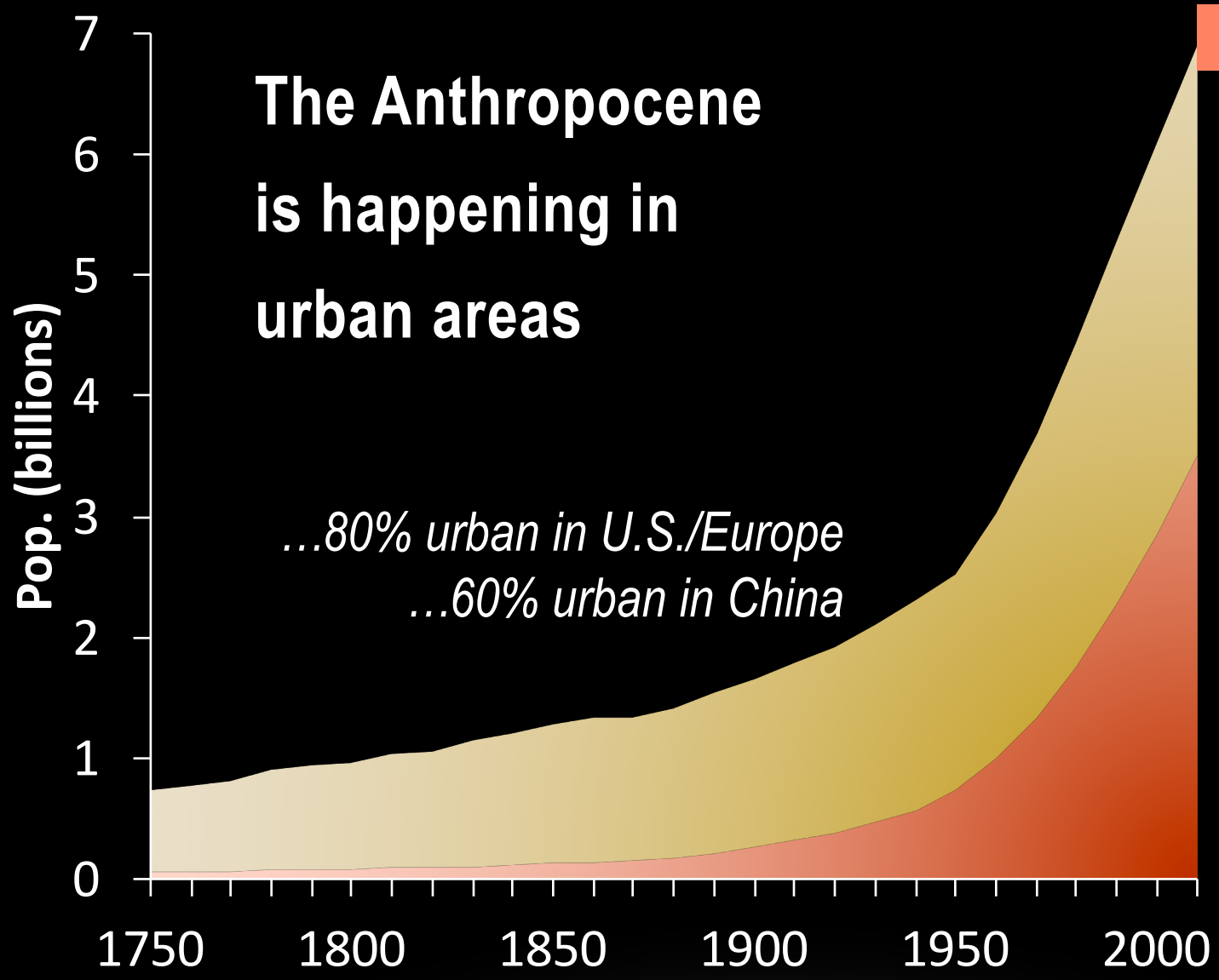








http://Anthropocene.info



Data from: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785

Entering the Anthropocene…

- A new geological epoch
- Humans are the single dominant force on planet
- Characterized by dramatically increased and increasing…
  - Human use of materials & natural resources
  - Expulsion of waste/pollutants into environment

E.g.: Steffen, W., et al,. 2015. *Anthrop Rev,* 2(1):81-98. doi: 10.1177/2053019614564785

What does it mean to be “transdisciplinary”?

Multidisciplinary, Interdisciplinary, Transdisciplinary

- Multidisciplinary
  - Scholars from more than one traditional disciplines working on a research question
  - Each bringing knowledge from their own home discipline (e.g., biology)
  - Define research goals in terms of their home discipline

Rice, M. 2013. *COSUST*, 5:409–419. doi:10.1016/j.cosust.2013.06.007
Hinrichs, C.C., 2008. *Agric Human Values*, 25:210

Multidisciplinary, Interdisciplinary, Transdisciplinary

- Multidisciplinary
  - Scholars from more than one traditional disciplines working on a research question
  - Each bringing knowledge from their own home discipline (e.g., biology)
  - Define research goals in terms of their home discipline
- Interdisciplinary
  - Scholars trained in theories and methods from interdisciplinary fields
  - The field of study/research question requires knowledge from multiple traditional disciplines
  - Knowledge, data, tools/methods, concepts are integrated for holistic understanding

Rice, M. 2013. *COSUST*, 5:409–419. doi:10.1016/j.cosust.2013.06.007
Hinrichs, C.C., 2008. *Agric Human Values*, 25:210
Wagner, C.S., et al., 2011..*J Informetrics*, 5:14-26

Multidisciplinary, Interdisciplinary, Transdisciplinary

- Transdisciplinary
  - Interdisciplinary + “non-academic participants”
  - “trans” = beyond disciplines
    - That is…
      - Beyond academia
      - Beyond research
  - Applied – Transdisciplinary research seeks to solve real-world problems

Rice, M. 2013. *COSUST*, 5:409–419. doi:10.1016/j.cosust.2013.06.007
Cronin, K. 2008. *Transdisciplinary research (TDR) and sustainability.* Report.

LUFA Research

Urban Foresters Response to Climate Change

CommuniTree: Evaluating Tree Planting in NW Indiana

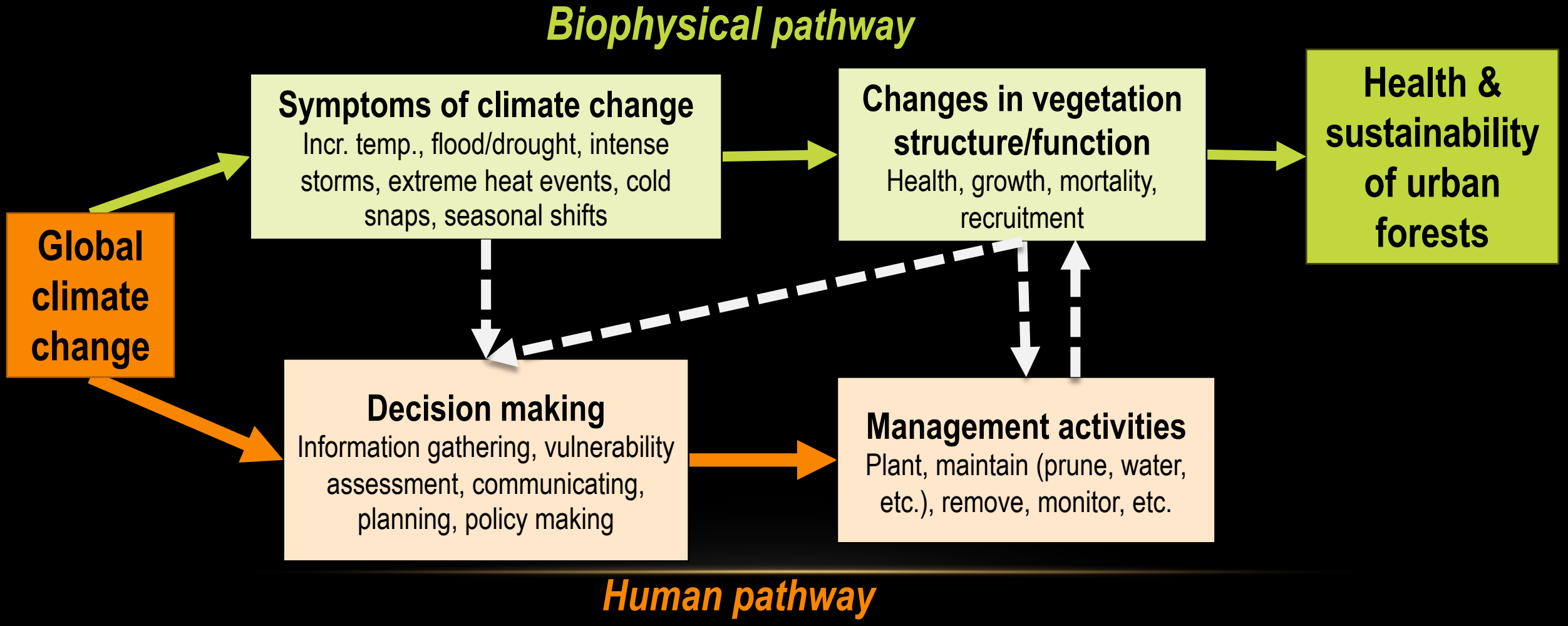
LUFA Research

Urban Foresters Response to Climate Change

CommuniTree: Evaluating Tree Planting in NW Indiana

LUFA Research

Climate change impacts urban forests via two pathways: Biophysical + Human



Vogt, Espeland, & Shoopmann, *manuscript in preparation*

The symptoms of climate change might change the maintenance strategy urban trees require…

- Drought = more water needed for not only newly planted trees but mature trees
- Floods = better soil management to avoid water-logging of roots
- Storms = more costly and intensive clean-up of fallen branches and failed trees after more intense and more frequent storms
- Extreme temperatures = managing associated pest outbreaks, e.g., mistletoe in Melbourne
- Seasonal shifts = changes when trees can/should be planted for greatest survival
- All of the above – impact species selection

LUFA: Urban Foresters Response to Climate Change

Research Question:

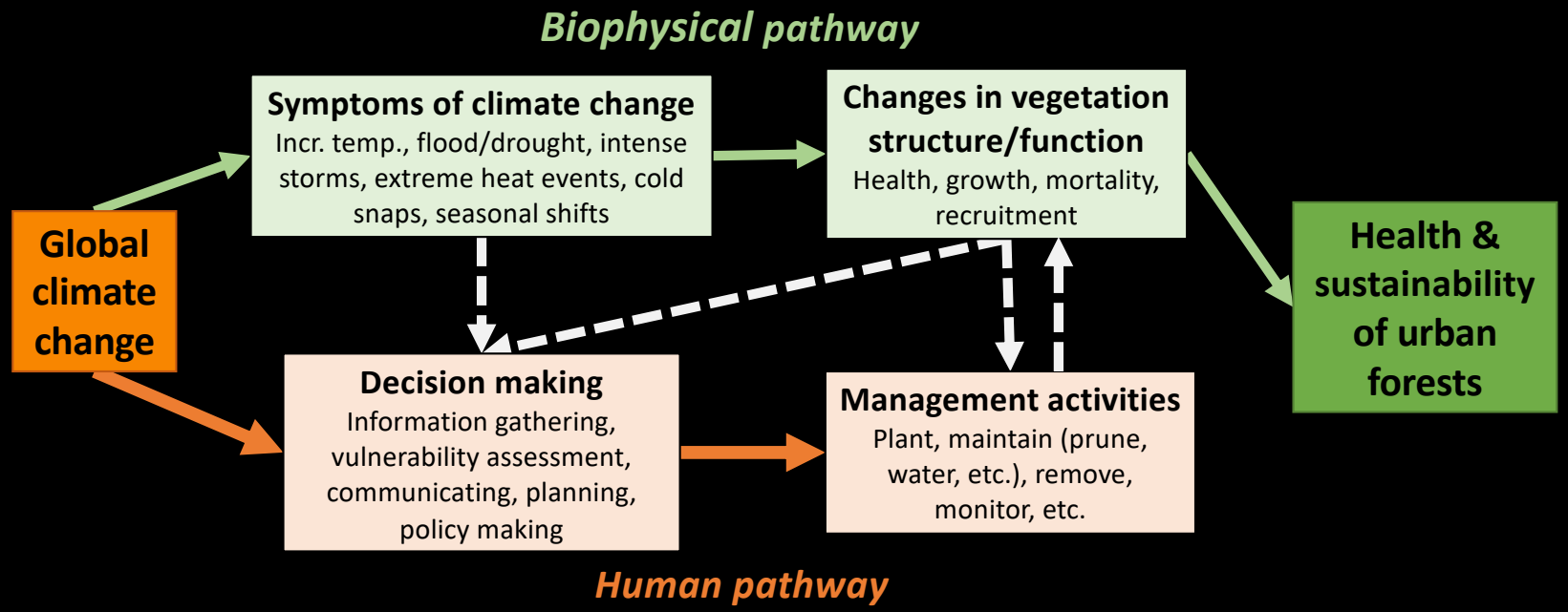
How are urban foresters responding to climate change?

How best to answer the research question?

- Since we're interested in what people are doing (what actions they are taking), we can use…
- "Self-report measures"
  - People tell you what they are doing or what they think in a questionnaire
- But...there is a slight problem!
  - People may not know they are responding to climate change!
  - May not connect symptoms with climate change

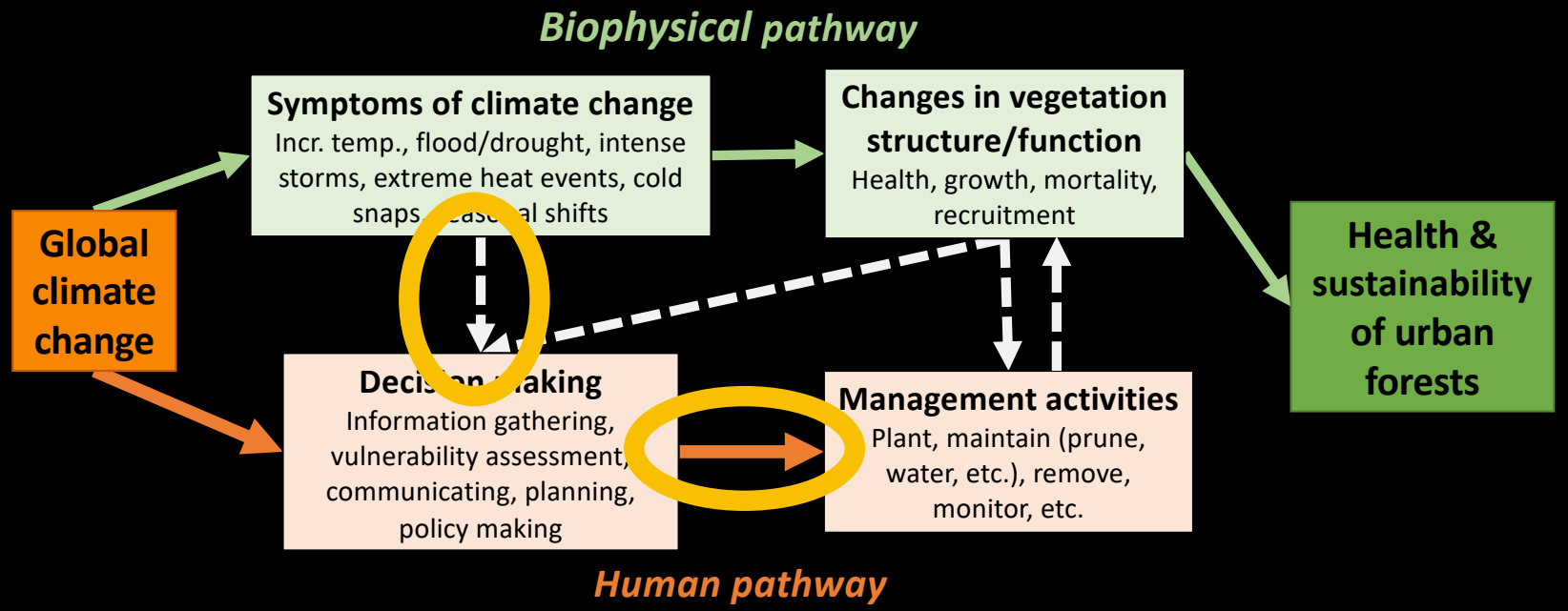
How best to answer the research question?

- Since we're interested in what people are doing (what actions they are taking), we can use…
- "Self-report measures"
  - People tell you what they are doing or what they think in a questionnaire
- But...there is a slight problem!
  - People may not know they are responding to climate change!
  - May not connect symptoms with climate change



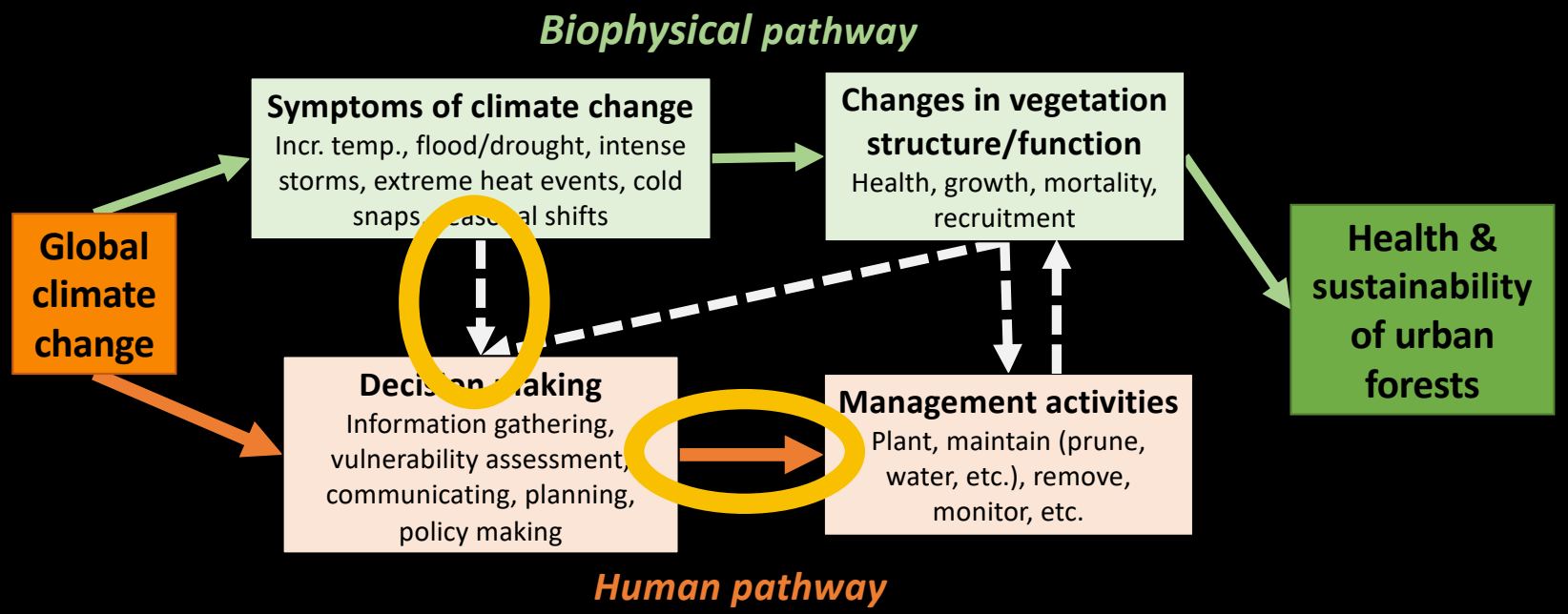
How best to answer the research question?

- Since we're interested in what people are doing (what actions they are taking), we can use…
- "Self-report measures"
  - People tell you what they are doing or what they think in a questionnaire
- But...there is a slight problem!
  - People may not know they are responding to climate change!
  - May not connect symptoms with climate change
- So we ask two sets of questions:
  1. Responses to symptoms (i.e., experience)



How best to answer the research question?

- Since we're interested in what people are doing (what actions they are taking), we can use…
- "Self-report measures"
  - People tell you what they are doing or what they think in a questionnaire
- But...there is a slight problem!
  - People may not know they are responding to climate change!
  - May not connect symptoms with climate change
- So we ask two sets of questions:
  1. Responses to symptoms (i.e., experience)
  2. Knowledge of connections between symptoms & climate change



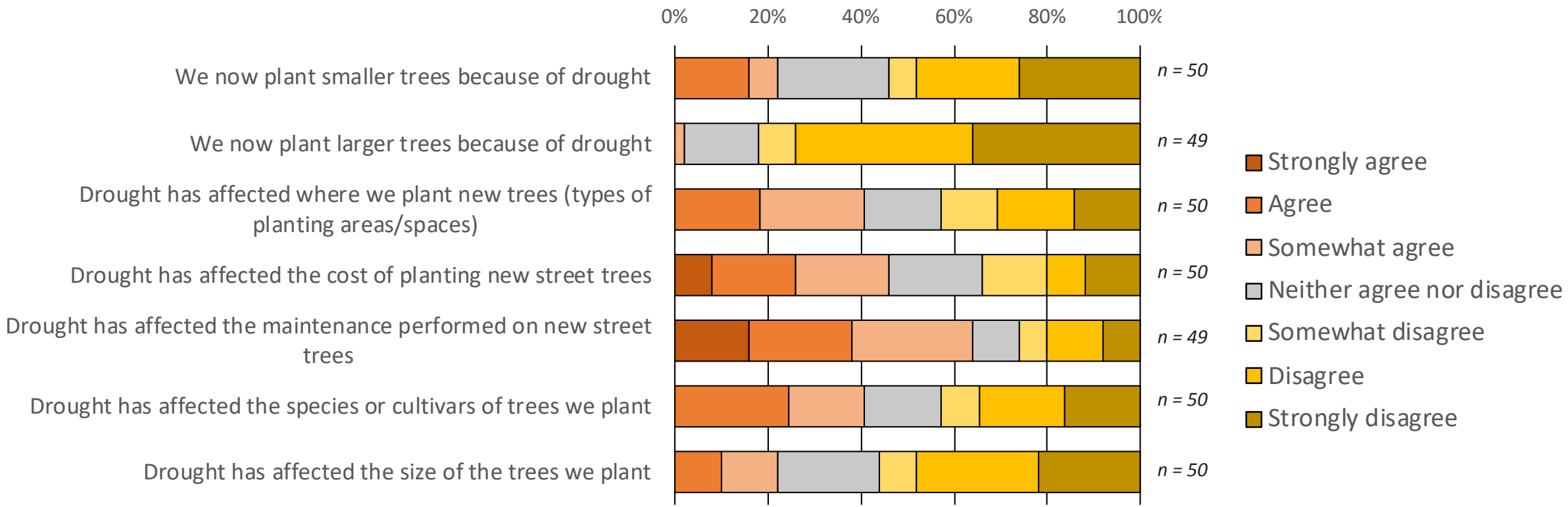
SURVEY OF URBAN FORESTERS

- Administered via urban forestry email lists in Chicago area (pilot of drought/flooding questions) and all of Canada (all 5 major symptoms)
- Asked about urban foresters experience with (i.e., response to) the symptoms of climate change:
  - Drought
  - Flooding
  - Intense storms
  - Extreme temperatures (heat + cold)
  - Seasonal shifts (earlier spring, later autumn)

CHICAGO RESULTS…

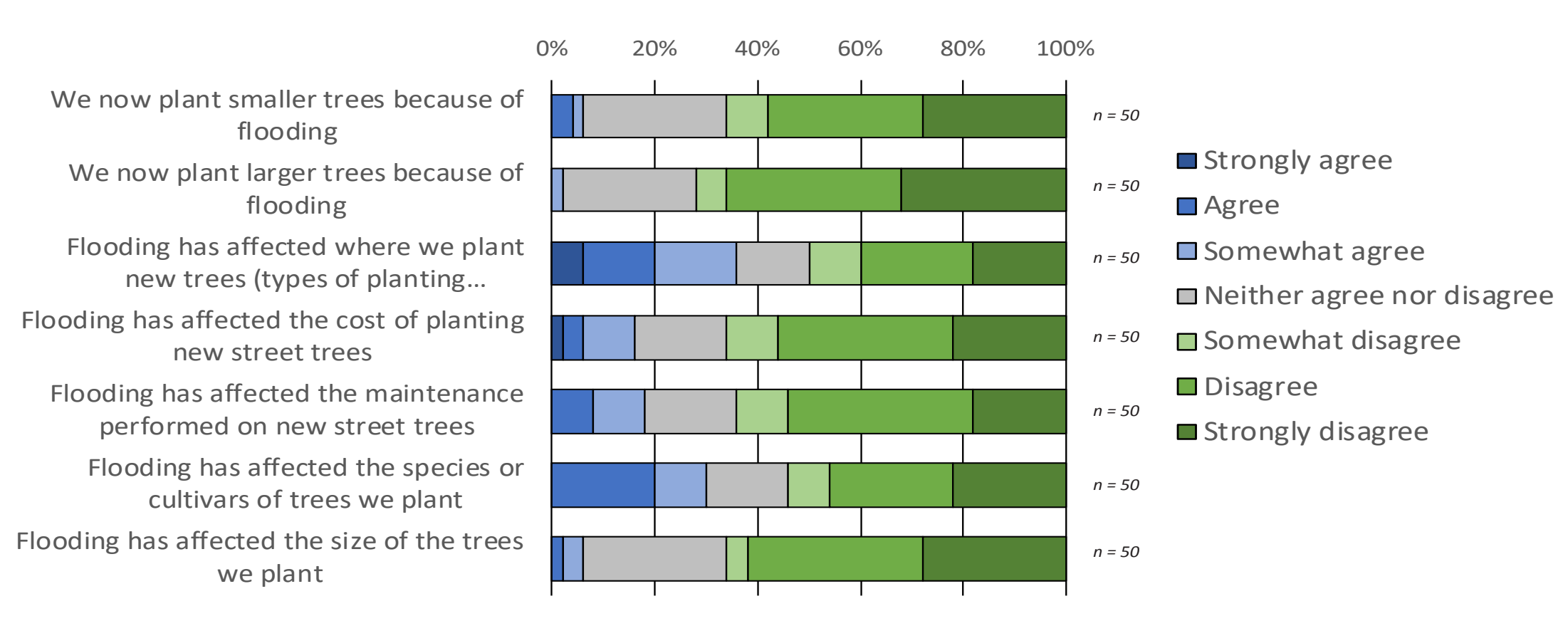
Select results presented herein.
(It was a long survey with a lot of data!)

Chicago urban foresters are sort of experience drought…
(especially as it impacts the maintenance of new street trees)



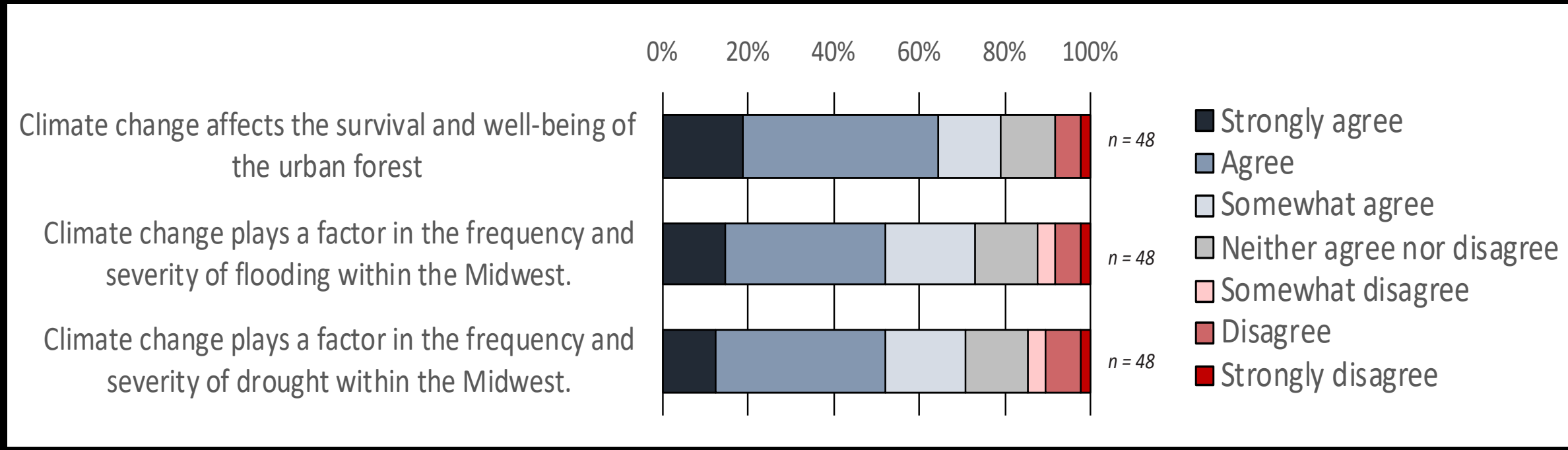
Vogt, Espeland, & Shoopmann, *manuscript in preparation*

Chicago urban foresters are not really experiencing flooding…. (Except perhaps as it impacts species selection)



Vogt, Espeland, & Shoopmann, *manuscript in preparation*

However…urban foresters think climate change has an impact on the urban forest…

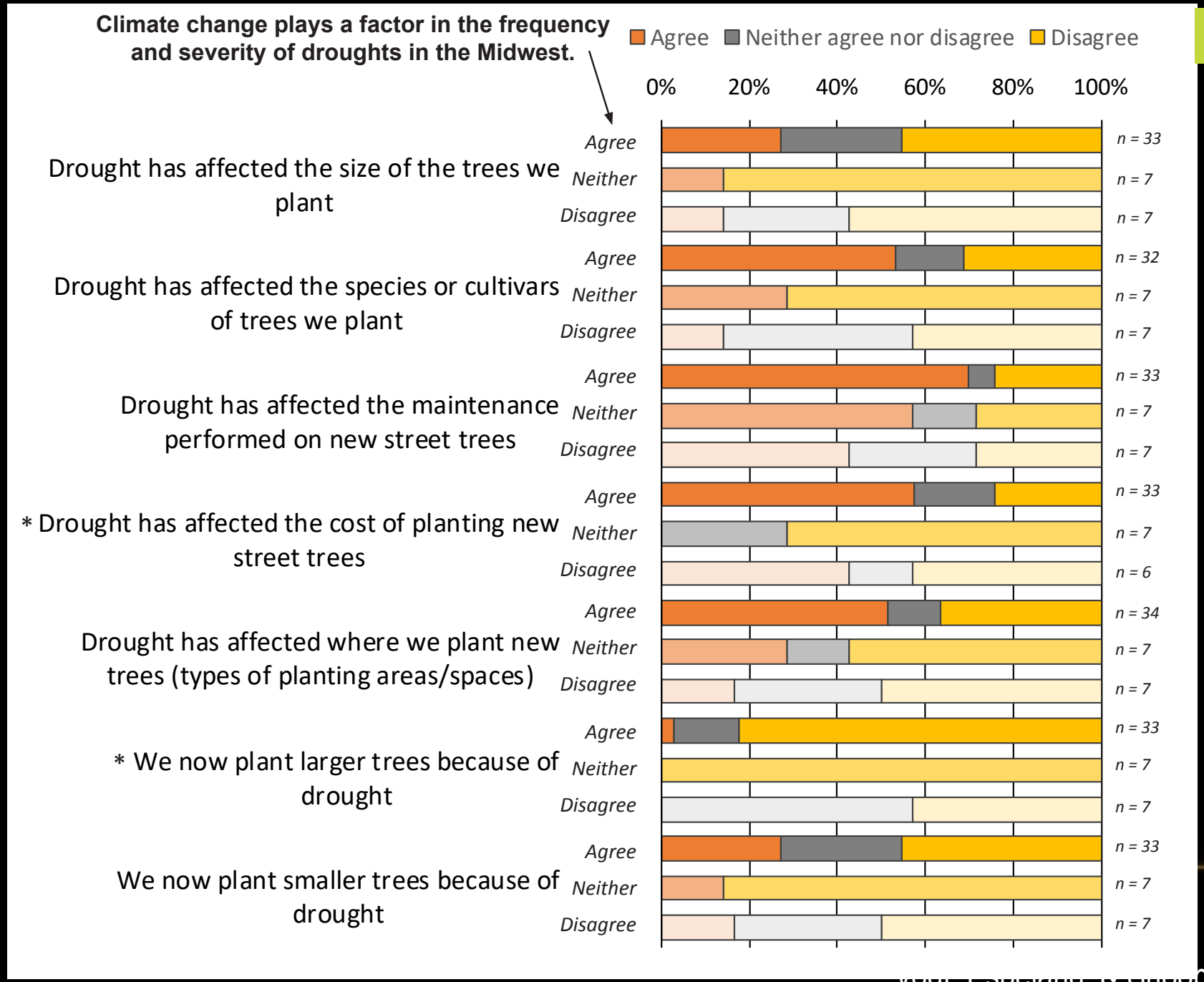


Vogt, Espeland, & Shoopmann, *manuscript in preparation*

What if we combine experience with knowledge?

That is…does knowledge of the connection between the symptoms of climate change (drought, flooding) impact one's experience of (i.e., likelihood of taking action in response to) that symptom?

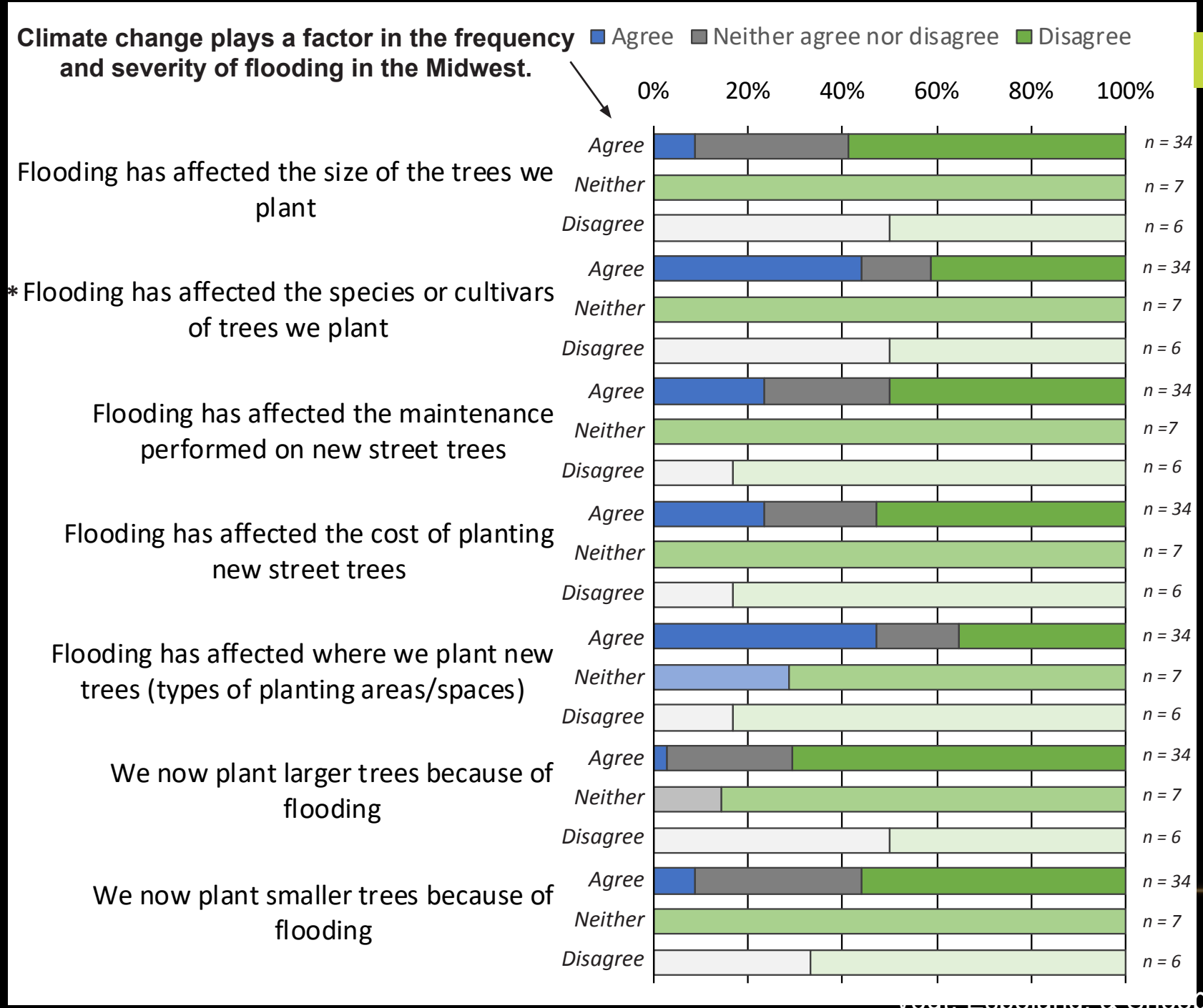
Does knowledge of drought impact experience of drought?



*Yes (significant impact)

drought affects costs of planting (*likely more expensive)*
&
drought does *not* incentivize planting larger trees

Vogt, Espeland, & Sheppmann, *manuscript in preparation*



Does knowledge of flooding impact experience of flooding?

*Yes (significant impact)

flooding impacts species selection

Vogt, Lopeland, & Shoopmann, *manuscript in preparation*

NEXT STEPS FOR CLIMATE CHANGE PROJECT

- Writing up the results of the Chicago area survey and a separate survey of Canadian urban foresters in 2 manuscripts
- Future research possibilities:
  - Interviews in Chicago area to learn more about gaps between knowledge and action
  - Expand survey to other geographies

Urban Foresters Response to Climate Change

CommuniTree: Evaluating Tree Planting in NW Indiana

LUFA Research

CommuniTree Evaluation Research Project (CERP)

- CommuniTree is a new collaborative, multi-organizational tree planting project in Northwest Indiana
- ENV 261 Mixed Methods Research class at DePaul has twice contributed to designing the evaluative research

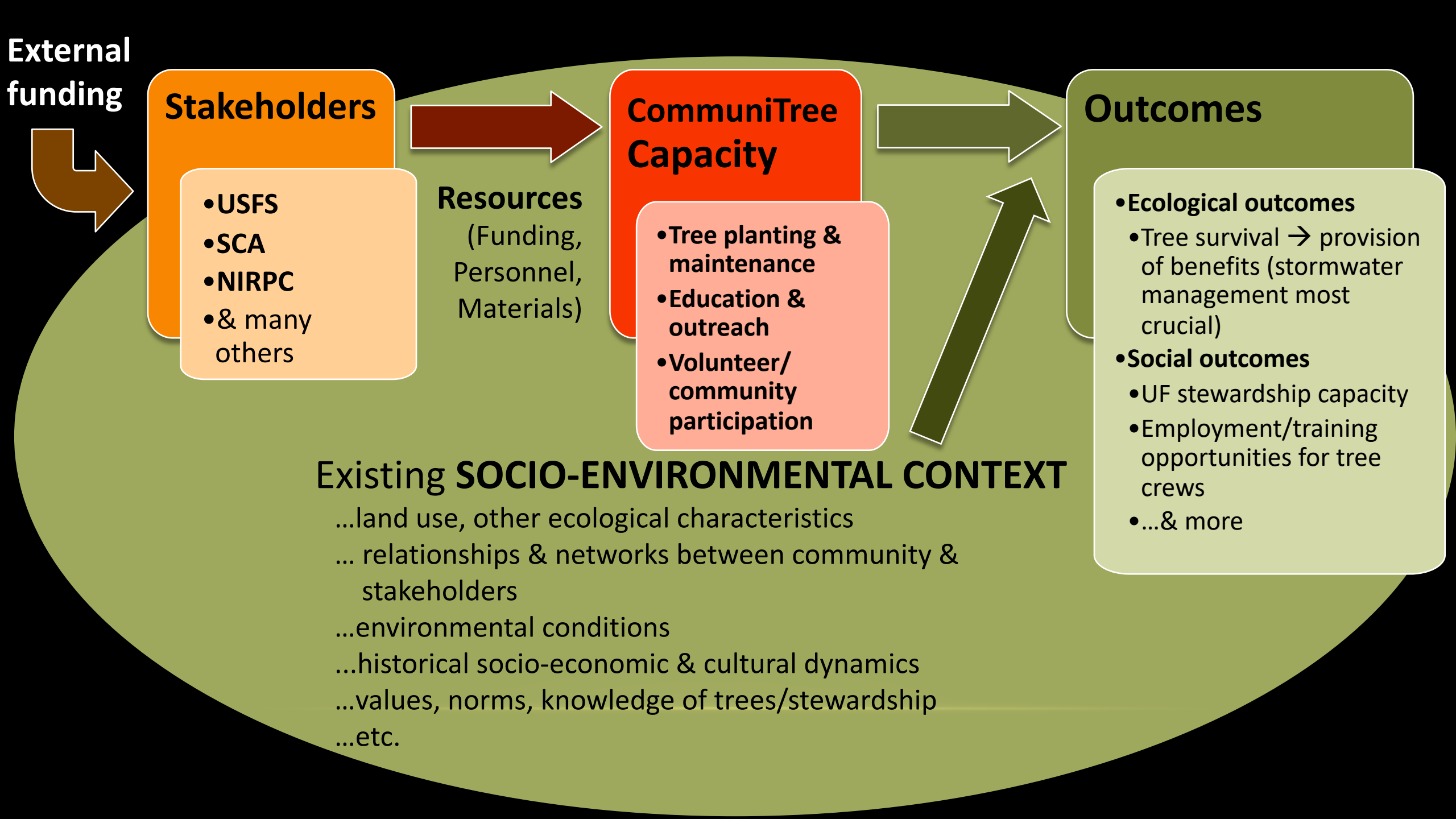
"a dynamic partnership of community, industry and government agencies"

"…to promote tree planting, after-planting care and maintenance of trees…with the ultimate goal of creating a healthier and more diverse tree population."

Source: CommuniTree website: http://www.nirpc.org/2040-plan/environment-green-infrastructure/communitree/

Research Questions

1. What are stakeholder **roles, motivations**, & **desired outcomes** for CommuniTree?
2. What **resources** (funding, time, material, etc.) are stakeholders allocating to the CommuniTree effort and **to what activities** are these resources dedicated?
3. What are the ***observed*** **environmental (ecological) and community (social) outcomes** of CommuniTree?
4. How does the **surrounding socio-environmental context** influence CommuniTree stakeholders & participants and observed environmental & community outcomes?


External funding
Stakeholders
•USFS
•SCA
•NIRPC
•& many others
Resources (Funding, Personnel, Materials)
CommuniTree Capacity
•Tree planting & maintenance
•Education & outreach
•Volunteer/ community participation
Outcomes
•Ecological outcomes
•Tree survival → provision of benefits (stormwater management most crucial)
•Social outcomes
•UF stewardship capacity
•Employment/training opportunities for tree crews
•…& more
Existing SOCIO-ENVIRONMENTAL CONTEXT
…land use, other ecological characteristics
… relationships & networks between community & stakeholders
…environmental conditions
…historical socio-economic & cultural dynamics
…values, norms, knowledge of trees/stewardship
…etc.

Multi-strand mixed methods research

1. Stakeholder Interviews - *completed*
2. Volunteer survey – *in-progress*
3. Household survey – *to be administered Winter 2019*
4. Resource flows mapping – *in progress*
5. Tree outcomes – *will happen Fall 2019*

Stakeholder interviews - METHODS

1. Interview script development and stakeholder identification

Stakeholder = a group or organization that provides (receives) resources to (from) the CommuniTree program

2. Interviewing Stakeholders
3. Qualitative Analysis using NVivo

Stakeholders

- U.S. Forest Service (USFS) – Drew Hart
- Student Conservation Association (SCA)
- Northwestern Indiana Regional Planning Committee (NIRPC)
- Indiana Department of Natural Resources (IDNR) Coastal Program
- Northern Indiana Public Service Company (NIPSCO)/Arbormetrics
- Northwest Indiana Urban Waters Partnership
- Municipalities: East Chicago, Gary, Hammond, Whiting
- Wildlife Habitat Council
- Dunes Learning Center
- The Nature Conservancy
- …and growing

Stakeholders

- U.S. Forest Service (USFS) – Drew Hart
  - Student Conservation Association (SCA)
  - Northwestern Indiana Regional Planning Committee (NIRPC)
  - Indiana Department of Natural Resources (IDNR) Coastal Program
  - Northern Indiana Public Service Company (NIPSCO)/Arbormetrics
  - Northwest Indiana Urban Waters Partnership
- Municipalities: East Chicago, Gary, Hammond
- Wildlife Habitat Council
- Dunes Learning Center
- The Nature Conservancy
- ...and growing

Public
Nonprofit
Private
Partnership

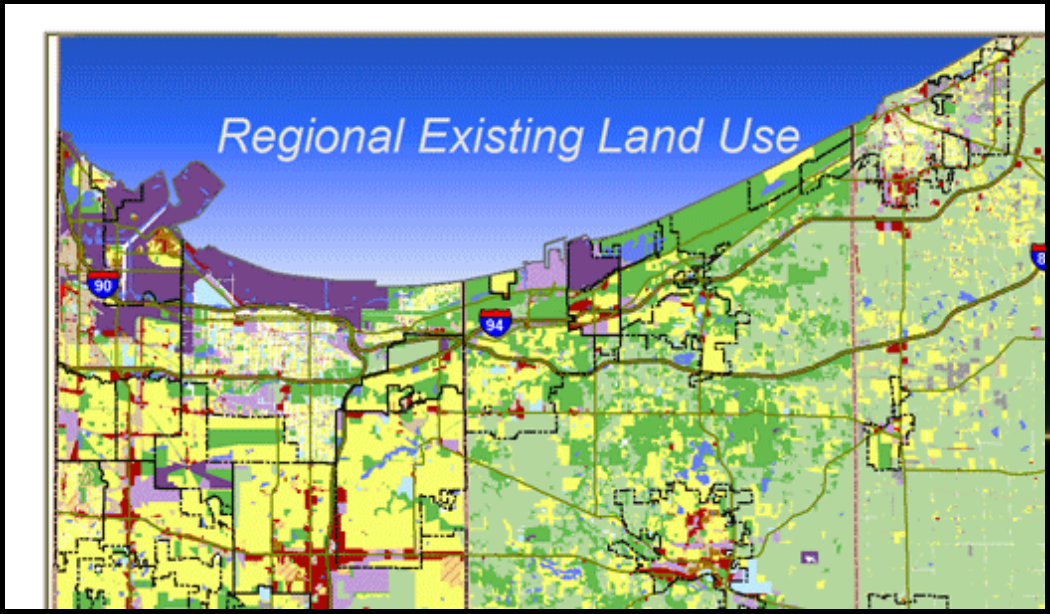
RESULTS: Desired outcomes

Most common

Public
Nonprofit
Private
Partnership

Ecological outcomes

1. Stormwater management * * * *
2. Pest/disease recovery (EAB) * * *
3. Air quality improvement * * *



Social outcomes

1. Aesthetics/beautification * * * *
2. Improved public spaces * * *
3. (tied) Community engagement * * *

Forestry job training * * *

Stewardship education * *

Low-cost tree planting & care * *

CommuniTree research next steps

- Household survey
  - In neighborhoods near and far from trees planted
  - Provide info to help CommuniTree better engage neighborhoods
- Transform stakeholders' desired outcomes into a 10-year plan to monitor & evaluate CommuniTree outcomes

Questions?

Transdisciplinary Urban Forestry for the Anthropocene

Dr. Jess Vogt jess.vogt@depaul.edu

Assistant Professor
Environmental Science & Studies
DePaul University

Principal
Lab for Urban Forestry in the Anthropocene

DEPAUL UNIVERSITY