

## **Notes: Research, Data Collection, and Modeling on Climate Adaptation**

Any way DNR can support climatic research serves people of MN and will address requests regardless of motive – data collection

Intersection of climate and meteorology where important research is happening right now – modeling

DNR is located in soil sciences building at U of MN and interactions very important between these two organizations

### **What's already being done:**

Winona – a lot of interest in what is happening to agriculture w/extreme weather and changing climate

- Impact on food, land

Leech Lake Tribal College

- Looking at native plant communities – food and medicinal uses
- hard to find data sets for northern MN – LIDAR, TEK (traditional ecological knowledge)
- want more chemical data in spreadsheets
- want access to already existing data sets
- Personal weather station (PWS) starting to collect Wx (weather) data

Humphrey School

- Capstone project w/Met Council on climate (social) vulnerability assessment (CVA)
- Areas susceptible to extreme heat and to flooding
- Data sources from Met Council and state for climate data
  - o Social and demographic data collected by Macalester to create base maps Semester 1

Regional DNR – Duluth

- stream temp data monitoring every hour (and oxygen content also being explored) which will be made public on web site

Community solar garden – contracts issued around the state, data source is Xcel contracts

U of MN Extension

- U greenhouses w/cloudier winter impacting solar – what are trends? To be able to plan for low impact/carbon neutral operations need this data

Have daily 100 yr. data at DNR temp and precip for some 12 stations; more for 50 year data; airport stations have 25 year sunlight data. Have monthly temp and precip for state in big areas 1895 – present

Daily rain gauge network 1000 gauges since 1970s – high density rainfall

Heat island dense network 5 years – 1 kilometer resolution every 15 minutes

Big stations have daily summary of character of day – solar radiation, wind, humidity for shorter duration

Limited soil temp and moisture data

Marcell Experimental Forest north of Duluth has lots of tree

2 satellites (SMAP) monitor soil moisture

Climate Office at [www.climate.umn.edu](http://www.climate.umn.edu), [climate@umn.edu](mailto:climate@umn.edu) like calls 651-296-4214

### **Climate Data Needs/Opportunities**

Rain density, soil data very important, soil temp and moisture

Carbon sequestration in soil

Future scenarios- modeling

River levels and sediment loads from high precip events – data exists in coop stream gauge effort

Link biophysical processes to yield, health, incomes, property value, socioeconomic data w/climate signal in it or to investigate stakeholder needs addressed by data

- What does general climate picture mean? Ramifications?

Be able to quantify natural environment as ecosystem services provided and inputs

Simplify models so can tell impacts more clearly

Tie back infrastructure costs to events and to lost productivity (OSHA-type things)

School of Nursing integrating climate change into classes – a lot of health data out there

- Knowing what data is out there in integrated way

Mismatch w/what scientists comfortable in saying vs. what program implementers need to hear to make decisions and investments

Phenology and climate data intersection w/observers of plants and animals in relation to gauges

- Enthusiasm of phenologists geographically disparate
- Satellite data will be bridge for gaps, helps fill in precision lacking from human observation

Human health effects and economic data

Need more geo-chemical data: mercury mobilization from warmer sediments for example

What data is available on what time and space scales?

### **Summary – Main Themes**

General unawareness about what's being collected, what's available, and how to get it (especially integrated across fields)

Smaller campuses – place for info to replicate on campus w/correct protocols and tools the climate data being collected by DNR – look on web site; lots of info already on hardcore climate data that will share with campuses – contact DNR

Missing geo-physical and phenological data

## **Notes from flip charts**

### ***Data available***

Temp + precip.

Monthly for state and big areas 1845 – pres.

Daily data 100+ yrs at greater than/equal to 12 stations

Daily 50 + years dozens of stations

High density rain

Heat island

Sun, humidity, and w2ind

Shorter duration

Met Council – Humphrey

- Climate vulnerability assessment
- Heat + flooding
- Social/demo data
- Met Council data on heat and rainfall

Regional DNR Duluth

- Stream temps

Comm. Solar Garden

- Contracts, Xcel

Solar Radiation

### ***Needs***

- Soil T and moisture
- Soil carbon
- Future data
- River levels
- Biophysical data linkages with: health, yields, socioeconomic, stakeholder needs
- Economic benefits
- Winona – no data/no idea
  - o Interested in food
  - o Local ag production
- Leech Lake
  - o Native plant communities
  - o Medicinal
  - o Lidar, TEK
  - o More chem. Data needed
  - o PWS for collecting WX data

- Why not Sim City like models?
- Event data to costs
- Productivity/OSHA question
- Networking – availability
- Phenology
- Geochemical
- Time and space scales