SUSTAINABILITY
AT MCGILL

McGill Office of Sustainability

Climate Resilience: Make it Personal

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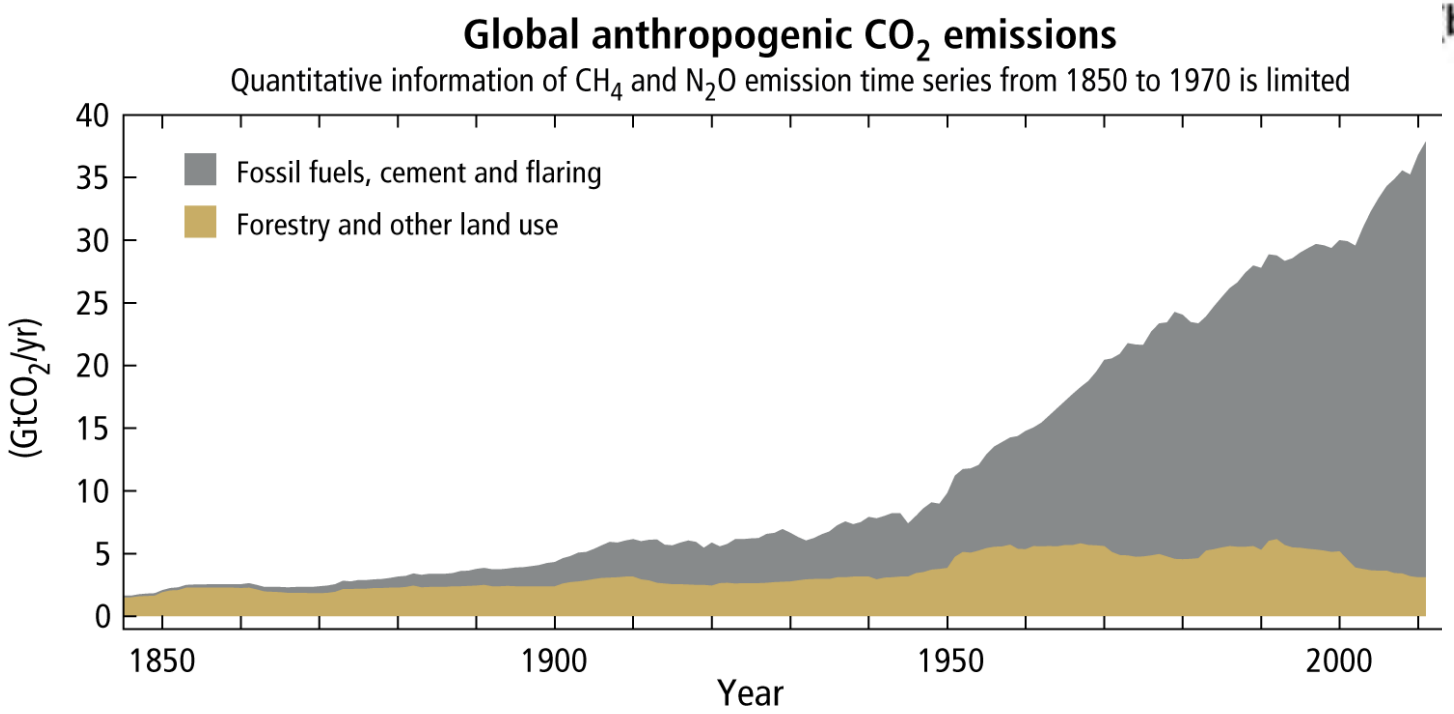
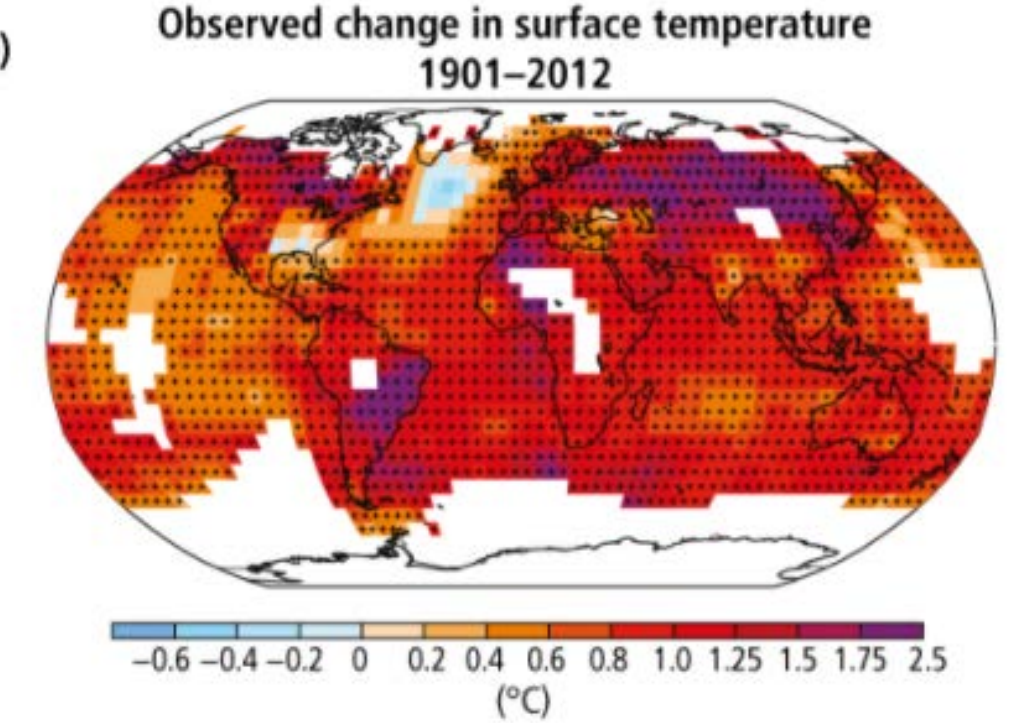
MForum

March 28, 2018

Climate Change

"A change of climate, which is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and which is in addition to natural variability observed over comparable time periods" – UNFCCC

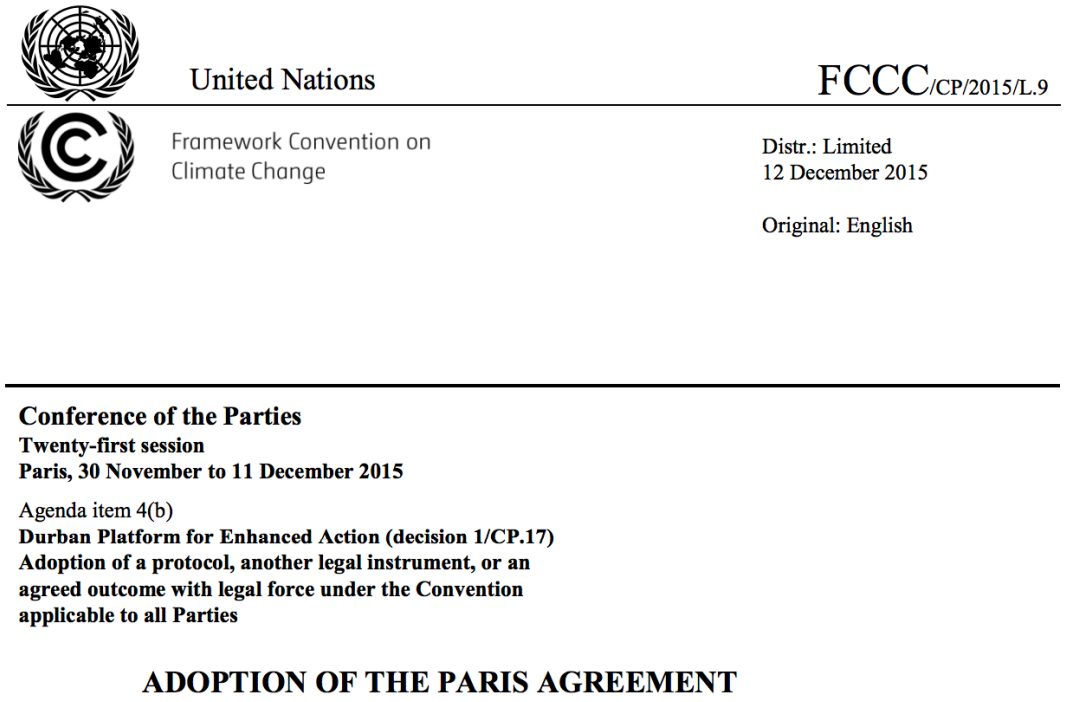




Key International Climate Science + Policy

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP



United Nations

FCCC/CP/2015/L.9

Framework Convention on Climate Change

Distr.: Limited
12 December 2015

Original: English

Conference of the Parties
Twenty-first session
Paris, 30 November to 11 December 2015

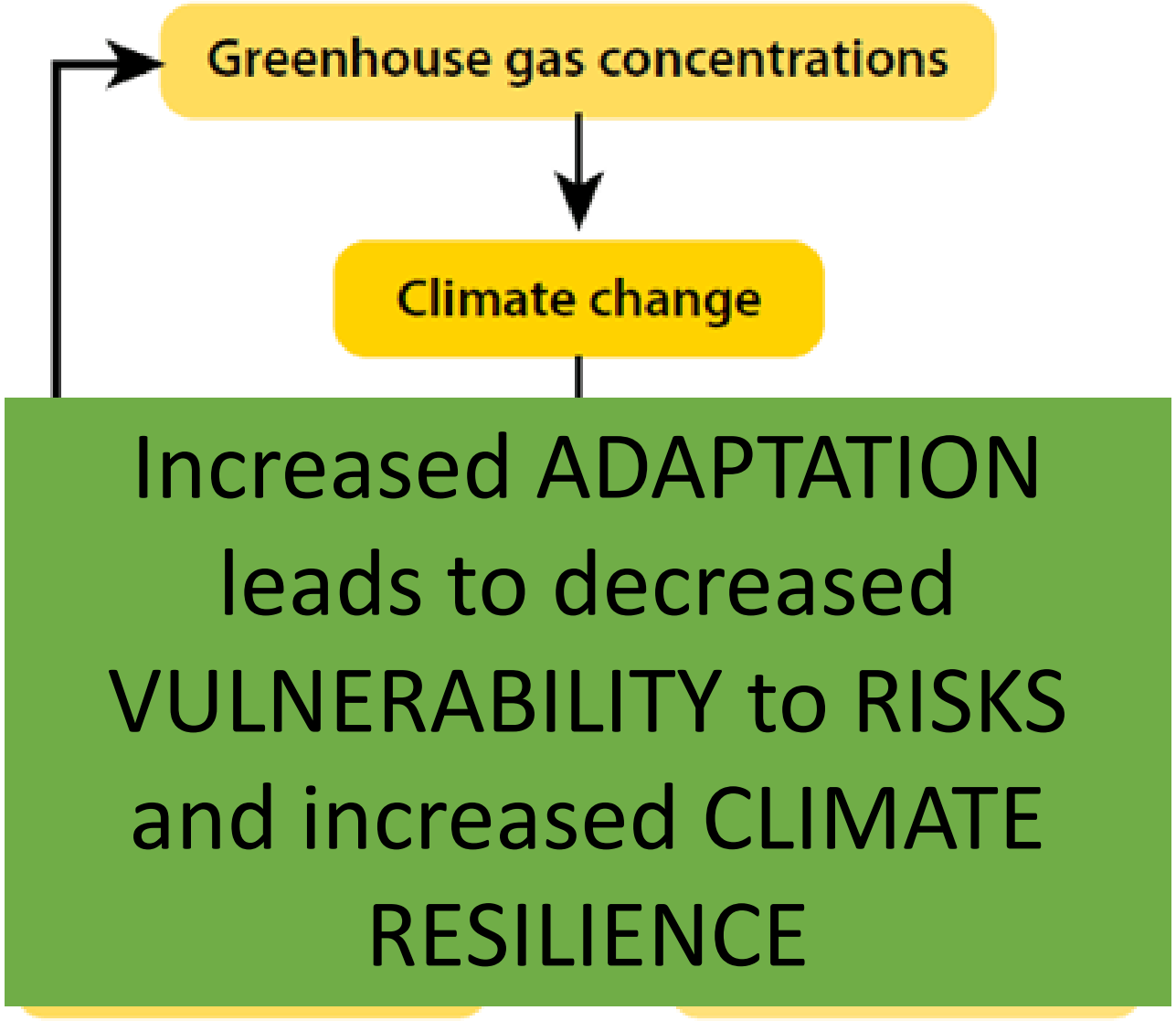
Agenda item 4(b)
Durban Platform for Enhanced Action (decision 1/CP.17)
Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties

ADOPTION OF THE PARIS AGREEMENT

- **Article 2 of the Paris Agreement:**
  - "Holding the increase in the global average temperature to **well below 2°C** above pre-industrial levels… **recognizing that this would significantly reduce the risks and impacts of climate change.**"

Climate Change Concepts

- **Mitigation:** actions to reduce the CAUSE of climate change (aka GHGs)



- **Adaptation:** actions to identify vulnerabilities and then prepare for and lessen the IMPACTS of climate change

Climate Resilience

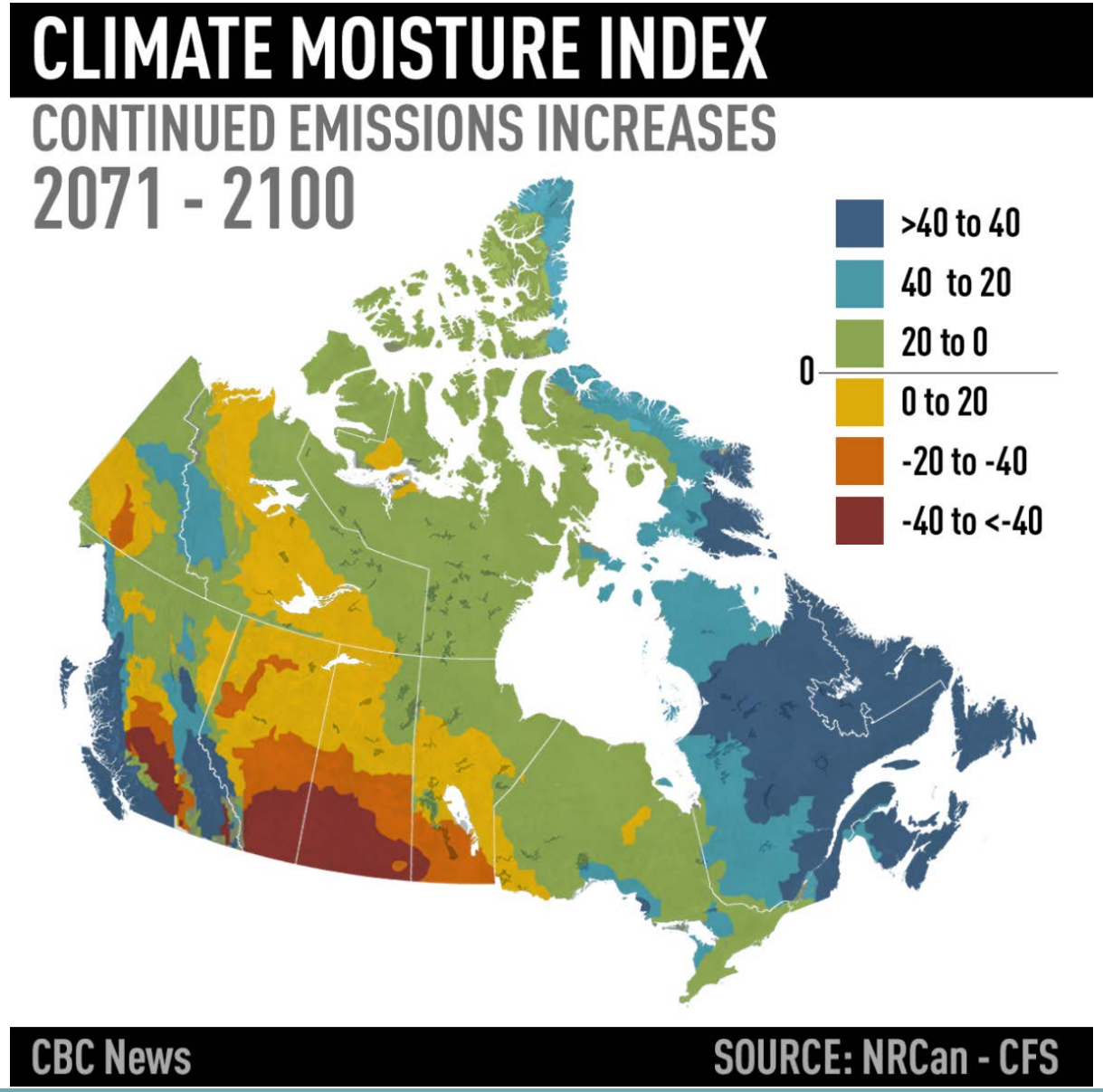
- Relatively new concept that moved from:
  - **Outdated idea of "ecological equilibrium"** (returning to a single prior state after a disruption)
  - **To… modern concept of a flexible system that can establish new baselines**
- Capacity for a socio-ecological system to:
  - **Absorb stresses and maintain function in the face of climate change impacts**
  - **Adapt, reorganize and evolve to improve long-term sustainability of the system**

Climate Change Impacts: Activity

In **pairs or groups of three**, take **5 minutes** to discuss:

- Have you ever personally been affected by a climate change-related event or impact? What was the impact?
- Was it at home, at work, on vacation, somewhere else?
- What type of effect(s) did it have? Consider physical effects, health (including mental health) effects, financial impacts, future-planning, work…
- What actions did you take – or could you take – to adapt to this kind of effect in future?

What about Quebec specifically?



Short on options, Îles-de-la-Madeleine residents make a strategic retreat from rising seas

On a Quebec archipelago, the Gulf of St. Lawrence is slowly devouring roads and threatening communities. But after expensive and ineffective battles against erosion, many locals are moving inland instead. **Matthew McClearn** reports in the second part of a Globe and Mail series

MATTHEW MCCLEARN
ÎLES-DE-LA-MADELEINE, QUE.
PUBLISHED MARCH 19, 2018

- What impacts will we face in Quebec?
- What vulnerabilities do we have?
- How can we adapt to increase our resilience?

What about Quebec specifically?

- What impacts will we face in Quebec?
- What vulnerabilities do we have?
- How can we adapt to increase our resilience?

Montreal was ill-prepared for spring flooding, city report shows

Outdated flood maps, emergency vehicles that were unusable because they had low floors, no inventory of city equipment and materials, not enough inspectors to check flooded homes, and a 911 system inundated with calls because the city help line went down for four hours.

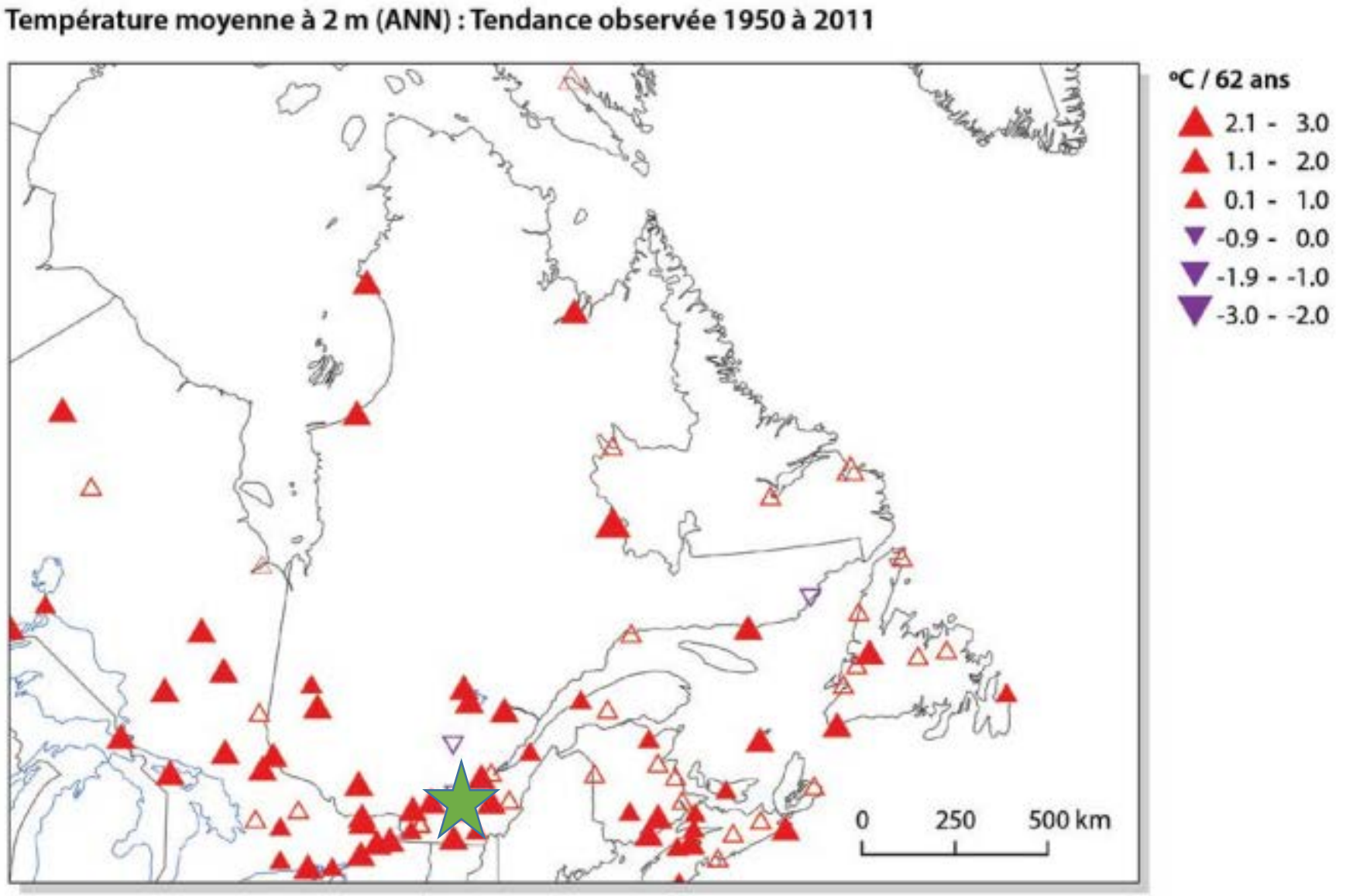
Researchers say spring flooding is a reality of climate change

UQAM researchers Ursule Boyer-Villemaire and Philippe Gachon say spring flooding is a reality of climate change. The two look to Europe for positive examples of how to counter the effects.

Aéroports de Montréal spending $6 million on new snow equipment for Trudeau airport

'Major fluctuations in winter weather conditions are forcing us to review our ways of doing things'

Quebec Context: Temperature



- Average temperatures in Quebec have increased 1°C – 3°C since 1950 (depends on where in QC)

Quebec Context: Temperature

HIGHER AVERAGE TEMPERATURES

Extented summer season

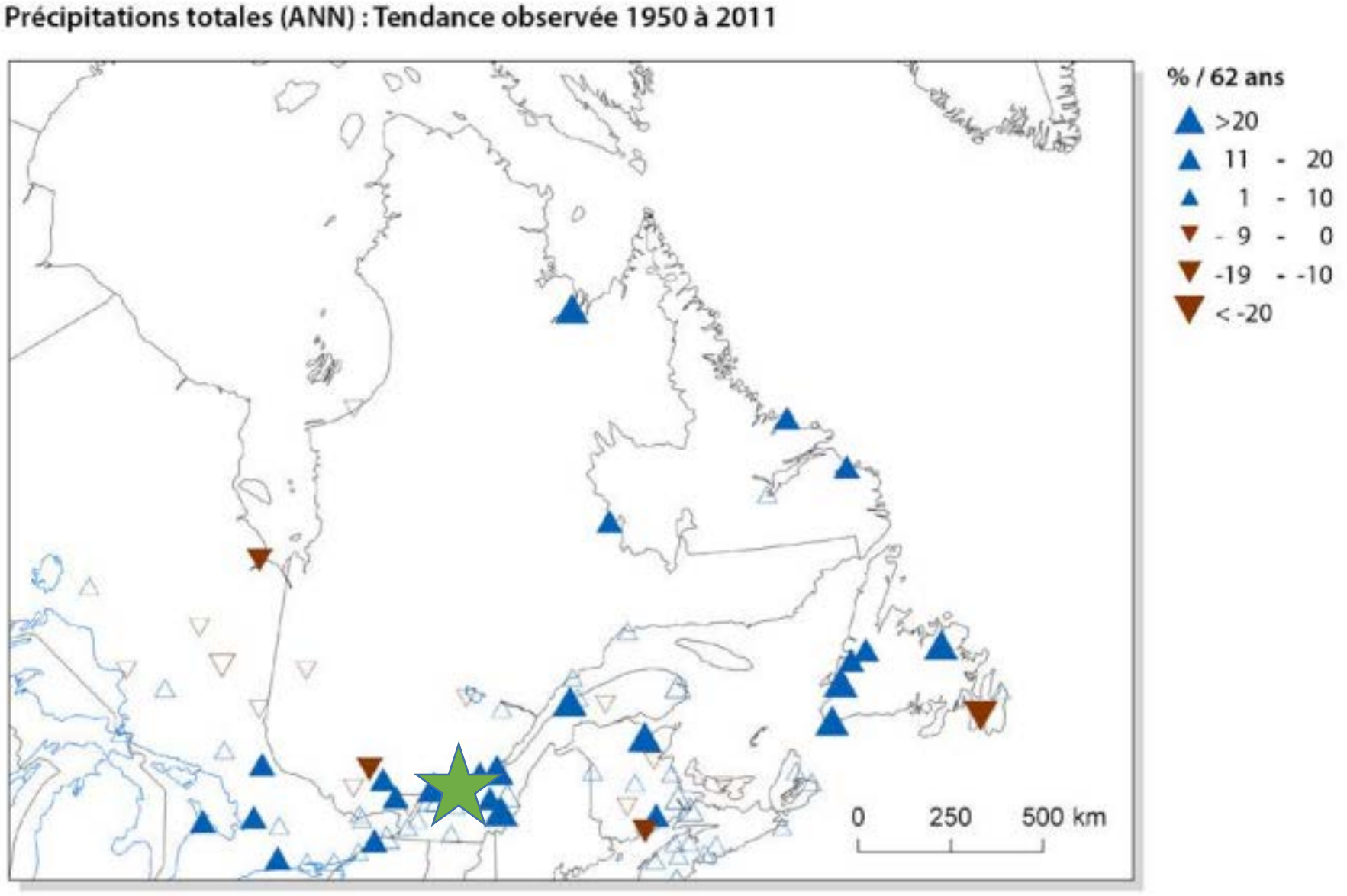
↘ freeze-up and snowy periods

↗ number of freeze-thaw cycles

HEAT WAVES

↗ frequency and length

Quebec Context: Precipitation



- Spring and fall rainfall has increased in Southern QC since 1950

Quebec Context: Precipitation

↗ frequency and intensity

↗ frequency of heavy snowfalls

↗ frequency of freezing rain

↗ spring river floods occurring earlier in the year

Quebec Context: Health

NUMBER OF REPORTED CASES OF LYME DISEASE AND WEST NILE FEVER CAUSED BY THE WEST NILE VIRUS (WNV) IN QUÉBEC SINCE 2002

PERIOD	NUMBER OF CASES REPORTED	
	Lyme disease*	West Nile fever**
2002 – 2003	Info not available	Approx. twenty per year
2004 – 2010	< 15 per year	< 5 per year
2011	32	42
2012	43	132
2013	141	32

- Longer pollen season + ↑ air pollution from forest fires = ↑ allergy, respiratory and cardiovascular problems
- ↑ health impacts due to heat waves and urban heat islands
- Myriad of risks from increase in frequency and severity of extreme weather events
- Arrival/expansion of harmful species (e.g. ticks, WNV)

What factors influence resilience?

Factors related to VULNERABILITY and CAPACITY FOR ADAPTATION

- Scope and availability of resources (information, materials, experts)
- Citizen engagement & knowledge
- Type & involvement of governing bodies
- Economic status
- Geography and ecological context
- Demographics of population (e.g. age, living arrangements)
- Level of redundancy (roads/transit routes, resources, public institutions)

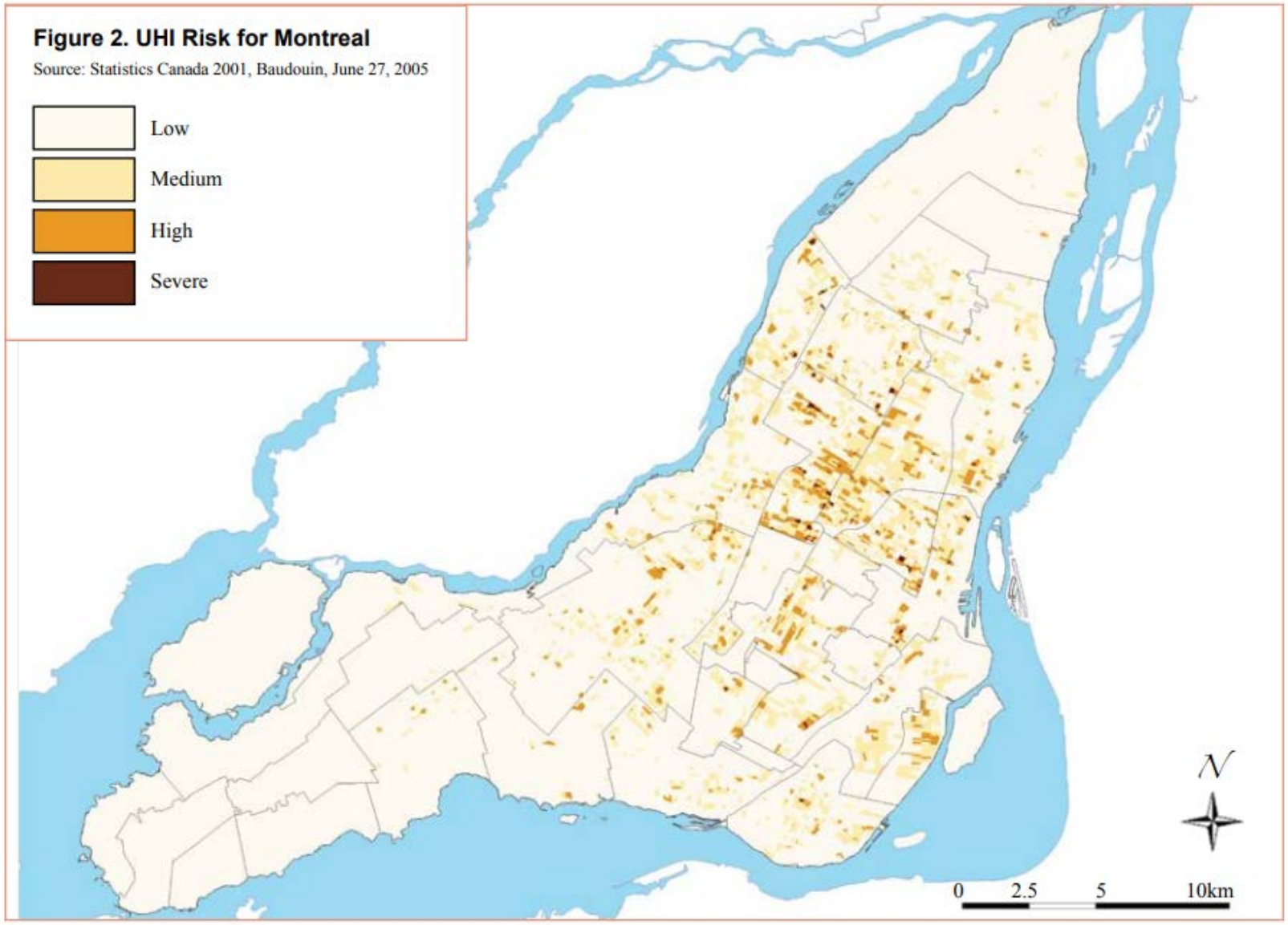
Montreal and Urban Heat Islands

Hazard

Temperature

+

THE RISK MAP



Neighbourhood Vulnerabilities: Activity

Which **vulnerabilities and impacts apply to our specific neighbourhoods**? Please follow these instructions – requires some movement!

1. Find your neighbourhood/region on the next slide.
2. Note which impacts it is vulnerable to (there will be 1 – 3).
3. Write your neighbourhood on a sticky note, one per vulnerability
4. Stick the sticky note(s) onto the relevant poster(s) (e.g. Storms)
    1. If your neighbourhood is listed but says “low” next to it: place your sticky note on the “Low Vulnerability” poster
    2. If your neighbourhood isn’t listed: place your sticky note on the “Unknown Vulnerability” poster
5. If you have time, head to the **“What Montreal Climate Resilience Looks like to Me”** posters and add a few words or a sentence.

Find borough: http://ville.montreal.qc.ca click “Borough” + enter postal code

- Ahuntsic-Cartierville: floods, heavy rains
- Anjou: urban heat islands
- Baie d’Urfe/Beaconsfield: floods
- Brossard/La Prairie: heat waves
- CDN/NDG: drought, heavy rains
- Cote-Saint-Luc/Hampstead: heavy rains
- DDO/Kirkland: floods
- Dorval: urban heat islands, floods
- Ile-Bizard/Saint-Genevieve: floods
- Lachine: low
- LaSalle: heat waves, drought
- Laval: urban heat islands
- Longueuil: urban heat islands
- Montreal Est: low
- Montreal Nord: heat waves, floods
- Montreal Ouest: low
- Mont Royal/Plateau/Ville Marie: urban heat islands, storms, heavy rains
- Mercier-HoMa: heat waves, urban heat islands
- Notre-Dame-de-l’Ile Perrot: floods
- Outremont: urban heat islands
- Parc Ex-Villeray-Saint M: storms, heavy rains, heat waves
- Pierrefonds-Roxboro: floods
- Pointe-Claire: floods
- Riviere-des-Prairies-Pointe-aux-Trem: floods
- Rosemont-La Petite P: heavy rains, urban heat island
- St-Anne-de-Bellevue/Senneville: floods
- Saint-Leonard: heavy rains, heat waves
- Saint-Laurent: heavy rains
- Sud-Ouest: heavy rains, heat waves
- Verdun: heavy rains
- Westmount: low

Neighbourhood Vulnerabilities: Activity

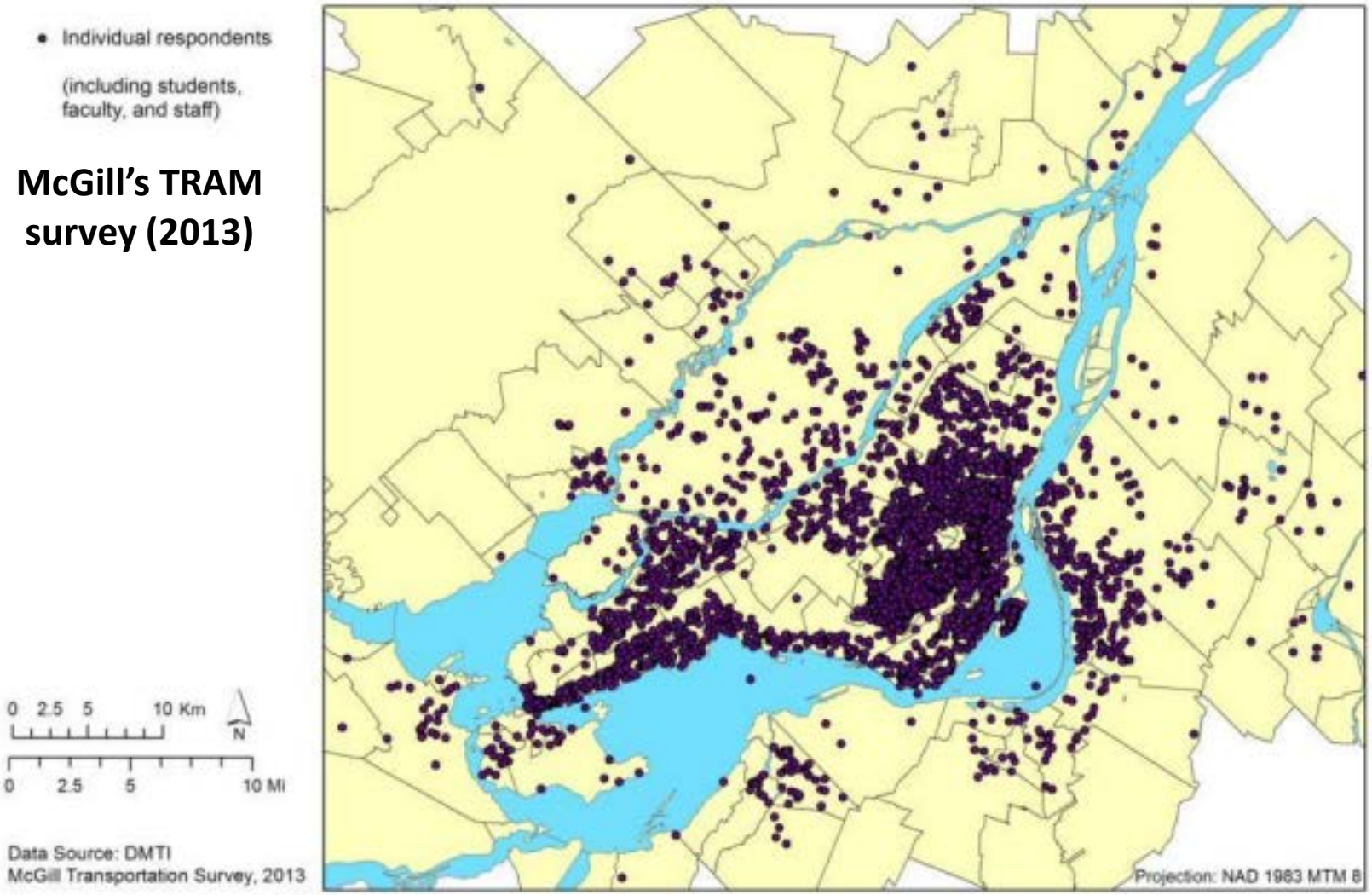


Figure 1: Spatial distribution of the home location of all survey respondents, including students, faculty and staff

- Do the stated vulnerabilities match your experience?
- How did this activity make you feel? What if your vulnerabilities were "low", or "unknown"?
- How can we use this info to inform adaptation strategies?

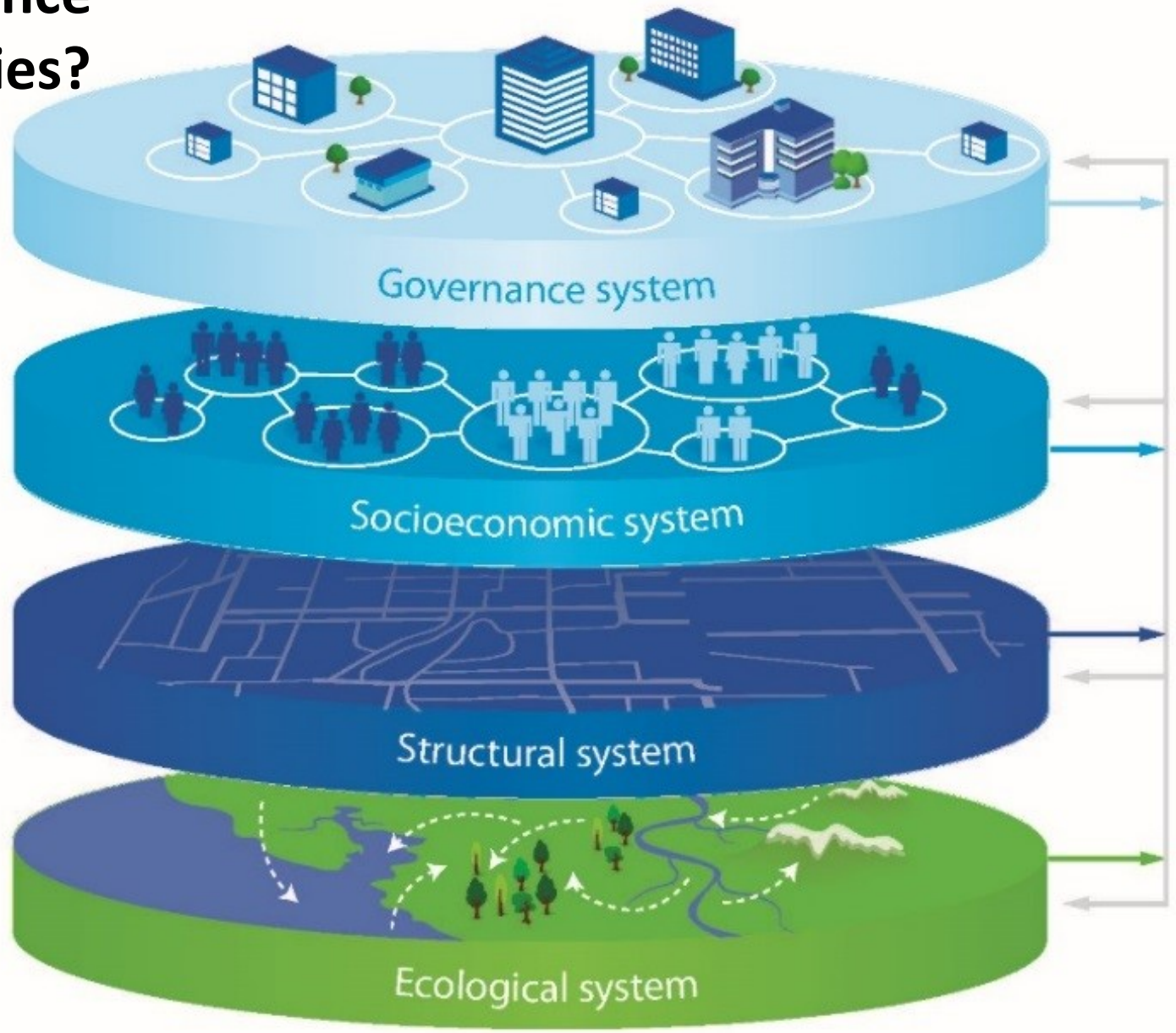
What are other examples of resilience strategies in each of these categories?

Governance: evacuation plans, land use zoning, facility relocation

Socio-econimic: early warning systems, community consultations

Structural: flood protection, sea walls/levees, porous pavement

Ecological: green roofs, wetland restoration, landscaping



1. **Governance**
2. **Structural**
3. **Social**
4. **Ecological**

Montreal Adaptation + Resilience Actions

HIGHER AVERAGE TEMPERATURES

- Protect biodiversity
- Increase infrastructures' resilience to the freeze-thaw cycle
- Adapt the slate of winter recreational activities and maintenance operations
- Broaden the slate of summer recreational activities and maintenance operations
- Control undesirable plant species

HEAVY RAINFALLS

- Harvest rainwater
- Increase infrastructures' and buildings' resilience to runoff water
- Minimize sealed surfaces
- Ensure the capacity of stormwater and combined sewer systems
- Increase and preserve tree and plant cover
- Develop emergency measures for heavy rainfalls

1. **Governance**
2. **Structural**
3. **Social**
4. **Ecological**

Montreal Adaptation + Resilience Actions

DESTRUCTIVE STORMS

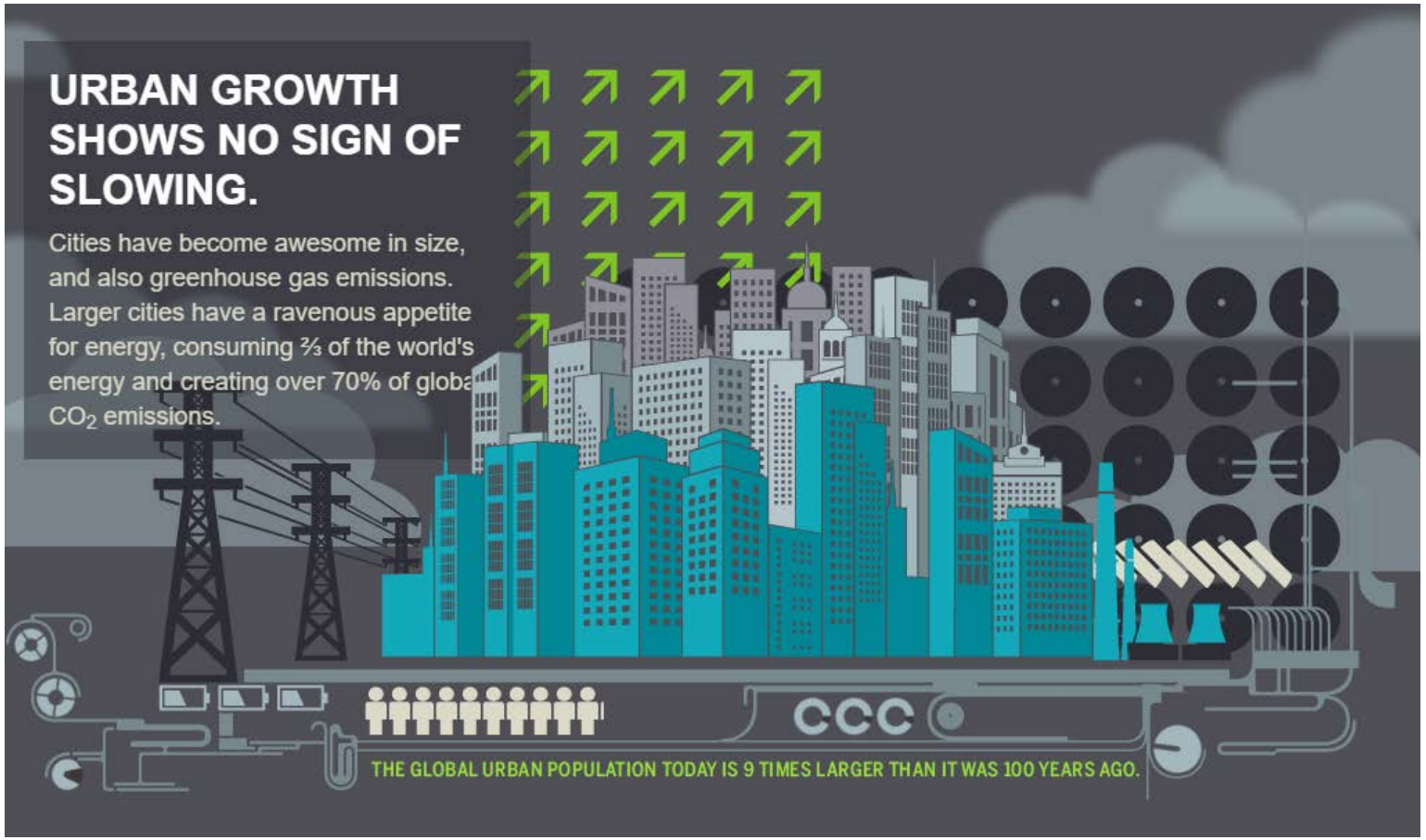
- Increase infrastructures' and buildings' resilience to wind and freezing rain
- Develop emergency measures in case of prolonged power outage (winter conditions)
- Increase plants' resilience to wind and freezing rain

RIVER FLOODS

- Increase infrastructures' and buildings' resilience to river floods
- Develop emergency measures for flood-prone areas
- Increase the stability of river banks facing erosion

Emerging Trends in Climate Resilience

1. Emphasis on individual and community-level knowledge and action
2. Cities are at the forefront!
3. Importance of natural or “green” infrastructure
4. Climate adaptation and resilience concerns will transform development



Climate Resilience: Resources + Action

Understanding your impacts and vulnerabilities

- Global Footprint Calculator; "Oroeco" app
- *"Climate change adaptation plan for the Montreal Urban Agglomeration"* (2017)
- Ouranos' *"Towards Adaptation"* (2015)
- C40 Cities Climate Leadership Group
- **Phone apps:** Seafood Watch & HowGood (sust food), iHuerting (urban gardening), JoinIn (community engagement)
- McGill lectures – e.g. Trottier Symposium Climate Resilience April 4th and 5th

Taking action in your everyday life, at work and in your community!

- UN's *"Lazy Person's Guide to Saving the World"*
- **At home:** resilient landscaping, increased tree cover + green roofs, urban ag, smart meters, rainwater harvesting, shop local, get insurance
- **In your neighbourhood/city:** ask for a risk + adaptation plan/updated flood maps, join community organizations, inquire whether climate risk factored into emergency plans
- **At McGill:** Sustainable Workplace Certification, Sustainable Events Certification, SPF, Staff Sust. Network

THANK YOU

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