Healthy Design .City

Putting environmental equity on the map

September 22| 2022

Jeff Brook, Dany Doiron and Eleanor Setton,
HealthyDesign.City co-Directors

Credit: Getty Images/iStockphoto

Presentation objective and overview

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Presentation objective:

Provide an overview of the HealthyDesign.City project and the HealthyPlan.City tool

Presentation overview:

- Environmental health equity and the built environment
- HealthyDesign.City project
- HealthyPlan.City tool: current release
- HealthyPlan.City and HealthyPlace.City tools: fall release
- Future developments

Environmental equity and the Built Environment

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"The way communities are planned and built, and the services and resources provided within them, directly influence people's physical, mental, and social health.

A commitment to health equity means planning communities to support the health of all community members including low income families, children, older adults, newcomers, Indigenous groups, and people living with physical or mental health challenges."

British Columbia Centre for Disease Control (2016). *Health equity and the built environment: Scoping review*

Through an equity lens

BC Centre for Disease Control

Environmental equity in Canadian Cities

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2021 Heat Dome: Significantly higher risk of heat-related death in lower socio-economic status and low greenness Vancouver area neighbourhoods

There are heat islands in 73% of Montreal's neighbourhoods with the lowest socio-economic status, compared with only 20% in Montréal neighbourhoods with the highest socio-economic status.

"5 per cent of the total population are living in low income households which are also situated in areas with low transit accessibility[…] This totals nearly one million people who are at risk of transport poverty nation-wide"

Environmental equity legislation in North America

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

BILL C-226 - National Strategy Respecting Environmental Racism and Environmental Justice Act

> The Minister must develop a national strategy to promote efforts across Canada to advance environmental justice and to assess, prevent and address environmental racism.

First reading: February 2, 2022

S.2630 - Environmental Justice Act of 2021

> This bill requires agencies to address and mitigate the disproportionate impact of environmental and human health hazards on communities of color, indigenous communities, and low-income communities resulting from agencies' programs and policies.

Introduced in Senate: May 8, 2021

New Canadian-specific evidence in urban environmental health

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CANUE

From 2017 to 2022 ... > 300 Data requests ... > 125 scientific publications

20 MSc and PhD theses

Environment-health association studies

Urban greenness and mortality in Canada's largest cities: a national cohort study

THE LANCET Planetary Health

Dan L Crouse, Lauren Pinault, Adele Balram, Perry Hystad, Paul A Peters, Hong Chen, Aaron van Donkelaar, Randall V Martin, Richard Ménard,

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Ambient air pollution and incidence of early-onset paediatric type 1 diabetes: A retrospective population-based cohort study

Michael Elten[a,b], Jessy Donelle[c], Isac Lima[c], Richard T. Burnett[d], Scott Weichenthal[b,e],

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Greenspace access does not correspond to nature exposure: Measures of urban natural space with implications for health research

Ingrid Jarvis[a,*], Sarah Gergel[a], Mieke Koehoorn[b], Matilda van den Bosch[a,b]

[a] Department of Forest and Conservation Sciences, The University of British Columbia, Canada
[b] School of Population and Public Health, The University of British Columbia, Canada

CrossMark

Early life exposure to air pollution and incidence of childhood asthma, allergic rhinitis and eczema

Teresa To[1,2,3], Jingqin Zhu[1,3], Dave Stieb[4], Natasha Gray[3], Ivy Fong[3], Lauren Pinault[5], Michael Jerrett[6], Alain Robichaud[7], Richard Ménard[7], Aaron van Donkelaar[8,9], Randall V. Martin[8,9,10], Perry Hystad[11],

Environmental Health

RESEARCH Open Access

Low concentrations of fine particle air pollution and mortality in the Canadian Community Health Survey cohort

Tanya Christidis[1*], Anders C. Erickson[2], Amanda J. Pappin[1,3], Daniel L. Crouse[4], Lauren L. Pinault[4], Scott A. Weichenthal[4,5], Jeffrey R. Brook[6,12], Aaron van Donkelaar[7,11], Perry Hystad[8], Randall V. Martin[7,11], Michael Tjepkema[9], Richard T. Burnett[10] and Michael Brauer[2]

Environmental Health

RESEARCH Open Access

Road proximity, air pollution, noise, green space and neurologic disease incidence: a population-based cohort study

Weiran Yuchi, Hind Sbihi, Hugh Davies, Lillian Tamburic and Michael Brauer*

Environment International

journal homepage: www.elsevier.com/locate/envint

Complex relationships between greenness, air pollution, and mortality in a population-based Canadian cohort*

Dan L. Crouse[a,b,c,*], Lauren Pinault[c], Adele Balram[b], Michael Brauer[d], Richard T. Burnett[c], Randall V. Martin[c,d], Aaron van Donkelaar[c], Paul J. Villeneuve[b], Scott Weichenthal[e]

Environmental equity research

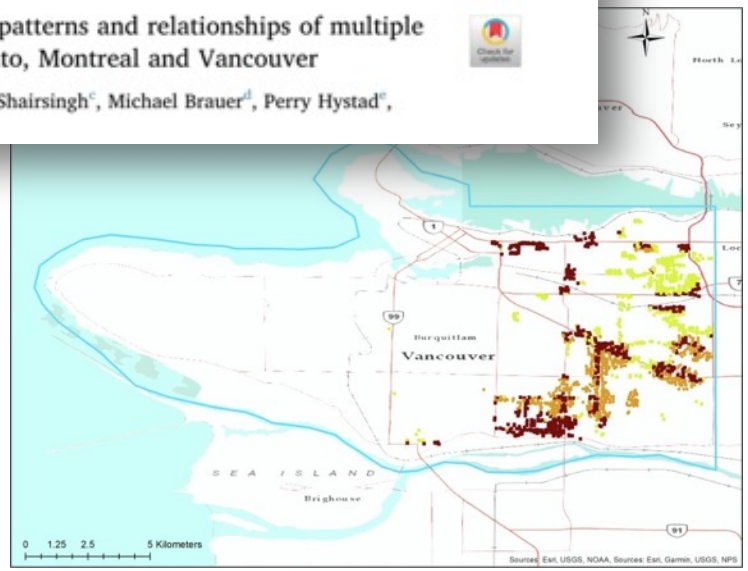
Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Healthy built environment: Spatial patterns and relationships of multiple exposures and deprivation in Toronto, Montreal and Vancouver

Dany Doiron[a,*], Eleanor M. Setton[b], Kerolyn Shairsingh[c], Michael Brauer[d], Perry Hystad[e], Nancy A. Ross[f], Jeffrey R. Brook[c,g]



ORIGIN OF HealthyDesign.City: CANUE environmental equity research

Environment International 143 (2020) 106003

Contents lists available at ScienceDirect

Environment International

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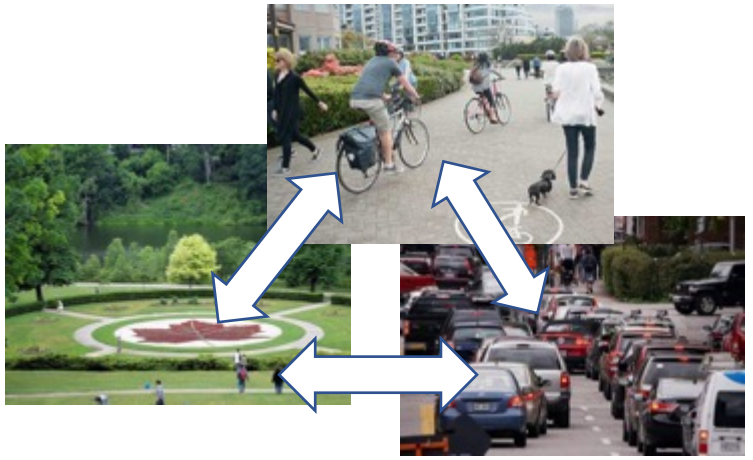
Dany Doiron[a,*], Eleanor M. Setton[b], Kerolyn Shairsingh[c], Michael Brauer[d], Perry Hystad[e], Nancy A. Ross[f], Jeffrey R. Brook[c,g]

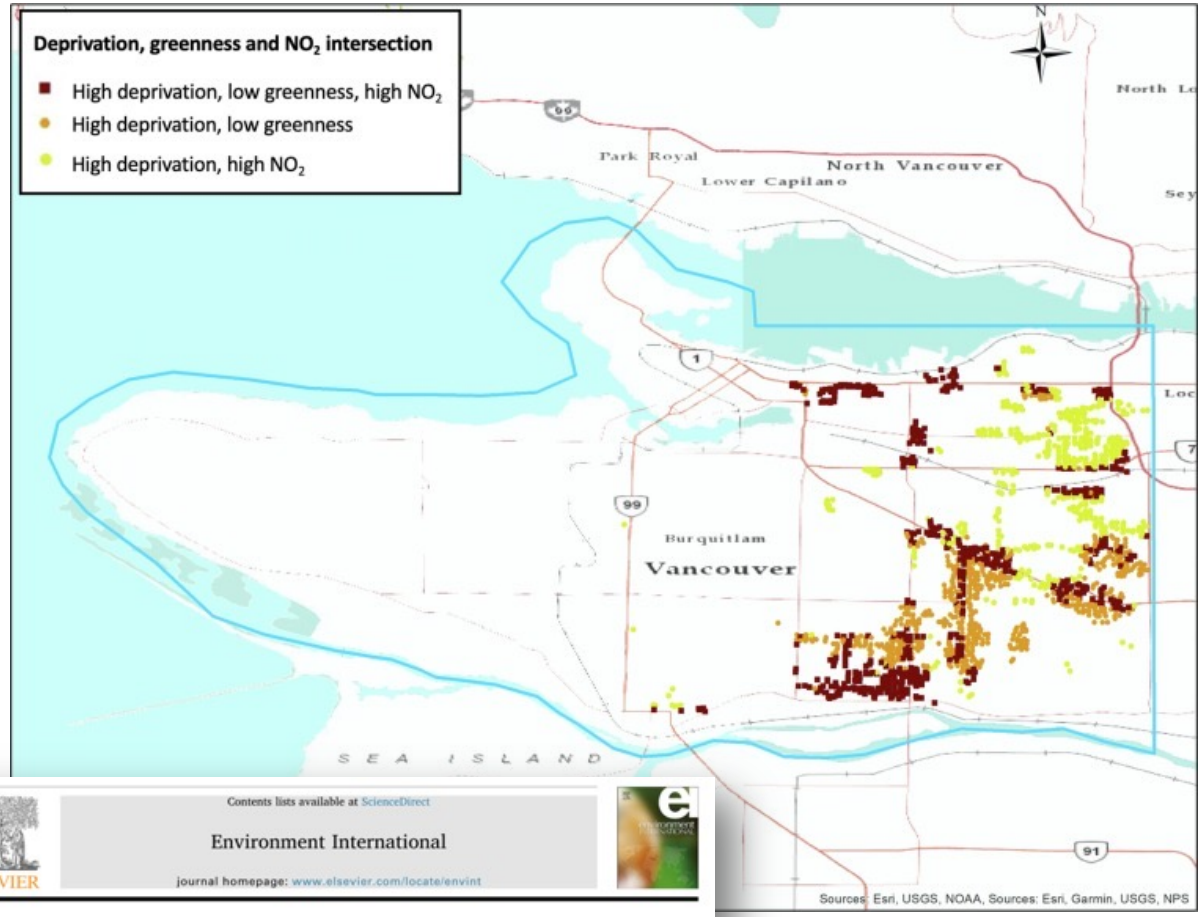


Toronto

Montreal

Vancouver

ORIGIN OF HealthyDesign.City: CANUE environmental equity research



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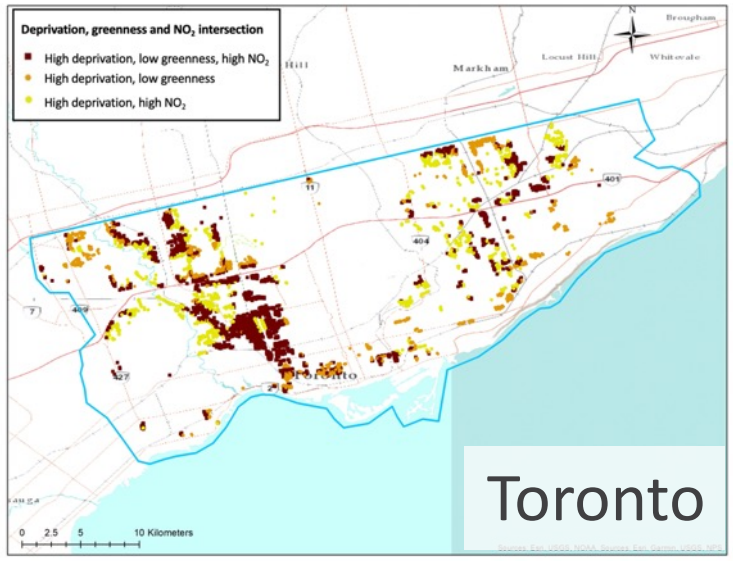
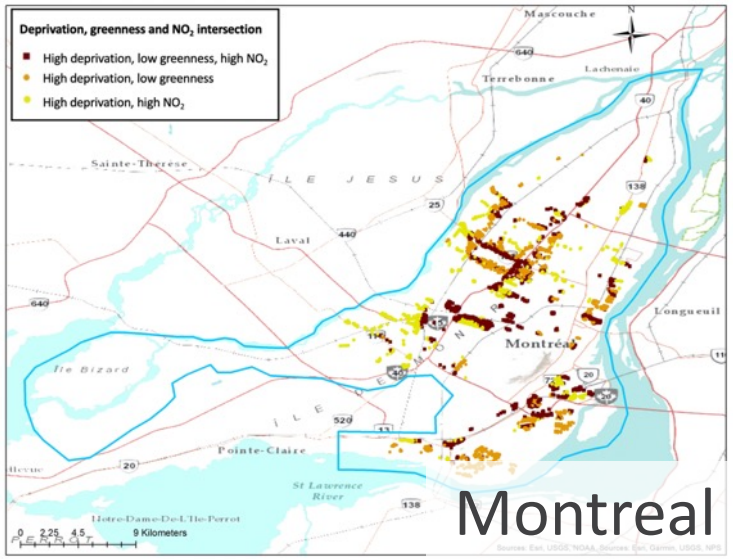
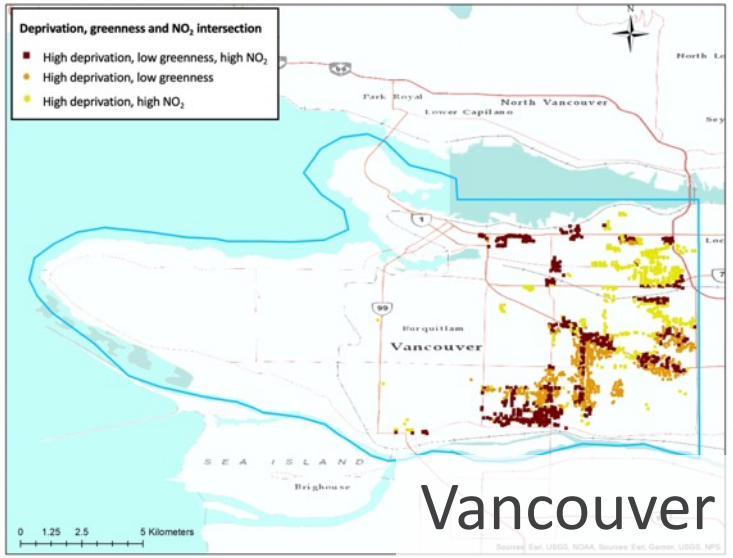
This maps shows postal code locations characterized by:

- High material deprivation AND high NO_2 (yellow)
- High material deprivation AND low greenness (orange)
- High material deprivation AND high NO_2 AND low greenness (red)

ORIGIN OF HealthyDesign.City: CANUE environmental equity research



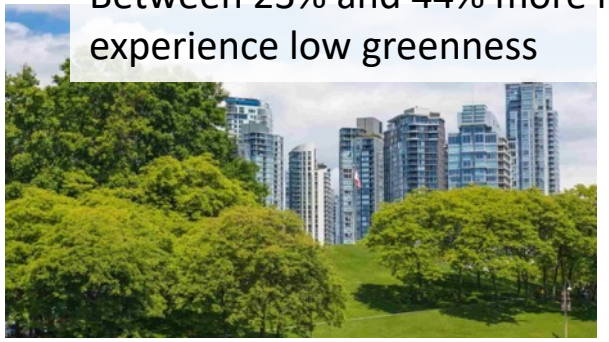




In Canada's 3 largest cities, high deprivation areas:

~50% lower prevalence of highly walkable areas

Between 38% (Toronto) and 23% (Vancouver) more likely to experience high air pollution



Between 23% and 44% more likely to experience low greenness

ORIGIN OF HealthyDesign.City: CANUE environmental equity research

Urban planners, public health professionals, advocacy groups and decision makers can leverage CANUE data to inform policies and programs.

HealthyDesign.City: leveraging CANUE data for “actionable” tools

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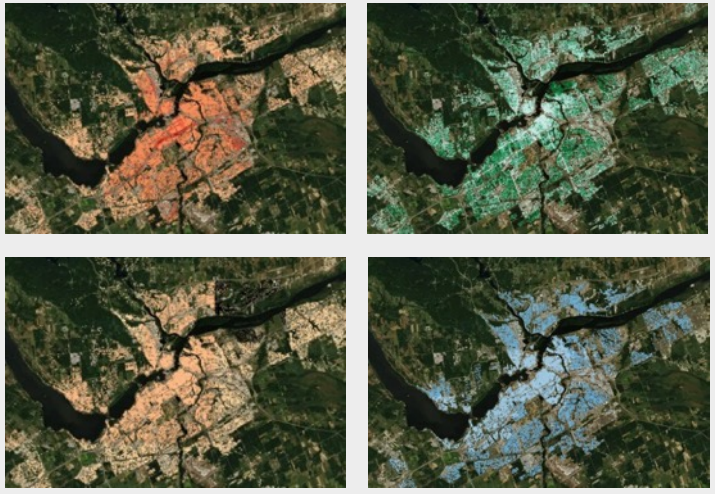
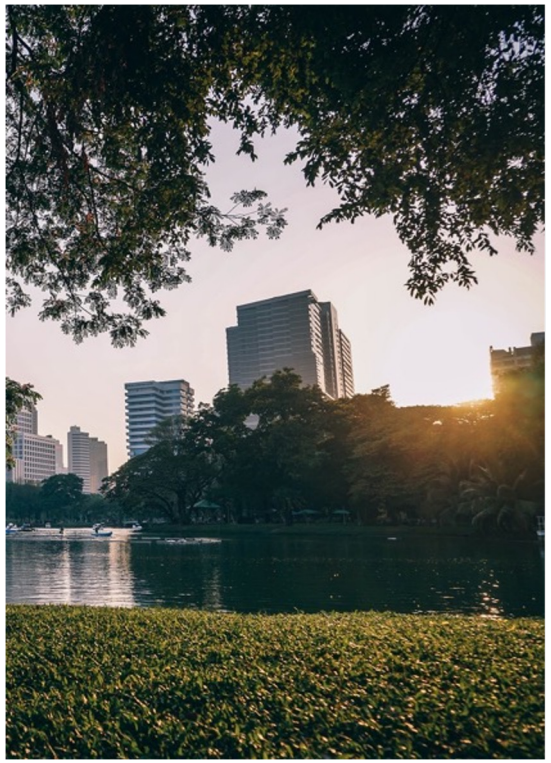
CANUE

Nationally-standardized datasets



More info: www.canue.ca
Data holdings: www.canuedata.ca



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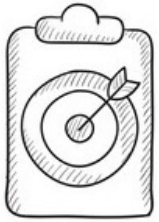
TOOLS THAT SUPPORT AN EQUITABLE AND HEALTHY BUILT ENVIRONMENT

Supported by:

Public Health Agency of Canada
Agence de la santé publique du Canada

Enhanced Surveillance for Chronic Disease Program (ESCDP)

HealthyDesign.City: Goals



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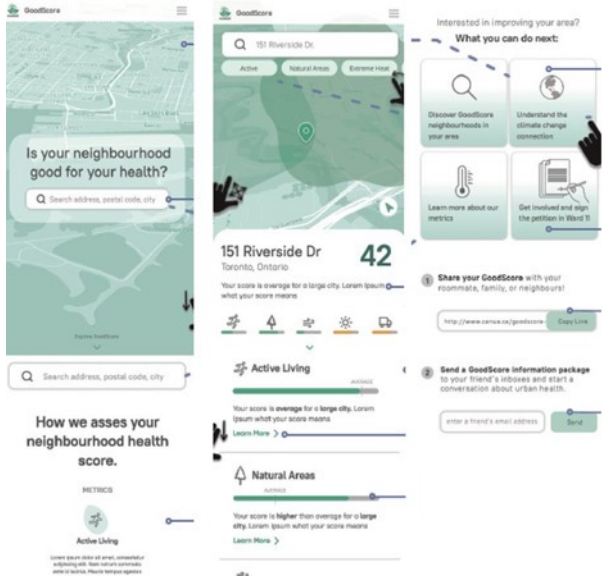
Map and visualise health relevant environmental factors to:

- **Monitor environmental** exposures over time and geography
- **Identifying locations where environmental inequity** exists
- **Support an equity focussed decision-making processes**
- Enable **policy and urban design intervention evaluation**
- **Empower communities** and **facilitate advocacy**
- **Increase public understanding** and awareness of built environment exposure and climate change vulnerabilities

HealthyDesign.City: Two tools

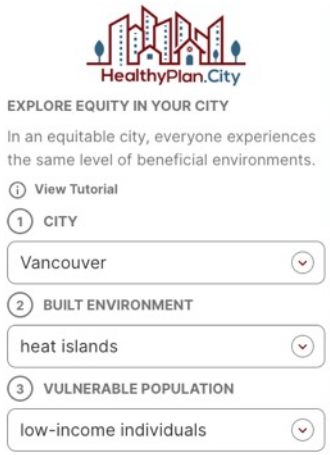
HealthyPlace.City

- **Aim:** Communication, public engagement, awareness
- **Audience:** Community organizations, members of the public, planners/public health professionals



HealthyPlan.City

- **Aim:** Analysis and reporting tool with a focus on equity
- **Audience:** Public health professionals, urban planners, community advocates, decision maker



HealthyPlan.City: First Release on July 13th, 2022 - partnership with CBC/Radio-Canada

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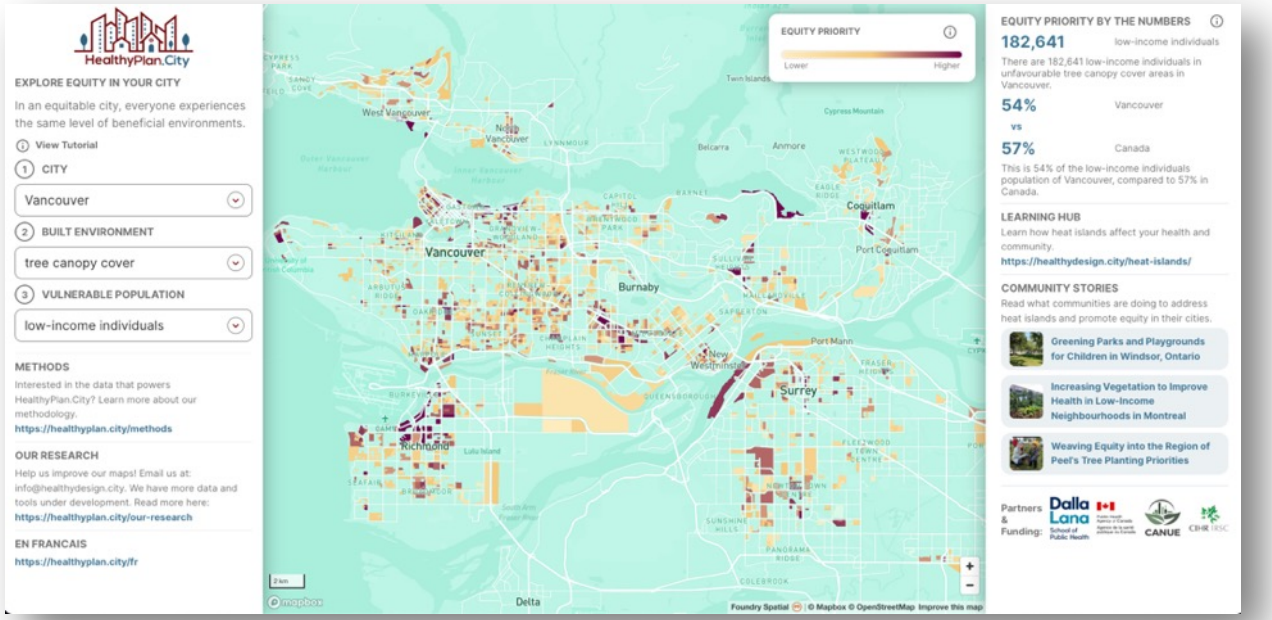
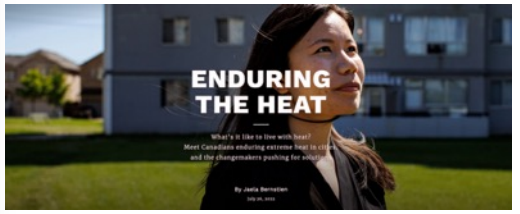
Focused on heat risk inequity:

- **Built environment factors:**
  - Land surface temperature
  - Tree canopy cover
- **Vulnerable populations:**
  - Children
  - Older adults
  - Low-income individuals
  - Visible minority individuals
  - Individuals living alone



CBC Radio-Canada



HealthyPlan.City

EXPLORE EQUITY IN YOUR CITY

In an equitable city, everyone experiences the same level of beneficial environments.

View Tutorial

1 CITY

Vancouver

2 BUILT ENVIRONMENT

tree canopy cover

3 VULNERABLE POPULATION

visible minority individuals

METHODS

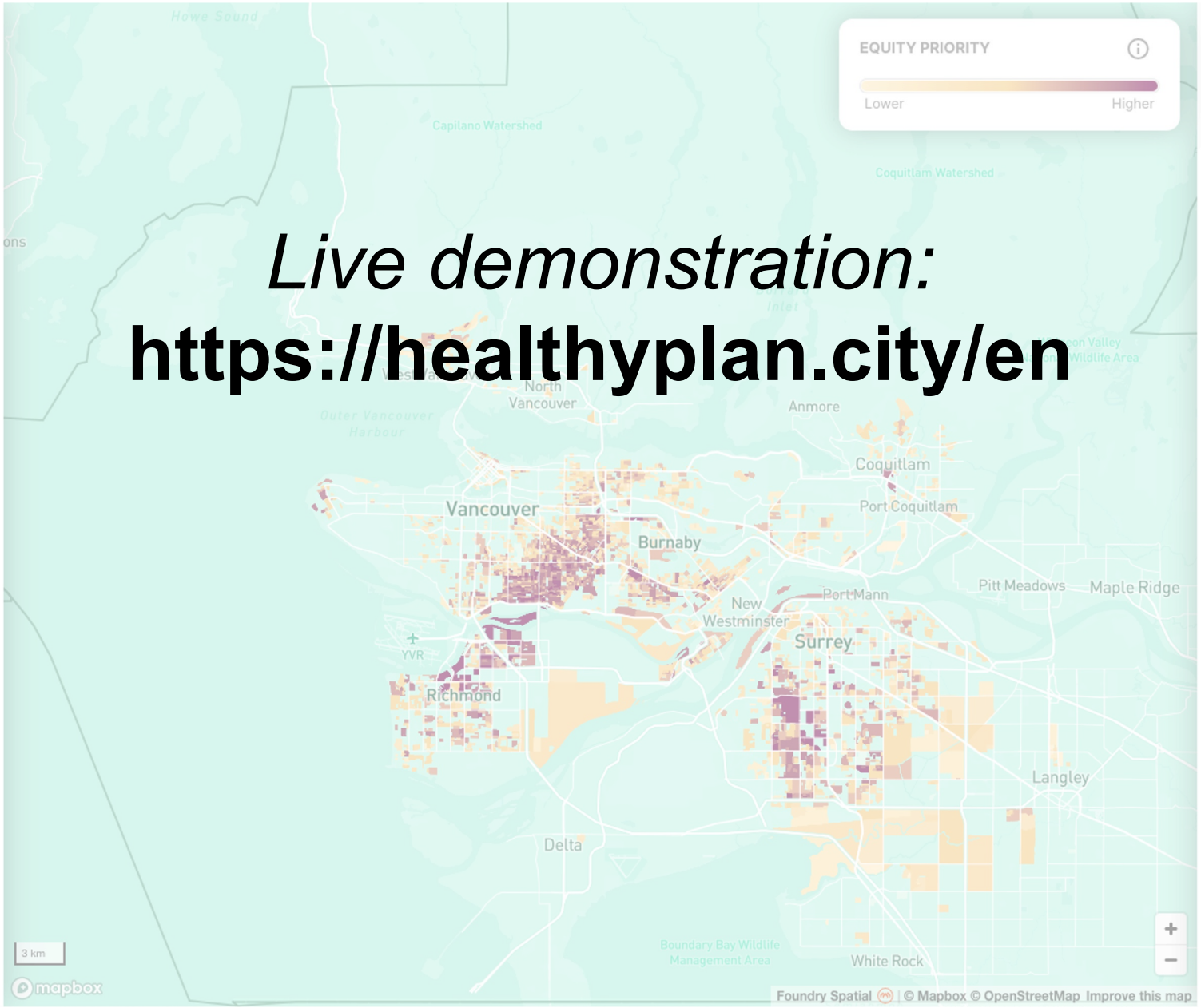
Interested in the data that powers HealthyPlan.City? Learn more about our methodology.
https://healthyplan.city/methods

OUR RESEARCH

Help us improve our maps! Email us at: info@healthydesign.city. We have more data and tools under development. Read more here:
https://healthyplan.city/our-research

EN FRANCAIS

https://healthyplan.city/fr



Live demonstration:

https://healthyplan.city/en

EQUITY PRIORITY BY THE NUMBERS

646,883 visible minority individuals

There are 646,883 visible minority individuals in unfavourable tree canopy cover areas in Vancouver.

55% Vancouver

vs

62% Canada

This is 55% of the visible minority individuals population of Vancouver, compared to 62% in Canada.

LEARNING HUB

Learn how heat islands affect your health and community.
https://healthydesign.city/heat-islands/

COMMUNITY STORIES

Read what communities are doing to address heat islands and promote equity in their cities.

Greening Parks and Playgrounds for Children in Windsor, Ontario

Increasing Vegetation to Improve Health in Low-Income Neighbourhoods in Montreal

Weaving Equity into the Region of Peel's Tree Planting Priorities

Partners & Funding: Dalla Lana School of Public Health · Public Health Agency of Canada / Agence de la santé publique du Canada · CANUE · CIHR IRSC

Data and Methods

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Built environment data

Land Surface Temperature

- Average land surface temperature from May - September 2019
- Derived from LandSat 8 satellite data in Google Earth Engine

Tree Canopy Cover

- Percentage of tree canopy cover in 2015
- Derived from Landsat Vegetation Continuous Fields (VCF) tree cover layer in Google Earth Engine

Vulnerable populations data

2016 CENSUS · RECENSEMENT

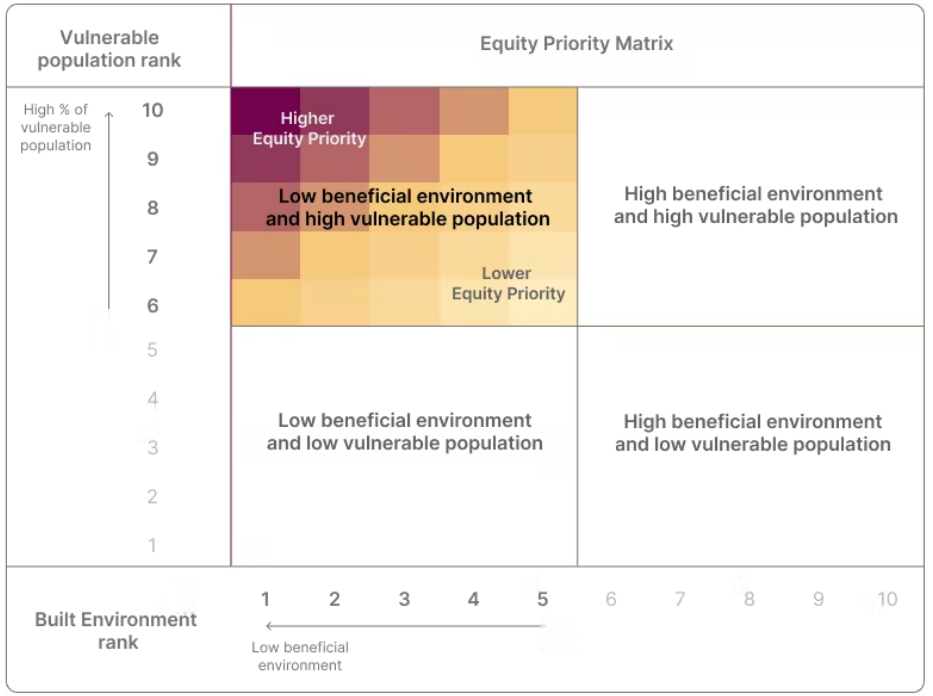
Dissemination area data downscaled to dissemination block

- **Children**: % pop. under 15 y/o
- **Older adults**: % pop. over 64 y/o
- **Low-income individuals**: % pop. under low-income threshold
- **Visible minority individuals**: % of pop. that identify as visible minority
- **Individuals living alone**: % pop who live alone

Equity calculation

"Equity priority" areas have higher than median proportion of vulnerable populations and lower than median levels of beneficial environments

- Each factor ranked as deciles (1 to 10) within a city
- Equity Priority are dissemination blocks with:
  - vulnerable population ranks > 5 AND
  - built environment ranks < 6



Strengths and limitations

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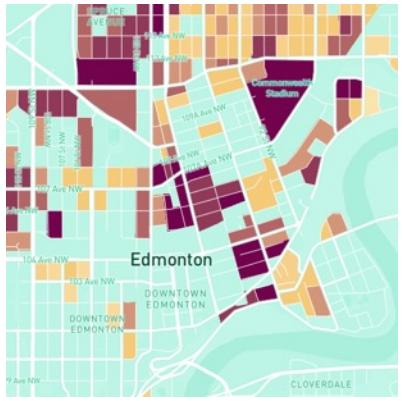
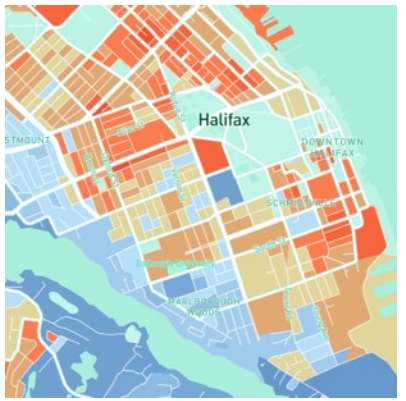
Strengths

- Simple, nationally-consistent data
- Evolving tool
- Built to be adaptable to local contexts
- Freely available

Limitations

- Based upon surrogates that are not “ground-truthed”
- Potentially not as accurate as locally available data
- Equity analyses in smaller cities limited given small variation
- Vulnerable populations broadly defined (for now)





Improving the tools through user engagement

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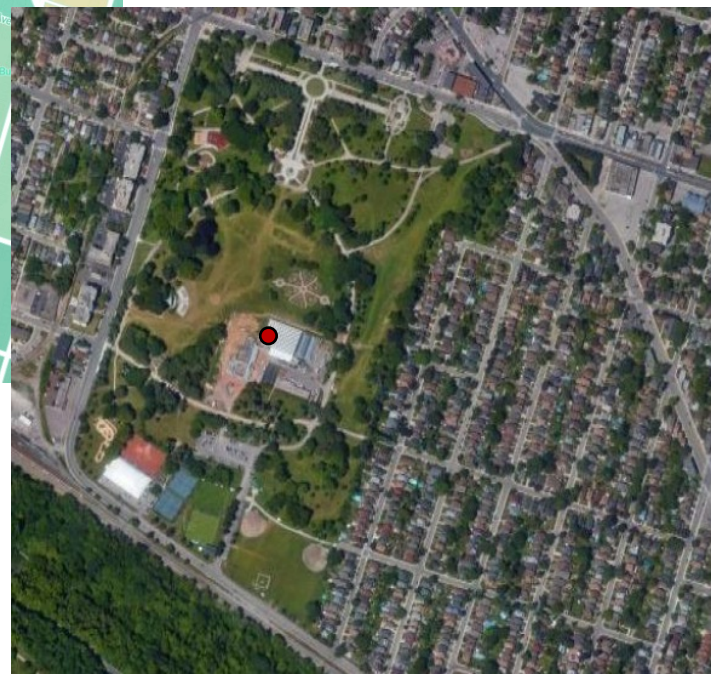
Example: Gage park in Hamilton

Low tree canopy

High tree canopy



HealthyDesign.City: Future data

Healthy Design .City

Built Environment factors

Urban climate

- Land surface temperature
- Tree canopy

Community Amenities

Diversity of destinations/services:

- Transit stops
- Education and culture
- Retail and services
- Healthy food outlets
- Cycling infrastructure

Parks and Recreation

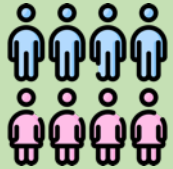
Infrastructure that promotes physical activity:

- Large greenspaces
- Urban parks
- Indoor recreation

Air and noise pollution

- Traffic-related pollution
- Noise pollution

Demographic factors



Vulnerable Populations

- Under 15
- Over 65
- Low-Income
- Visible minority
- Living alone

HealthyDesign.City: Future developments / Tailored applications

Healthy Design .City

Healthy Design .City

Vulnerability and Equity

Intersect demographic factors to better identify vulnerable populations

For example:
Low income seniors

CLIMATE RISKS: Wildfire smoke

Health Canada

BC Centre for Disease Control

UBC

First Nations Health Authority

CLIMATE RISKS: Flooding

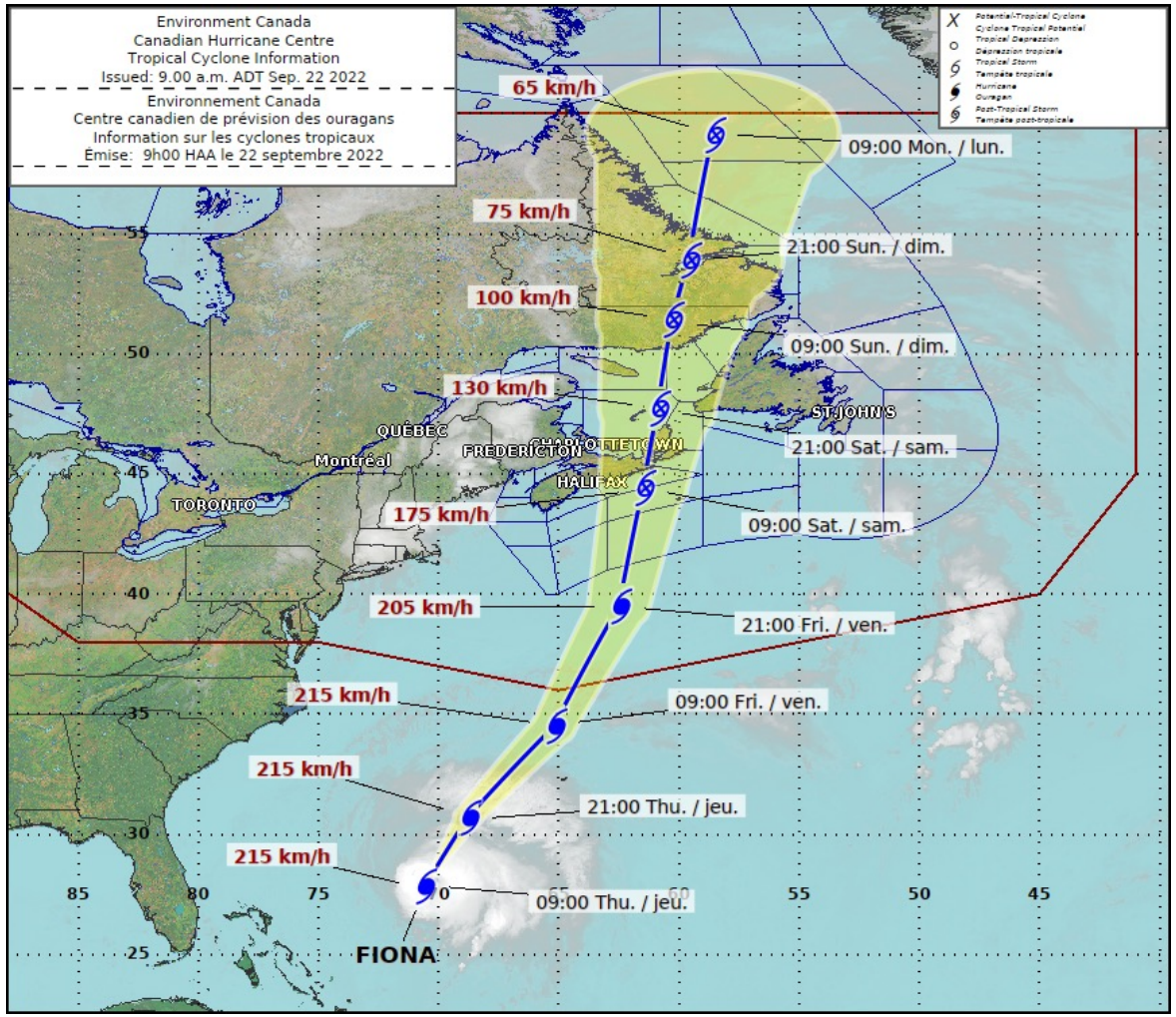
Rain pounds Montreal area, causing flooding and road closures

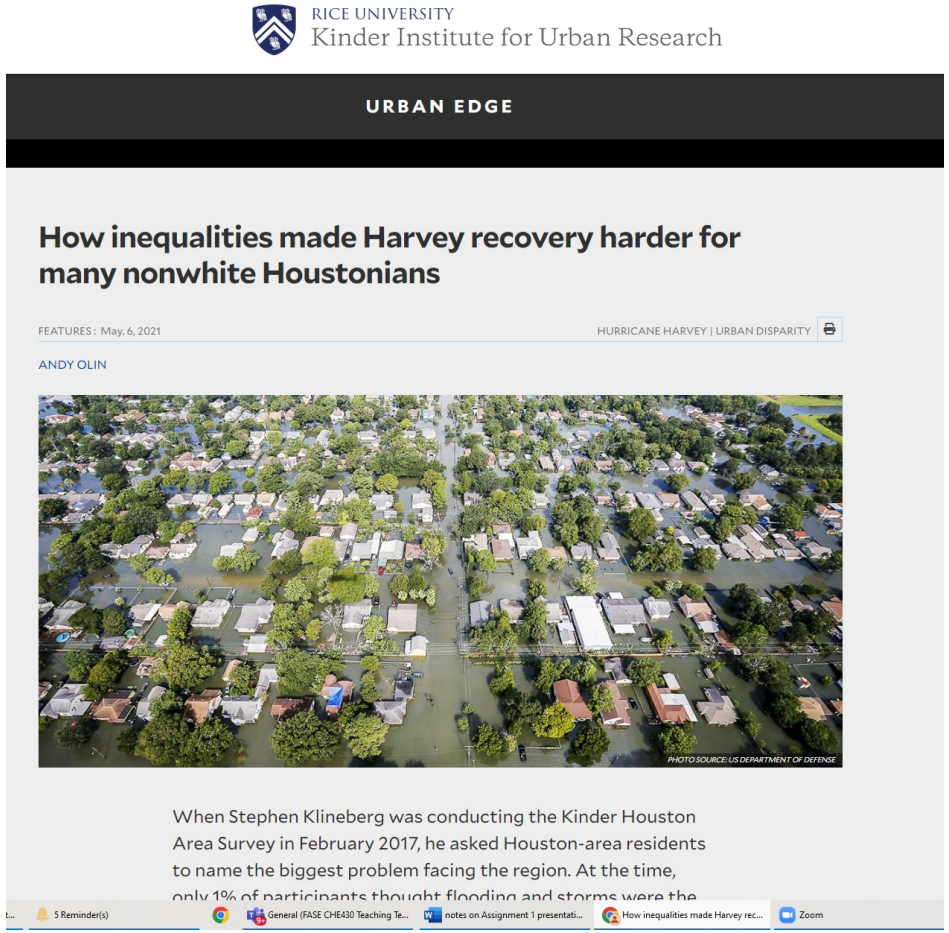
Nearly 60 mm of rain fell on downtown by 7 p.m., according to Environment and Climate Change Canada

Verity Stevenson · CBC News · Posted: Sep 13, 2022 7:48 PM ET | Last Updated: September 14

September 13, 2022

HealthyDesign.City: Future developments / Tailored applications





SUSTAINABLE DEVELOPMENT GOALS

CANUE

Accelerating Canadian research that motivates progress on **sustainable cities**

SUSTAINABLE DEVELOPMENT GOALS

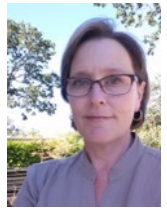
Healthy Design .City

Accelerates **solution-oriented work** by democratizing data and targeting environmental equity

Questions

HealthyDesign.City/CANUE team

Jeffrey Brook, University of Toronto
HealthyDesign.City Co-Director
CANUE Scientific Director



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Natalia Calijorne, University of Toronto
Administrative assistant

Funding from:

CIHR IRSC
Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

Public Health Agency of Canada
Agence de la santé publique du Canada

More information:

HealthyDesign.City: www.healthydesign.city
HealthyPlan.City tool: https://healthyplan.city
CANUE : www.canue.ca
CANUE data portal: www.canuedata.ca
TEDx: https://www.youtube.com/watch?v=sDOklHvbdmQ