



The Samuel Centre for Social Connectedness

Social Connectedness Fellowship Application

Research Project #6 - Data-Driven EnviroLab

The Social Connectedness Fellowship provides students and recent graduates with the opportunity to carry out research, writing, analysis, and outreach related to overcoming social isolation and building social connectedness. Fellows are paired with partner organizations that work to build belonging and social inclusion across a variety of thematic areas—climate change, disability and older people’s rights, refugee integration, inclusive education, placemaking and urban design, and much more.

Project Details:

Partner: [Data-Driven EnviroLab](#) (Data-Driven Lab), a research group that seeks to create solutions to environmental challenges using cutting edge data analytics.

Location of Fellow: Remote

Project Description:

Are you interested in exploring urban sustainability at the intersection of social inclusion and climate action?

The [Urban Environment and Social Inclusion Index](#) (UESI) is a research effort that aims to provide the data that urban residents, city managers, and policymakers need to understand their cities’ performance on critical urban environmental issues. Incorporating novel geospatial approaches, including remotely-sensed data and open source datasets (such as OpenStreetMap), the Index spatially maps environmental performance in over 160 cities, and reveals how these cities perform on sustainable inclusive urban growth.



The framework focuses on quantifying progress on the environmental dimensions of the United Nations Sustainable Development Goal 11, which aims to make cities inclusive, safe, resilient, and sustainable. It captures the spatial and socio-economic distribution of air pollution, urban heat island effects, urban tree cover, and public transportation access, amongst other environmental measures. This research aims to demonstrate the potential for innovative datasets to provide near real-time assessment of environmental performance in a replicable and scalable manner. Furthermore, the UESI highlights knowledge gaps and identifies research priorities that could help cities build an evidence-based approach to enhance the equity of urban environmental performance.

During the next phase of the UESI, there will be work to add more cities to the Index; to add several more indicators to the Index; to provide a more in-depth profile of these cities; and to feature more case studies and multimedia content that ground the Index in concrete examples, with a particular emphasis on the synergies and interactions between social inclusion and urban environmental performance.

This year, a Fellow can work on one of two projects:

- 1) Full-value supply chain urban climate impacts: One area that the UESI will consider in its next phase is developing metrics that evaluate the full value chain urban climate emissions, particularly consumption-based emissions. As cities become increasingly integrated and their environmental footprints expand beyond their immediate boundaries, the importance of consumption-based, indirect, and supply-chain emissions is increasing. However, cities are only beginning to account for these critical emission sources. The work of DDL and The Fellow may build upon existing literature and other work in the fields of materials-based consumption quantification¹

¹ E.g., Wiedmann, T. O., Schandl, H., Lenzen, M., Moran, D., Suh, S., West, J., & Kanemoto, K. (2015). The material footprint of nations. *Proceedings of the National Academy of Sciences*, 112(20), 6271–6276.
<https://doi.org/10.1073/pnas.1220362110>



or downscaling of planetary boundaries,² for example, to design indicators or develop extended case studies to help the UESI dive into the inequality dimensions and social inclusion implications related to urban growth.

- 2) Air pollution-islands - rural-urban air pollution gradients: More than 95 percent of the global population breathes unsafe air, primarily in urban areas. Existing satellite remote sensing data has contributed breakthrough advances in providing global estimates of air pollution exposure, although the spatial resolution is still inadequate to distinguish intra-urban variability. A previous SCSC Fellow worked with Data-Driven Lab to scope the possibility for quantifying an “air pollution island effect” as a way to assess rural-urban differences in air pollution. The Fellow would work with DDL’s data science team to further this methodology and implement preliminary analyses for the UESI cities.

While not required, candidates who have a background in computer science and are interested in practical programming experience can assist with a range of tasks, from big data mining to development of front-end data visualizations and graphics. In the past, we’ve had programmers help build databases, scrape public data sources, and develop machine learning models. The Fellow would share their experiences and insights, and if applicable, any analyses and visualizations on the UESI blog and/or in case study boxes featured as part of the report. To focus on these types of projects, experience with statistical programming language – particularly R – is strongly preferred.

Wackernagel, M., Kitzes, J., Moran, D., Goldfinger, S., & Thomas, M. (2006). The Ecological Footprint of cities and regions: Comparing resource availability with resource demand. *Environment and Urbanization*, 18(1), 103–112. <https://doi.org/10.1177/0956247806063978>

² Hachaichi, M., & Baouni, T. (2020). Downscaling the planetary boundaries (Pbs) framework to city scale-level: De-risking MENA region’s environment future. *Environmental and Sustainability Indicators*, 5, 100023. <https://doi.org/10.1016/j.indic.2020.100023>



Previous projects from DDL Fellows have included explorations of the [Urban Heat Island effect in Montreal](#), [Inclusive Air Monitoring strategies for Urban Areas](#), and the [role of Public Transit systems in inclusive cities](#).

Key Deliverables:

1. Research memo and data collection to contribute to new indicators for the UESI, which will focus on carbon emissions or air pollution
2. Two blog articles, with multimedia (e.g., video or photography) components
3. A community engagement component (ex. survey, interactive webpage)
4. A more quantitatively-inclined Fellow can contribute to data analysis, web programming and visualization

Key Skills/Competencies Required:

- Background in environmental studies, statistics, computer science or a related field.
- Strong qualitative (and preferably quantitative) research and writing skills.
- Able to work independently and with remote team members.
- Excellent time management skills.
- Experience with statistical programming language – particularly R - is an asset.

How to Apply:

All applicants must fill out the [Google Form application](#) by March 7, 2021 at 11:59 pm EST. Applicants can apply for 1 or 2 projects. In addition to answering the standardized questions, applicants must also answer a specific question or two for



each project that they are interested in. Specific question(s) for Research Project #6 - Data-Driven EnviroLab:

1. Please share a short description of your background and interest in urban sustainability and inclusion. (Required, max 250 words)
2. If you are interested in focusing on the computer science or data analysis elements of this project, please share a brief description of your programming or coding experience, and links to any work samples you would like to share (i.e., a GitHub page). (Optional, max 200 words)