

# Mohamed Hachaichi (Ph.D)

**Researcher with a strong background in linear algebra, statistics, science and programming.**

[ [Personal website](#) ] . [ [Twitter](#) ] . [ [LinkedIn](#) ] . [ [Google Scholar](#) ] .

hachaichi\_mohamed@outlook.com . (+33) 635 549 103

*I am a Postdoctoral Researcher at the Institute of Urbanism and Geography Alpes (IUGA) at Grenoble Alpes University. I hold a Ph.D. in circular urban metabolism and climate change delivered by the laboratory of "Cities, Urbanism and Sustainable development" at the Polytechnic school of Architecture and Urbanism (Algiers-Algeria).*

*Currently interested in designing a rapid whole system change on a global scale using new relevant sustainability metrics in a data-driven approach coupled with Artificial Intelligence (AI) algorithms. I Aim to clearly identify social tipping points using behavioral mechanisms and pattern recognition to find structure in chaotic social/economic/urban environments.*

## Academic referees

- **Prof. Sebastien Bourdin:** sbourdin@em-normandie.fr: Professor of Economic Geography at EM Normandy Business School, Economy, Territories & Sustainable Development Department (Caen, France)
- **Dr. Jafaru Egeiya:** jafaruegieya@gmail.com: Postdoctoral researcher at Stellenbosch University (Cape Town, South Africa)

## Experience

**Post doctoral fellowship, [Institut of Urbanism and Geography Alps](#)** (10/2022 - 10/2023, Grenoble, France)

- Territorial systems' resilience:
- Ecological metabolism is composed of two entries: (i) Input section includes water, raw materials inputs, and energy. (ii) Output includes carbon emissions (CO2), waste water, and solid wastes.
- Affluence flux.
- Governance structure.

**Assistant Researcher, [EM Normandie Business School](#)** (11/2021 - 07/2022, Caen, France)

- Collecting, cleaning & harmonizing COVID-19-related data:
- Explaining the spatial diffusion of the COVID-19 across EU regions (spatial econometrics models).
- Explain why some regions were severely hit by the virus and others were not.

**Center Manager, [Stellenbosch University](#)** (2011 - 2012, Cape Town, South Africa)

- CoT's WFE nexus model: a six-way perspective (compromising population, agriculture, water, energy, economy, and climate). The model uses a system dynamics framework. To predict water availability at the catchment areas, precipitation was predicted using 17 climate parameters through 3 climate

scenarios using a downscaling process of Global Climate Models (GCM), and then after we used the downscaled data into a PCNN model using a Transfer-Learning approach.

- Climate change - water scarcity - droughts

## Teaching

**University lecturer, [Institut of Urbanism and Geography Alps](#)** (03/2023 - 04/2023, Grenoble, France)

- Giving a series of lectures at the department of urbanism of "Voirie et espace public"
- Creating exercises and correct them.
- Grading students

**University teacher, [Polytechnic School of Architecture and Urbanism](#)** (11/2021 - 07/2022, Algiers, Algeria)

- Teaching classes with 25 students, subject: 3D modularization using Revit and 3Dmax
- Prepare and correct exams
- Perform 3D modeling for complex buildings and shapes
- Participate in my lab work of Cities, urbanism, and Sustainable Development: accompany Master candidates, international conferences, writing papers.

## Education

**Ph.D. diploma in Circular urban Metabolism and Climate Change** (10/2016 - 03/2021)

- Carbon carrying capacity
- Coursework in physics, engineering, and statistics.

**MS.s diploma in Architecture and Urban Project** (2008 - 2011)

- Master's degree: A student level, (ranked 3rd out of 183 students).

## Internship

Potsdam Institute for climate impact research Research domain IV: [Transdisciplinary Concepts & Methods](#)

## Skills

**Programming:** Python, SQL, R, Fortran, git, HTML/CSS, Pytorch, TensorFlow **Mapping:** ArcGis, Qgis, Mapinfo (+ R & Python for spatial data science) **Graphic design:** Photoshop, Inkscape, InDesign, Illustrator

## Languages

- Amazigh: read, speak, write.
- Arabic: read, speak, write.
- French: read, speak, write.
- English: read, speak, write.
- Deutsch: read, speak, write.

## Side-Projects

### \*Geosis (2022-present)

- A python package for advanced geographic analysis (geoparsing, network analysis, community detection, and spatial mapping).

### \*Englighten (2022-present)

- An online podcast with researchers, politics, and practitioners across the globe. The main topics includes: Sustainability, Artificial Intelligence, climate change, human-nature interactions, and mankind-machine nexus.

## Publications

- Hachaichi, M. (2023). Unpacking the urban virtual water of the Global South: Lessons from 181 cities. *Ecological Economics*, 210, 107859.
- Hachaichi, M. & Bourdin, S. (2023) "Wheels within wheels: Mapping the genealogy of circular economy using Machine Learning"
- Egieya, J. M.A. Amidu, Hachaichi, M. (2023) "Small modular reactors: An assessment of workforce requirements and operating costs"
- Hachaichi, M., & Egieya, J. (2023). "Water-Food-Energy Nexus in Global Cities: Addressing Complex Urban Interdependencies"
- Hachaichi, M. (2022). "Cities: Allocating climate change responsibilities at planetary scale"
- Hachaichi, M. (2022) -preprint-. "Reshaping modern urban models with the global environmental ceiling: What, When How, and Why?"
- Hachaichi, M. and Baouni, T., (2021). "Virtual carbon emissions in the big cities of middle-income countries". *Urban Climate*, 40, p.100986
- Mohamed H, Tahar B, (2020), "Downscaling the planetary boundaries (Pbs) to city scale-level: De-risking MENA region's environment future". *Environmental and Sustainability Indicators*, Elsevier
- Mohamed H, Jan K, Tahar B, (2020), "Evaluating city carbon Carrying capacity: How many people can Algiers support?". *Algerian Journal of environmental science and technology*
- Mohamed H, Tahar B, (2019), "The carbon footprint model as a plea for cities towards energy transition: The case of Algiers, Algeria". *International Journal of Energy and Environmental Engineering*

## Scientific reports (technical reports)

- Territorial impacts of COVID-19 and policy answers in European regions and cities

## Scientific conferences

- International Colloquium, 2017, Batna-Algeria, Prefiguring and designing the architectural and urban landscape from the perspective of a sustainable quality of the city of the future of the Mediterranean

countries, "Carbon carrying capacity at the service of urban planning, the case of Algiers urban ecosystem".

- International Colloquium, 2017, Batna-Algeria, Prefiguring and designing the architectural and urban landscape from the perspective of a sustainable quality of the city of the future of the Mediterranean countries, " Resilient landscape for man and nature, the case of the Bainem-Algiers forest ecosystem".
- International Colloquium, 2019, Rome-Italy, Green Urbanism III, "Algiers urban model from vulnerability to resiliency: Shifting the development patterns using the carbon footprint model".
- Global Conference on Economic Geography (GCOEG), Machine Learning Meets Economic Geography: Alternative Data and Methods for Mapping and Analysing Geographies of Knowledge Production and Knowledge Relations, 2022, Dublin-Ireland, "Wheels within wheels, tracking the gleam of the circular economy using machine learning".
- 5th international conference on technologies & business models for circular economy, 2022, University of Maribor Press, "Urban Water-Food-Energy Interdependences: Solving Urban Challenges Together", Mohamed Hachaichi, Jafaru Musa Egieya, Neill Goosen.
- Dimitrie Cantemir International Geographical Conference – ESPON TERRCOV Workshop, 2022, Iasi-Romania, "The spread of the COVID-19 pandemic in Europe - changing spatiotemporal patterns of pandemic indicators". Andris Igari, Mohamed Hachaichi.

## Seminars

- Universitat Autònoma de Barcelona, Facultat Economia i Empresa, Departament Economia Aplicada, "COVID-19 in European regions: Explaining disparities", 2022, Sébastien Bourdin, Mohamed Hachaichi.
- Universitat Autònoma de Barcelona, Facultat Economia i Empresa, Departament Economia Aplicada, "Territorial impacts of COVID-19 pandemic on EU regions", 2022, Sébastien Bourdin, Mohamed Hachaichi.

## Organization committee member in scientific workshops

- International colloquium organized by the Cities, Urban Planning, and Sustainable Development Laboratory at EPAU "Citizen and inhabitant participation in social and urban development: Between 'good practices' and political slogan. Crossed views in the Algerian and international contexts", Algiers, 17-18 May 2017.
- Thematic day organized by the Ecole Polytechnique d'Architecture et d'Urbanisme (EPAU) "Use of new technologies of BIM in the process of documentation of the built environment", Algiers, 17-18 May 2017. Algerian Experiences" 06 Nov 2017.

## Reviewer

I'm a reviewer at the following journals:

- [Ecological Indicators Journal](#), Elsevier

- [Environment, Development and Sustainability](#), Springer-nature
- [Urban climate](#), Elsevier
- [Water resources managment](#), Springer