POPCLIMA (Grant agreement: 101002973)

Title: *Population Dynamics in a Changing Climate: Evidence, Impacts, and Future Projections*

Lecturers: Raya Muttarak with Itza Akari Olguín Zúñiga and Sirinya Kaikeaw
Dates: 27–28 May 2025
Location: Department of Statistics, Computer Science, Applications (DiSIA), University of Florence

Room 214, Centro Didattico Morgagni, Viale Giovanni Battista Morgagni 40, 50134 Florence

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Course synopsis

Climate change is no longer a distant or abstract threat – it is a pressing reality with far-reaching consequences for human populations. This short course explores the bidirectional relationship between climate change and population dynamics, considering that human populations are both contributors to and affected by environmental change.

In particular, the course will explore how climate change differentially impacts individuals and communities based on demographic and socioeconomic characteristics such as age, gender, education, and geographical locations. The course will examine empirical evidence on how and in which direction climate change affects the three key components of demographic change – fertility, mortality, and migration – that drive population dynamics. This approach will allow us

to assess the implications of climate change for future population structures, using both empirical evidence and demographic projections.

Through a combination of lectures, discussions, and hands-on data analysis, students will gain analytical tools and research insights relevant for understanding population dynamics under global climate change.

Course schedule

Day 1: 27 May 2025

Session 1 (10:00–13:00): Introduction to climate change and population research (Raya Muttarak)

- Introduction to key concepts, terminology, and scenarios in climate change research
- Overview of climate change impacts on human populations
- Differential vulnerability by demographic and socioeconomic groups

Format: Lecture and group discussion

Session 2 (14:00–17:00): Lecture and hands-on workshop: climate change and fertility (Itza Akari Olguín Zúñiga)

- Review of empirical evidence and mechanisms linking climate variability to fertility outcomes
- Introduction to relevant data sources
- Workshop: Data handling and analyses in R – Exploring the relationship between temperature extremes and fertility

Format: Short lecture combining with practical session with guided analysis

Day 2: 28 May 2025

Session 3 (10:00–13:00)
Climate change, mortality and migration (Raya Muttarak)

- Impact of climate change on health and mortality
- Impact of climate change on migration

Format: Lecture and group discussion

Session 4 (14:00–17:00)
Considering the impact of climate change on future population dynamics (Sirinya Kaikeaw)

- Overview of conventional methods for population projections

- Reflections on impacts of climate change on fertility, mortality and migration
- Approaches to incorporating climate impacts into population projections
- Example: population projections accounting for climate-induced changes in mortality

Format: Research presentation and open discussion

Selected Readings

Hoffmann, R., Andriano, L., Striessnig, E., Rüttenauer, T., Borderon, M., & Grace, K. (2024). Climate change and population: Demographic perspectives on the 21st century's defining challenge. *Vienna Yearbook of Population Research, 2024*. https://doi.org/10.1553/p-nfjc-z82h

Hunter, L. M., Gray, C., & Véron, J. (Eds.). (2022). *International Handbook of Population and Environment*. Springer.

Lutz, W., & Muttarak, R. (2017). *Forecasting societies' adaptive capacities through a demographic metabolism model*. *Nature Climate Change*, 7(3), 177–184.

Muttarak, R. (2021). *Demographic perspectives in research on global environmental change*. *Population Studies*, 75(sup1), 77–104.