

Unit 2.7 Inequality: How does inequality arise and persist in complex adaptive systems?

Rising inequality has emerged as a defining challenge of our era. After declining for much of the 20th century, within-country inequality has surged since 1980 in nearly all regions. Today, the richest 1% of the world's population owns nearly half of all global wealth, while the poorest half of humanity owns just 2%. This extreme inequality directly challenges the foundational vision of sustainable development—the commitment to equitable improvements in well-being both within and across generations.

Understanding the mechanisms that create and maintain inequality is essential for achieving the equity goals of sustainable development. Building on our analysis of actors, institutions, and power (Unit 2.6), we now examine how heterogeneity generates inequality among actors. Both theory and empirical evidence demonstrate that inequality is an emergent property of all complex adaptive systems. Even when everyone follows identical rules and starts with similar opportunities, inequality has a tendency to snowball—small differences in initial conditions compound through positive feedback loops such that wealth distributions become increasingly unequal over time.

Research identifies two key mechanisms that reinforce emergent inequalities. First, incumbent actors leverage their power across multiple dimensions—using resource control to compel others, shaping institutions to exclude challengers, and promoting narratives that naturalize hierarchy (as explored in Unit 2.6). This dynamic is intensified by what psychologists call social dominance orientation—some proportion of most populations actually prefer hierarchy to equality. Second, cultural processes reflect and reproduce inequality through narratives, norms, and beliefs that make existing distributions seem natural or inevitable. Together, these mechanisms transform what might begin as small, random differences into entrenched patterns of inequality that persist across generations. This unit explores how the heterogeneity of complex adaptive systems naturally tends toward unequal distributions and examines the self-reinforcing dynamics that make inequality so persistent. While the dynamics explored here reveal formidable challenges, Unit 3.2 examines capacities for promoting equity, including institutional reforms, social movements, and empowerment strategies that have successfully countered these self-reinforcing inequalities.

Preparation for class: To prepare for this unit, please:

- a) **Explore:** Hasell, J., Rohenkohl, B., Arriagada, P., Ortiz-Ospina, E., & Roser, M. (2023). Economic Inequality. *Our World in Data*. <https://ourworldindata.org/economic-inequality>
Interactive visualizations and analysis of how global income and wealth inequality have evolved over time.
- b) **Read and Explore:** Return to the NetLogo guide you first explored in Unit 2.2 on Stocks and Flows (i.e. Clark, W. C., & Harley, A. G. (2025). *NetLogo Guide for Sustainable Development Course*. Harvard University. (available in the Course Library). Review Section 1 “Basic access” and explore Section 5 “NetLogo wealth distribution model.”
- c) **Read:** Milanovic, B. (2024). The three eras of global inequality, 1820–2020 with the focus on the past thirty years. *World Development*, 177, 106516. <https://doi.org/10.1016/j.worlddev.2023.106516>
- d) **Read:** Scheffer, M., van Bavel, B., van de Leemput, I. A., & van Nes, E. H. (2017). Inequality in nature and society. *Proceedings of the National Academy of Sciences*, 114(50), 13154–13157. <https://doi.org/10.1073/pnas.1706412114>
Empirical evidence that inequality is a fundamental pattern in both natural and social systems.

Study Questions to help you get the most out of the readings:

- I. **Exploring Trends in Inequality:** Explore how inequality differs within versus between countries using the **Our World in Data** section on Economic Inequality (reading 'a'). What has happened to global inequality over the past 40 years when we look at individuals regardless of country? How does this differ from inequality trends within countries? What patterns surprise you?
- II. **Emergence from heterogeneity:** Exploring the NetLogo Wealth Distribution Exercise (reading 'b'), test at least two of the sources of heterogeneity presented there. How much does introducing those heterogeneities change the inequality of wealth distribution that is produced as an outcome of the model? (Think about outcomes in terms of the Gini Index). How much inequality emerges from small differences? What happens when you add inheritance? Explain how positive (reinforcing) feedback loops turn small initial differences into large inequalities. How might the simplified assumptions in this model differ from real-world dynamics where actors have varying degrees of power (as explored in Unit 2.6)?
- III. **Historical patterns:** What are the three major eras of global inequality Milanovic identifies in reading 'c'? How do his findings relate to what you observed in the *Our World in Data* visualizations? What forces drive the shift from declining to rising within-country inequality after 1980?
- IV. **Inequality as system property:** How does Scheffer et al.'s evidence from natural systems (reading 'd') help explain the patterns you observed in the NetLogo model? What does it mean that inequality appears across both natural and social systems for our efforts to promote equity?

Digging deeper (optional materials for further exploring frontiers in the pursuit of sustainability):

- e) **Read:** Milfont, T. L., Bain, P. G., Kashima, Y., Corral-Verdugo, V., Pasquali, C., Johansson, L.-O., Guan, Y., Gouveia, V. V., Garðarsdóttir, R. B., Doron, G., Bilewicz, M., Utsugi, A., Aragones, J. I., Steg, L., Soland, M., Park, J., Otto, S., Demarque, C., Wagner, C., ... Einarsdóttir, G. (2018). On the relation between social dominance orientation and environmentalism: A 25-nation study. *Social Psychological and Personality Science*, 9(7), 802–814. <https://doi.org/10.1177/1948550617722832>
Academic research showing that more unequal societies tend to value environmental protection less than more equal societies, revealing links between psychological preferences for hierarchy and sustainability challenges.
- f) **Read:** Bennett, H. (2017, November 2). Have psychologists found a better way to persuade people to save the planet? *The Guardian*. <https://www.theguardian.com/inequality/2017/nov/02/psychologists-better-way-persuade-people-to-save-planet-environment>
Accessible introduction to social dominance theory and its implications for sustainability.
- g) **Read:** Chancel, L. (2020). *Unsustainable inequalities: Social justice and the environment*. The Belknap Press of Harvard University Press.
Book-length analysis explicitly connecting inequality to environmental challenges and sustainability—showing how social and ecological inequalities reinforce each other.
- h) **Read:** Zucman, G. (2019). Global wealth inequality. *Annual Review of Economics*, 11(1), 109–138. <https://doi.org/10.1146/annurev-economics-080218-025852>
Accessible review article synthesizing research on wealth inequality patterns and mechanisms globally.