

# Geo-cultural Time: Advancing Human Societal Complexity Within Worldwide Constraint Bottlenecks—A Chronological/Helical Approach to Understanding Human-Planetary Interactions

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**Abstract**

The integration of feedbacks between Holocene planetary history and human development benefits from a change in perspective that focusses on socio-historical periods of stability separated by global-scale events, which we call foundational transitions or bottlenecks. Transitions are caused by social and/or astronomical and biogeophysical events such as volcanoes, changes in solar emissions, climate change such as sea-level/ice volume conditions, biogeochemical and ecological changes, and major social and technical innovations. We present a global-scale cultural chronology that accounts for major changes generated by such events in the late Pleistocene and Holocene. These changes are governed by transitions that make energy more or less available to human groups. The chronology is followed by methodologies to incorporate the innate, Malthusian-Darwinian human tendency to grow systems over time into a helical-feedback equation that provides for testing the hypothesis. A proof of concept test of these ideas using information system-based data from the Maya lowlands in conjunction with other civilizations suggests a troubled transition for the current worldwide economic system because of potentially catastrophic climate impacts and resource constraints on biogeophysical-social resilience in the face of obvious needs of the system to change to a more sustainable mode of acquiring energy. The Maya case implies that change is more likely to transpire because of planetary-scale disturbances/constraints in the Earth (human and planetary) system and will likely lead to strong social disruptions. There may be as many as 200 such case studies to test this idea worldwide. Our analysis suggests that a transition toward sustainability for the current energy dense globalized industrial society will be very difficult.

Read the article in [BioPhysical Economics and Resource Quality](#) [1].

**Associated Project:**

[If the past teaches, what does the future learn?](#) [2]

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