Environmental challenges are dynamically generated within the dominant global culture principally by the mismatch between short-time-scale market and political forces driving resource extraction/use and longer-time-scale accommodations of the Earth system to these changes. Increasing resource demand is leading to the development of two-way, nonlinear interactions between human societies and environmental systems that are becoming global in extent, either through globalized markets and other institutions or through coupling to global environmental systems such as climate. These trends are further intensified by dissipation-reducing technological advances in transactions, communication and transport, which suppress emergence of longer-time-scale economic and political levels of description and facilitate long-distance connections, and by predictive environmental modeling, which strengthens human connections to a short-time-scale virtual Earth, and weakens connections to the longer time scales of the actual Earth.

Environmental management seeks to steer fast scale economic and political interests of a coupled human-environmental system towards longer-time-scale consideration of benefits and costs by operating within the confines of the dominant culture using a linear, engineering-type connection to the system. Perhaps as evidenced by widespread inability to meaningfully address such global environmental challenges as climate change and soil degradation, nonlinear connections reduce the ability of managers to operate outside coupled human-environmental systems, decreasing their effectiveness in steering towards sustainable interactions and resulting in managers slaved to short-to-intermediate-term interests. In sum, the dynamics of the global coupled human-environmental system within the dominant culture precludes management for stable, sustainable pathways and promotes instability.

Environmental direct action, resistance taken from outside the dominant culture, as in protests, blockades and sabotage by indigenous peoples, workers, anarchists and other activist groups, increases dissipation within the coupled system over fast to intermediate scales and pushes for changes in the dominant culture that favor transition to a stable, sustainable attractor.

These dynamical relationships are illustrated and explored using a numerical model that simulates the short-, intermediate- and long-time-scale dynamics of the coupled human-environmental system. At fast scales, economic and political interests exploit environmental resources through a maze of environmental management and resistance, guided by virtual Earth predictions. At intermediate scales, managers become slaved to economic and political interests, which adapt to and repress resistance, and resistance is guided by patterns of
environmental destruction. At slow scales, resistance interacts with the cultural context, which co-evolves with the environment. The transition from unstable dynamics to sustainability is sensitively dependent on the level of participation in and repression of resistance. Because of their differing impact inside and outside the dominant culture, virtual Earth predictions can either promote or oppose sustainability.

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