



Understanding the life-cycle of soils to prevent global civilization collapse

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In Ronald Wright's words empires that collapse show similar behaviour: **Sticking to entrenched belief and practices, robbing the future to pay the present, spending the last reserves of natural capital on reckless binge of excessive wealth and glory.** In the past civilization collapses were localised to certain geographical areas. Soil degradation is the most frequent cause of both cultural decline and total civilization collapses. With six billion - and rising - inhabitants on Earth that are intertwined in global trade the looming collapse is likely to be global. Average world-wide soil erosion is $70 \text{ mm Ky}^{-1} \text{ yrs}$ (1 t ha yr^{-1}). Soil erosion rates are up to 60 times higher in Asia, Africa, South America and Australia (4300 mm Ky^{-1}), and 25 times higher in USA and Europe (1800 mm Ky^{-1}). Soil formation rates have been estimated to be as slow as 4 mm Ky^{-1} for granite in Virginia, USA to 60 mm Ky^{-1} for quartz diorite in Puerto Rico. Rock to regolith transformation rate is diminished from 100 mm Ky^{-1} for bare rock to 15 mm Ky^{-1} under 1 m of soil cover. This summary demonstrates that soil erosion rates are up to three orders of magnitude higher than soil formation rates. However, our knowledge of soil formation rates and processes is much less detailed than erosion rates and needs to be a focus of future research. Therefore European scientists are linking with the US community to set up soil observatories to obtain scientific data to underpin soil protection policies world-wide. Soils store more than twice the carbon of vegetation and the atmosphere combined. Therefore soils are important for buffering climate change. The future of everything we have accomplished since our intelligence evolved will depend on the wisdom of our actions over the next few years.