



Co-Evolutions of Ecosystems, Societies, and Economy in Dryland Asia

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This presentation aims at the interactive changes of the natural system (NS) and the human system (HS) as well as the feedbacks in time and space for dryland Asia where multiple administrative units from several countries experience similar climates, ecosystems, cultures, and traditions but different governments, land uses, economic development, and demographic changes (e.g., ethnic composition). We compiled and examined the changes in major measures for ecosystems (e.g., PAR, LAI, GPP, ET), economy (GDP, export/import, EGS), and human demography (e.g., population, health, education) between 1981 through 2011 (30+ variables) for six Central Asian countries (Afghanistan, Turkmenistan, Tajikistan, Uzbekistan, Kazakhstan, Kyrgyzstan) and two East Asian countries (Mongolia and China). Particular attention was made to understand the co-evolutions of the ratios between the elements of HS and NS, such as: GDP: GPP, PET: FWW, R: PDSI, EGS: GPP, etc., so that feedbacks and interactions can be empirically studied. Spatial and temporal changes of each measure, as well as their ratios, were quantified to highlight the relative contributions of human activities (e.g., policy) and biophysical changes (e.g., climate). We found some tight connections between the HS and NS variables, but the co-evolutions have to be understood in the context of governments, policy, and other major institutional shifts.