The Indus River Basin located in South Asia is home to an estimated 300-million people (61 % Pakistan, 31 % India, 8 % Afghanistan, and less than 1 % China) and has the highest density of irrigated land in the world. In recent years, the region experienced rapid population and economic activity growth, and this process is expected to continue in the next decades leading to reduced poverty and growing demands for water, energy and food. With no surface water left in the basin for expanded use and accelerating exploitation of fossil groundwater as a result, long-term management of systems dependent on water is fundamental for the sustainable development of the region. This presentation overviews the development and application of a new open-access sub-national scenario modeling framework designed to aid decision-makers with complex choices regarding the development of water, energy and land resources in the Indus River Basin. The NExus Solutions Tool (NEST) links an engineering-economic model, representing investment and allocation decisions across water, energy and land-use sectors, to a distributed hydrological model, representing the detailed biophysical processes at high spatial and temporal resolutions. NEST provides insights into: (1) the vulnerability of water, energy and land resources to future socioeconomic and climatic change; and (2) how policies, technological solutions and investments can improve the sustainability of water, energy and land transformation pathways while avoiding trade-offs across sectors. The framework is applied to develop basin-wide scenarios for water-energy-land systems consistent with the Sustainable Development Goals (SDG) for clean water (SDG6), energy (SDG7) and climate action (SDG13). Human development narratives and associated demand drivers from the Shared Socioeconomic Pathways (SSPs) are used to examine potential interactions with SDG12 (sustainable consumption). Results demonstrate under a mid-range human development scenario (i.e., SSP2) and climate change impacts scenario (RCP6.0) the significant investments needed to transform Indus water-energy-land systems in line with the SDG targets. Limiting demands to achievable per capita intensities can avoid a large part of the incremental investments. The results demonstrate the critical importance of spatial and temporal scale and the linking of climate and socioeconomic narratives when assessing interactions between SDGs at the river basin-scale.