HARTMAN, MELANNIE D.,[1] J. S. BARON[1,2], D. S. OJIMA,[1] and W. J. PARTON.[1] [1]Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523-1499 USA; [2]USGS-BRD. The effects of land use and temperature change on ecosystem processes in the South Platte River Basin.

Human induced land use and climate change alter water and energy fluxes, water availability, and biomass production. Evapotranspiration (ET) rates modify atmospheric moisture that influences local climate patterns. Temperature change affects growing season length and water available to plants. Using the Century model, we examined the relative changes to biomass production and evapotranspiration due to land use and temperature change (-2°C, +4°C) in the South Platte River Basin. Here, a large percentage of potential natural vegetation (grassland) has been converted to dry or irrigated croplands, resulting in temporal and quantitative changes to ET rates. Irrigated corn transpired much more in the late summer than did native grasslands, while winter wheat transpiration ceased after harvest. Annual ET rates from irrigated croplands were 50% greater than those from native grasslands, while annual ET rates from winter wheat croplands were 30% less. Temperature increase suppressed grassland productivity, where water limits growth, but enhanced productivity of coniferous forest, where water is not limiting. Temperature change had little impact on winter wheat and irrigated corn productivity. Annual ET rates increased with temperature in coniferous forests, winter wheat croplands, and irrigated corn croplands, but not in native grasslands.