

WEATHER, WATER AND CLIMATE THEME

Regional co-design and co-production of research and management actions to support climate change adaptation strategies for managing natural resources in the Northern Great Plains

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Abstract: Grasslands, shrublands, rangelands, and pasturelands (GSRP) comprise more than a third of the land area in the United States and worldwide. The ecosystem goods and services derived from GSRP provide critical wildlife habitat, forage for livestock, water conservation, and soil stabilization to support biodiversity and livelihoods across these systems. The Northern Great Plains (NGP) region plays a very important role in providing water and land resources and habitat for wildlife and livestock, crops, energy production, and other critical ecosystem services to support rural livelihoods (Ojima et al. 2015). The semi-arid conditions of the region and the tight coupling of livelihood enterprises with ecosystem services in the region creates a situation of increased sensitivity to climate changes and enhanced vulnerability among the rural communities and Native American nations across the region. Recurrent drought conditions across the region have differential impacts on ecosystem services and natural resource management targets.

The changing climate and social-economic situations across the NGP have further challenged current land and water management practices (Shafer et al 2014). Recent research and assessment efforts of current climate stresses have indicated that changing seasonality, impacts of extreme events (e.g., droughts, floods, ice storms), and warming trends on ecosystem services across the region have increased the vulnerability of communities and sectors in the region. Strategies for how resource managers and the research community can better collaborate and to more effectively co-design and co-produce efforts to understand and to respond to these challenges are needed.

Research efforts have been undertaken to include stakeholder input from various natural resource management communities to improve the information and focus of the climate science and social-ecological impact and response research communities. The co-design efforts are leading to improvements in forecasting information and technologies, linkages to field observations and ground truthing of instrument data, remote sensing data sets and interpretations, and modelling results across the region. The co-design effort is structured to improve the management to researcher interface and to enhance the knowledge exchange between these communities.

Joint activities between the USGS and the USDA provide a platform for enhanced stakeholder dialogue, engagement on resource management issues and the co-design and co-production of research activities to support stakeholder and manager concerns more effectively. These efforts are leading to improved "climate-smart" research-management partnerships and the implementation of improved activities to reduce climate sensitivity and risk, and increase resiliency to climate variability and change. Development of a joint platform to serve as a resource to regional efforts have been established to provide better information to management entities across the region on climate dynamics, impacts of climate changes, vulnerability and risk assessments. These efforts are leading to the development of strategies to better coordinate among local, state, federal, and tribal agencies, to provide a more comprehensive information portal where managers and decision makers can readily find scientific information, including analysis of impacts and consequences to guide development of specific strategies to cope with a changing climate.