Water & Weather Monitoring Project Description

High Plains Grasslands Alliance
June 2014

Introduction
Over the past several months, the Alliance has been gaining education about the value of monitoring soil moisture, precipitation, weather/climate patterns, and groundwater on a regular basis at both the ranch scale and the landscape scale. While we are still in the process of educating ourselves about how to implement and put to use the data gathered from this type of monitoring, Twin Willows, Piojo, Fort Union, Black Willow and Watrous Valley Ranches have all made (or are in the process of making) an initial investment in a single monitoring station to launch this project. Soil moisture, ground water dynamics, weather patterns, local climate patterns, land management and long-term ranch viability are all interconnected factors that every ranch owner and manager needs to consider in order to maximize the health and productivity of their lands. In addition, understanding weather and water dynamics – both ground water flows and changes in microclimate – within the HPGA landscape may provide valuable information for surrounding community-based efforts related to regional land and water planning and management.

Rationale/Purpose
Monitoring is an important tool that enables ranch owners and managers make informed management decisions and maintain healthy rangelands. Water and weather patterns (like precipitation, temperature, and wind) affect soil health and forage productivity. Furthermore, in arid climates like that of northern New Mexico, the capacity of soils to actually store the limited precipitation that falls during the growing season significantly influences the long-term resilience and productivity of the landscape as a whole. While soil type plays an important role in soil moisture retention, we also know that management decisions are equally important.

The Alliance is interested in launching a long-term, collaborative effort to monitor weather and water across the 200,000+ acres represented by its membership to:

1. Gain a better understanding of the interconnections between precipitation, groundwater, surface water, wells, water tables and land/livestock management decisions.
    - How effective is rainfall (i.e. are our soils capturing it and holding it so that it can be used by plants?)?
    - How can we use this information to improve range management and land health?
2. Monitoring data provides long-term protection in the event that water rights are challenged or come into question for some reason.

3. Data on the dynamics of our landscape will open additional opportunities for new collaborative projects related to the long-term health and viability of land and livestock operations

Goals

The goals of the Alliance in undertaking this monitoring project are to:

1. Understand groundwater dynamics in relation to different management practices, soil and cover types, and microclimates;
2. Learn better management practices for improving soil moisture retention and hydrologic cycling;
3. Develop standardized protocols for data collection, storage, analysis, reporting and distribution; and to
4. Achieve these goals with a maximum commitment of 4-6 hrs per month per ranch. In the event that this project grows beyond this time commitment constraint, we will explore the opportunity to engage interns and/or volunteers from Highlands University or elsewhere in the community.

Regional/Watershed Description

Sourced from: Thompson, B. and Ali, A. 2009. Water Resources Assessment of the Mora River. *Water Resources Program, University of New Mexico. Albuquerque, NM. 71pp.*

The Mora River watershed, located in northeastern New Mexico, drains approximately 1,476 square miles of land on the eastern slopes of the Sangre de Cristo Mountains. The Mora River, which is a tributary of the Canadian River, runs easterly onto the high plains of New Mexico from a high point of more than 12,000 feet in the Sangre de Cristo's. The Mora River's main tributaries include Coyote and Wolf Creeks to the north, and the Sapello River and Pedroso Creek to the south.

Climate

The Mora Watershed exists at the intersection of two climate zones: the high altitude climate of the Sangre de Cristos to the west and the semi-arid climate of the high plains to the east. Annual precipitation is largely influenced by summer monsoons, which carry moisture into the region from the Gulf of Mexico. As one moves eastward and down in elevation, precipitation decreases while temperature and evapotranspiration increase.

Soils

The soils in the Mora region originated from metamorphic, igneous and sedimentary rock and large alluvial deposits cover the high plains. The valleys tend to be composed of highly erodible soils (Mollisols) that are dark in color. The higher altitude soils in the mountains tend to contain higher percentages of organic matter and non-decomposed leaf litter due to higher precipitation and cooler temperatures. Climate is a major driver influencing vegetation, drainage, soil temperatures, and precipitation patterns.

Vegetation

The gradient of vegetation within the Mora Watershed transitions from subalpine forest at higher elevations to short-grass prairie on the high plains. Below 7,000 ft one encounters junipers and piñon, which are better adapted to the warmer and drier climates than the higher elevation tree species of fir and spruce. Low

elevation riparian areas tend to be dominated by willows, cottonwoods and alders and the grasslands are largely composed of warm season grasses, forbs and a variety of shrubs.

Ground Water

Seismic investigations of the Mora Valley suggest an average alluvial aquifer thickness of 200 feet containing about 12,000 acre-feet of groundwater. Further downstream there is another 4,000 acre-feet stored in the alluvial desposits near Watrous and 7,000 acre-feet from Valmora to Shoemaker.

Surface Water

Surface water supplies the majority of water needs in the region. The Mora River and its tributaries are the primary sources of surface water in addition to four small lakes.