
NRT: Transdisciplinary Education for Resilient Rangeland Action Science

A Data Management Plan created using DMPTool

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Data and Materials Produced

We will produce **primary research data** from field observations, laboratory analyses, remote sensing, simulation models, GIS maps and layers, images, video files, interviews, surveys, curricula and other materials for three permanent in-person and two online courses, and stakeholder interaction reports. Specific research topics for Fellows, Trainees, and Teams will be selected as part of the work of the program, so a complete characterization of potential data collection is impossible. We will also collect **evaluation and assessment data** throughout the project that will include interviews, surveys, essays, and reports. In addition, we will collect data on our diversity efforts and outcomes including numbers of Fellows and Trainees at each level by gender and ethnicity, enrollment trends, time-to-degree, and career pathways. Data collected in the field will be transferred to Colorado State University for archival with appropriate metadata (see below).

Standards, Formats and Metadata

Specific research will be defined as part of the proposed program, and data will be documented and archived according to appropriate metadata standards. For example, primary field data may be documented using the Access to Biological Collections Data (ABCD) Schema and archived via the Global Biodiversity Information Facility, because these are widely supported and commonly used standards that facilitate discovery. Ecosystem and climate model simulations will be archived in self-documenting files using CF Metadata Conventions (netCDF files). Text, audio, and video collections will be documented using the Dublin Core metadata standard.

Roles and Responsibilities

PI Meena Balgopal will be primarily responsible for data management in collaboration with SP Scott Denning. They will be responsible for decisions regarding implementation of the data policy and for creating the repository. Day-to-day data management and training of project personnel will be delegated to a Research Coordinator paid on the project. Balgopal and Denning will assure adherence of this policy. We will work with data specialists at the CSU Libraries to transfer decisions about the data archive after the original project personnel are no longer available.

Dissemination Methods

The project website will include a searchable catalog of data to facilitate discovery and collaboration. Data will be documented (metadata attached) and made available within one year of collection, allowing for quality assurance and analysis by Fellows and Trainees. Publications using project data will follow publisher guidelines regarding dissemination and copyright.

Policies for Data Sharing and Public Access

We do not anticipate any permission restrictions, ethical or privacy issues with respect to the student research conducted by the program. Our institutions retain ownership of intellectual property developed by the program, but strongly support publication and dissemination. We anticipate that other ecologists, social scientists, climate scientists, and educators will be eager to use data that we produce, and will actively facilitate such use as described above. Project personnel frequently publish in open access journals, yet respect and abide by copyright law regarding the intellectual property of publishers.

Archiving, Storage and Preservation

We will store documented data on servers at our institution while maintaining links on the project website, but long-term archival of all project data will be stored on servers provided by Google. Colorado State University has a long-term arrangement with Google that allows university researchers to store *unlimited* amounts of data via Google Drive. SP Scott Denning has experience with archival and versioning tools available for Google Drive, and will work closely with PI Meena Balgopal and other project personnel to prioritize and select data for long-term archival. Unique and irreplaceable data will be stored for at least 20 years after the project ends. Data that could be reproduced (for example, remote sensing or other spatial data available from other sources or simulations output that could be regenerated) will be deprecated three years after the project ends.