South Platte Data Platform

(Previously referred to as South Platte Roundtable Data Platform)

WSRF Grant - POGG1 2018-451

Final Report

October 30, 2018

Contents

Summary

This is the final report for the South Platte Data Platform WSRF project, completed for the Colorado Conservation Board (CWCB) by the Open Water Foundation (OWF). The project has been completed and deliverables are being used in production. The project enhances the ability of the South Platte and Metro Roundtables to tell their stories to other roundtables and the public through the use of data-driven stories. The open platform can be evaluated and enhanced over time.

The purpose of the South Platte Data Platform project was to implement a web-accessible data platform that can be used by South Platte and Metro Roundtable members to facilitate the work of the Roundtables. The platform is intended to help Roundtable members, their stakeholders, and public understand water resources issues within the basin.

The project as proposed was not intended to develop new software technologies such as databases and models that would be expensive to implement and maintain. Instead, the platform integrates existing datasets and open technologies to implement innovative new tools. Data products and visualizations provide context and explain water resources issues in the South Platte. After discussion and initial prototyping, it was decided to focus on stories that emphasized key concepts and issues in the South Platte and Metro Roundtable Basins:

1. South Platte and Metro Basin Hydrology
2. South Platte and Metro Basin Water Entities
3. South Platte and Mero Basin Identified Projects and Processes (IPPs)

The above stories are available on the South Platte Basin website:

http://southplattebasin.com/ (see the Stories link)

The project focused on fundamental datasets such as lists of municipalities, water providers, ditch companies, Colorado's Data Support Systems (CDSS) South Platte StateMod model dataset, and datasets that provide insight on multi-faceted water issues that evolve over time. The datasets are made available in simple forms such as map layers and comma-separated-value (CSV) files that can be used by other projects such as the Statewide Water Supply Initiative (SWSI) Update, Basin Implementation Plan (BIP), and other projects. Visualizations and story content have been implemented to emphasize important issues for each sector (agriculture, recreation, environment, municipal and industrial). The project leverages previous and ongoing work from the Open Water Foundation and its collaborators and has been coordinated with other projects where opportunities allow.

The project implemented an open source approach where story data, processing workflow, visualizations, and narrative content are maintained in public GitHub repositories, with links to the repositories provided at the end of each story. This allows the "source code" for the project to be accessed by the State and other interested parties. Consequently, project deliverables are transparently available after the project ends, allowing future enhancements to pick up where the project ended.

OWF presented intermediate and final products to South Platte and Metro roundtables as well has conducting several web and in person meetings. The project was coordinated with the South Platte and Metro education and outreach efforts and stories are being used in education programs. The project results have been featured in CWCB social media and water resources publications and media. The project results have been received favorably by the Roundtables and water community.

The remainder of this report provides information about each project task.

Task 1 - Create Initial Inventory of Key Datasets, Source Entity, Data Format, and Accessibility

This task was funded with matching funds. OWF identified multiple relevant datasets that could be used for the South Platte Data Platform, for example:

- Municipalities and municipal water provider entities (OWF, using data from DOLA and others)
- Population (DOLA and SWSI)
- Water Use (HB 1051 Water Efficiency Data Portal)
- Hydrology (CDSS and web sources)
- Irrigated agriculture (CDSS)
- Water providers (SWSI, DOLA, others)

Datasets are processed and are made available using GitHub and other websites.

Task 2 - Create Initial Prototype Website

This task was funded with matching funds. OWF created several prototype websites to provide access to data, visualizations, and stories. These websites were evaluated and the modular nature of the prototypes allowed them to be evolved into the final design.

A simple website was also created to coordinate project progress, including listing visualizations and stories that are of interest to roundtable http://projects.openwaterfoundation.org/owf-proj-south-platte-data-platform/. This approach provided to be effective in disseminating project resources and coordinating input.

Task 3 - Implement Processes to Transfer Data from Original Source to South Platte Data Platform

OWF implemented automated processes to transform and integrate original source data into forms that are used by visualizations and stories. Processing workflows are implemented using CDSS TSTool, GIS tools, and scripts. These workflows can be used to reprocess data and scale processing beyond the South Platte and Metro basins. Example workflows to automate data processing include:

- processing CDSS StateMod dataset input and results into a dataset to illustrate hydrologic variability
- processing population data to illustrate growth
- processing datasets into formats suitable for visualization software
- automating upload of data and visualizations to cloud sites, including demonstration sites on the OWF website, and the final southplattebasin.com website

Task 4 - Implement Visualizations for Datasets

Datasets from Task 3 were used to create visualizations that were deployed to the web and used in stories, such as:

- Maps of municipalities, CDSS StateMod model node locations, water providers, agriculture, etc.
- Thematic maps to illustrate spatial variability of data, such as population growth
- Hydrographs and heatmaps illustrating time series variability over time

OWF also implemented a number of visualizations using open technologies, which have not been commonly used previously for State datasets, including:

- “juxtapose” visualization showing “before” and “after” images of urban growth onto agriculture
- spatial walk through tool to illustrate parts of water resources systems (used to illustrate the North Sterling Irrigation District system)
- timeline tool to visualize timeline of SWSI and other planning projects

Task 5 - Develop Integrated Stories

OWF evaluated technology options to implement stories, including Esri Story Maps, open source JavaScript libraries, and cloud platforms, in order to provide the final solution for deliverables. Use of technologies within the State's information technology (IT) environment proved challenging and project resources were allocated to resolve challenges. For example, although the State uses Esri technologies, there is not a clear approach for using the State platform to support third-party efforts such as web mapping solutions for Roundtable-specific needs. OWF coordinated with CWCB staff and Colorado Watershed Assembly, which is involved in education and outreach efforts in the basin.

Through interaction with Roundtable members and others, it was decided to focus project resources on three stories, with indicated goals:

1. South Platte and Metro Basin Entities
    a. Provides an understanding of entities in main water sectors including municipal, agricultural, environmental, and industrial
    b. Provide background on important concepts such as Colorado water law
    c. Provides comprehensive foundational datasets and visualizations
    d. Indicates important issues by sector, such as water demand and supply
    e. Provide links to other data, such as municipal websites
2. South Platte and Metro Basin Identified Projects and Processes (IPPs)
    a. Roundtable members repeatedly indicated an interest in seeing a map of IPPs
    b. The project highlighted issues with IPP datasets such as a lack of spatial data, which were overcome by the project
3. South Platte and Metro Basin Hydrology
    a. Provide concepts to educate about issues such as hydrologic variability, climate change, return flows, etc., that complicate water resources solutions in the connected river system
    b. Highlight use of CDSS and other datasets
    c. Discuss important issues related to each water sector

Each story is intended to stand on its own and therefore some content is repeated. The three stories taken together cover many aspects of water resources in the basin and serve as a comprehensive introduction to water issues. Third-party resources are referenced extensively, including publications from Water Education Colorado, prior CWCB project results, federal government publications, and research.

Task 6 - Public Involvement and Outreach

OWF coordinated the project with South Platte and Metro Roundtables, Environmental and Recreational committee, and Education and Outreach committee, as well as multiple individuals from water organizations and the public. Input was used to adjust the content of stories. GitHub repository issues were used to track input and any remaining feedback that could not be addressed within project resources is saved to allow updates in future enhancements. OWF has worked to support education efforts and will continue to look for opportunities to leverage the stories.

Task 7 - Reporting and Final Deliverable

The project provided incremental reporting and prototype deliverables via the OWF website, to allow Roundtable members to provide input on project results. These products were refined until the end of the project.

The stories developed on the project were uploaded to the southplattebasin.com website (see Stories link) to increase accessibility for Roundtable members and others. Publishing the stories using this approach illustrates how a similar approach could be used on other projects to integrate CWCB project deliverables with Roundtable websites.

OWF submitted 6-month report and this final report to the CWCB, as well as invoices.

Project deliverables are available on the southplattebasin.com website and source files are accessible in GitHub repositories that were created to track story content versions.

Schedule and Project Close-out

The project focused on working deliverables that met the project goals, including web-enabled, data-driven stories. Multiple versions of stories were made available and were finalized by the fall of 2018, within a roughly one-year project window. Roll-out of final products occurred via South Platte and Metro Roundtable meetings and the southplattebasin.com website. The project deliverables are consistent with the original scope.