

The Economic and Social Benefits of an Integrated Approach: Marrying LiDAR Data and the National Hydrographic Dataset

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Elizabeth W. Zeiler, M.C.R.P., works with the Geospatial Technology Group at the New Mexico State Environment Department. She combines her academic perspective and more than 20 years of experience working with geographic information systems at the federal, state and local levels and has focused her expertise on natural resource issues with an emphasis on planning and surface water. Elizabeth currently shares stewardship of the USGS National Hydrologic Dataset with Ralph Campbell from the New Mexico Office of the State Engineer. She has a BS in geography from Humboldt State University, and a master's degree in community and regional planning from the University of New Mexico.



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Carol Giffin works for the U.S. Geological Survey, National Geospatial Program, as the Acting Coordinator for the Natural Resources Conservation Community of Use and as the National Map Liaison for Colorado and New Mexico. Carol also served as the USGS National Mapping Division Liaison to the Bureau of Land Management. Her career in Mapping, Charting and Geodesy includes serving in lead management, supervisory and technical roles at the Department of Homeland Security and the Defense Mapping Agency.

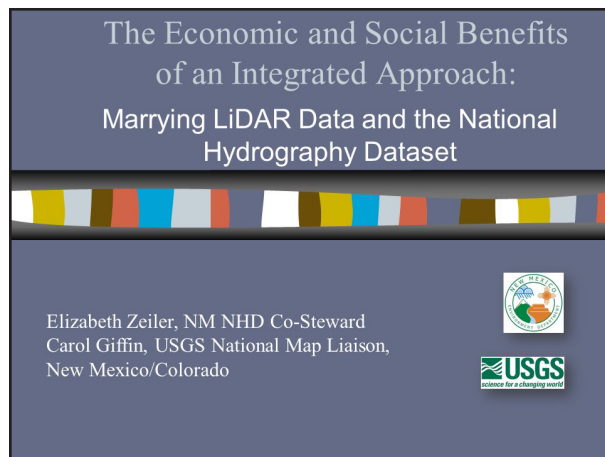


Figure 1. Introduction.

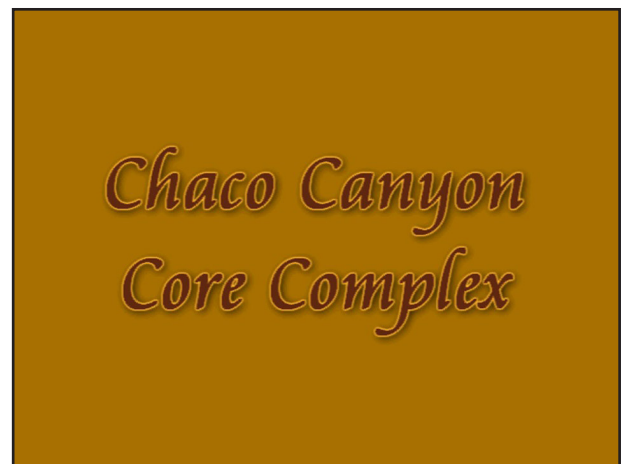


Figure 2. Chaco Canyon Core Complex.

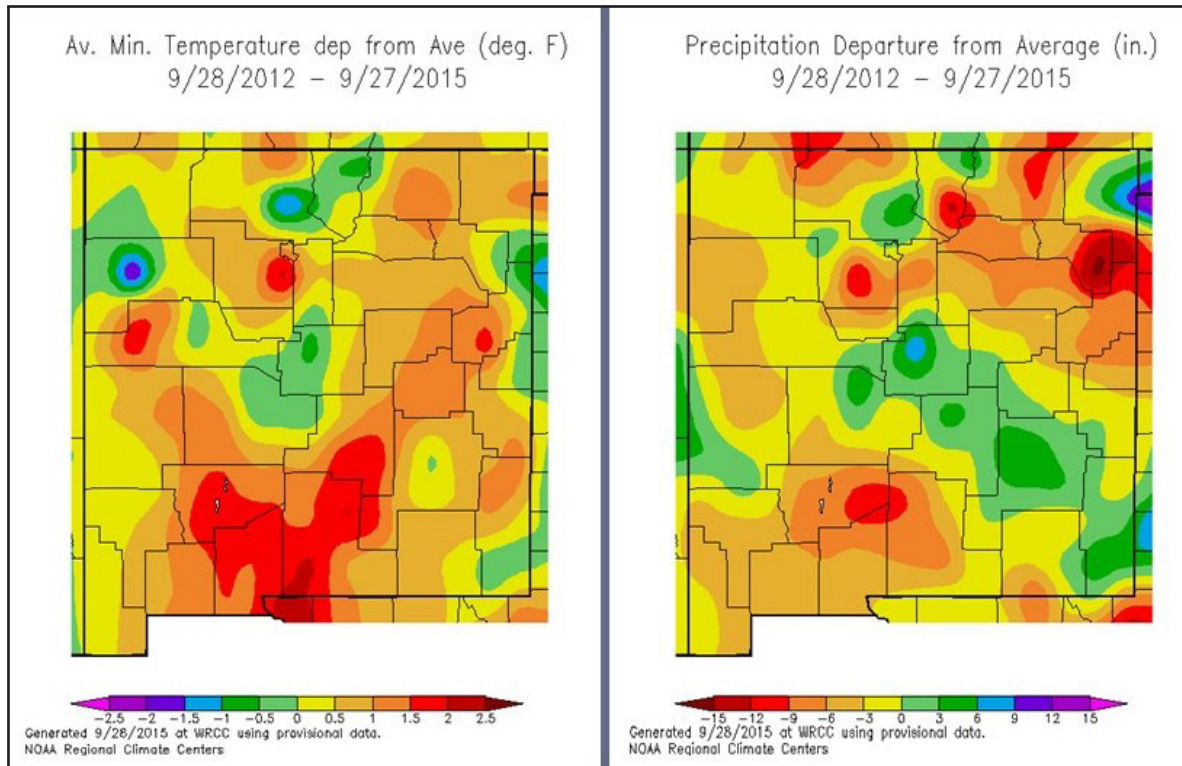


Figure 3. Recent climate in New Mexico. Maps showing status of temperature and precipitation departures 09/28/2012 to 09/27/2015.

- Combined effects
 - Soil moisture is depleted
 - Vegetation stress and die-off
 - More intense wildfires
 - Increased flooding

Average length of wildfire season

Early 1970s: 5 months

Today: 7+ months

Wildfires are increasing and wildfire season is getting longer in the Western U.S.

Average number of large wildfires per year bigger than 1,000 acres

1980-1989	1990-1999	2000-2012
~140	~160	~250

Figure 3. Science Connections: Western Wildfires and Climate Change, Copyright Union of Concerned Scientists 2013; <http://www.uscc.suica.org/westernwildfires>.

Figure 4. Increased temperatures and reduced rainfall.

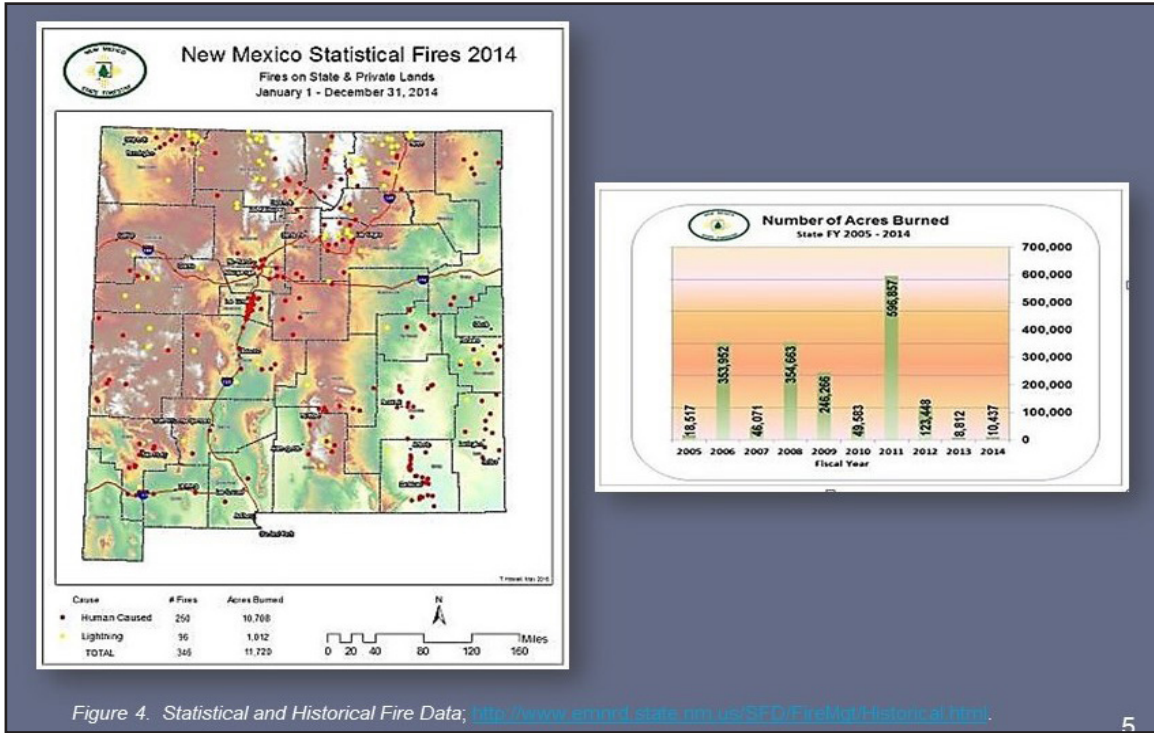


Figure 5. Wildfire in New Mexico.

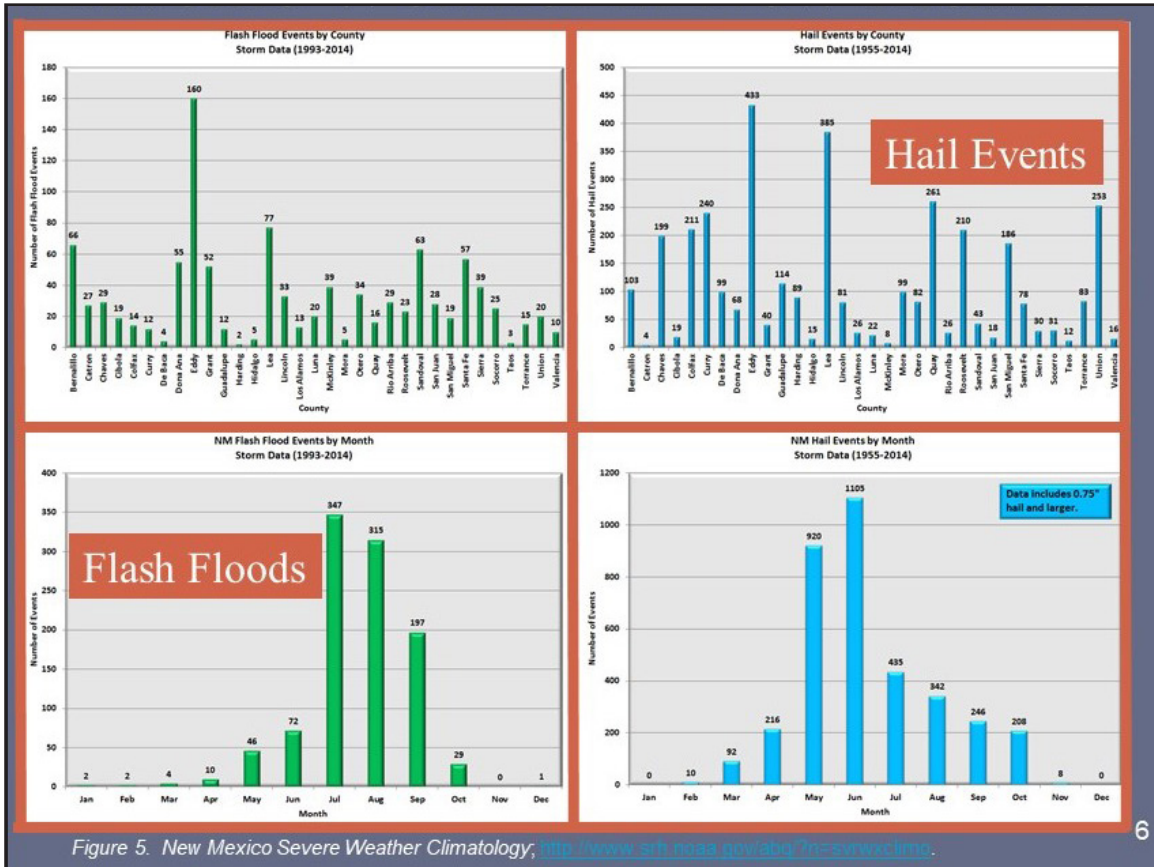
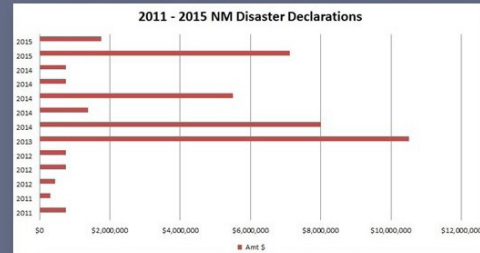


Figure 6. Extreme weather in New Mexico.

■ 2011-2015 State Presidential Disaster Declarations

- Funded by State Executive Orders (EOs)
- FEMA declarations for public assistance
 - Includes roads, bridges, power lines, debris removal

Figure 7. Disaster costs New Mexico.



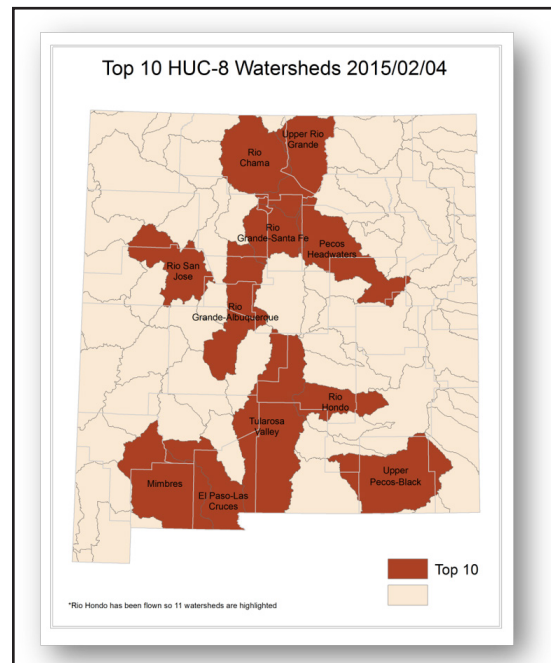
Source: Personal interview, William Borthwick, New Mexico Department of Homeland Security and Emergency Management, September 2015.

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- Goal is to prioritize watersheds to mitigate risk from natural hazards
- Develop a multi-risk portfolio to guide watershed hazard mitigation and LiDAR acquisition
 - Methodology based on Idaho Bureau of Homeland Security and includes population, weighted dam hazard potential, and critical infrastructure.

Figure 8. FEMA’s Cooperating Technical Partners Program.

Figure 9. Top Ten HUC-8 Watersheds Identified in 2015.



- USGS National Hydrography Dataset Stewardship Program
 - Surface water component of National Map
 - National Hydrography Requirements and Benefits Study
- 3D Elevation Program
 - National Enhanced Elevation Assessment
 - Collect Lidar over an eight year period

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Figure 10. Components of the USGS Hydrography Dataset Stewardship Program.

- NGP satisfies the needs of users for geospatial information.
 - Water Resources
 - Geologic Hazards and Mapping
 - Natural Resources Conservation
- NGP provides geospatial products and services that users incorporate into their decision making and operational activities.
- Ensure that the Program's products and services meet users' needs, and guide the Program's investment in data, products, and services based on an understanding of how they are employed.
- Support USGS/CSS strategy to characterize, synthesize, and describe the critical zone.

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Figure 11. USGS National Geospatial Program Strategic Plan - Meeting user needs.

- National Enhanced Elevation Assessment (NEEA)
 - Study completed in 2011
 - Results identified 602 functional activities with requirements for enhanced elevation data
- Hydrography Requirements and Benefits Study (HRBS)
 - Study implemented in 2015
 - Preliminary results completed for New Mexico

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Figure 12. Defining mission critical activities.

- National Enhanced Elevation Assessment (NEEA)
 - Study completed in 2011
 - Results identified > 600 requirements
- Hydrographic Requirements and Benefits Study (HRBS)
 - Study implemented in 2015
 - Preliminary results completed for New Mexico

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Figure 13. Defining mission critical activities (cont.).

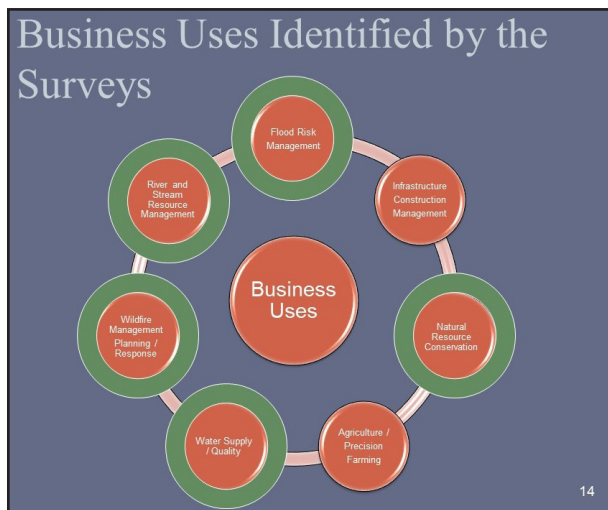


Figure 14. Business uses identified by surveys.

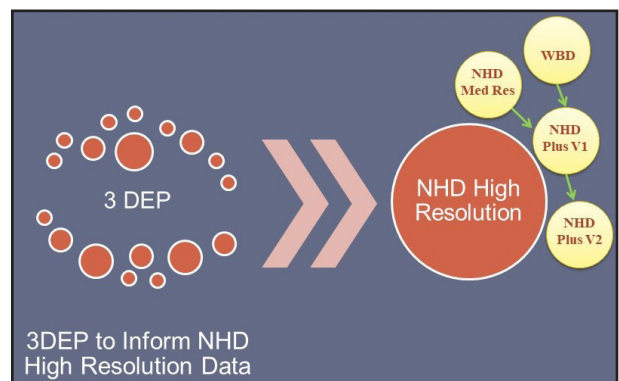


Figure 15. Using LiDAR to inform National Hydrography Dataset (NHD).

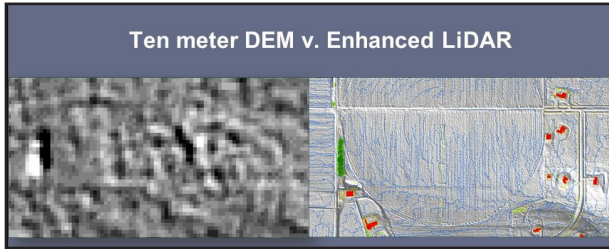


Figure 16. Benefits of LiDAR.

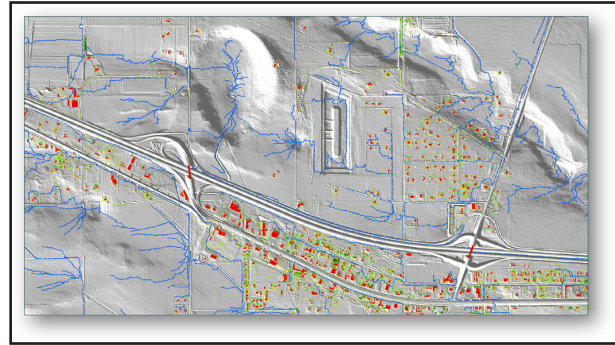


Figure 17. High quality level two data.

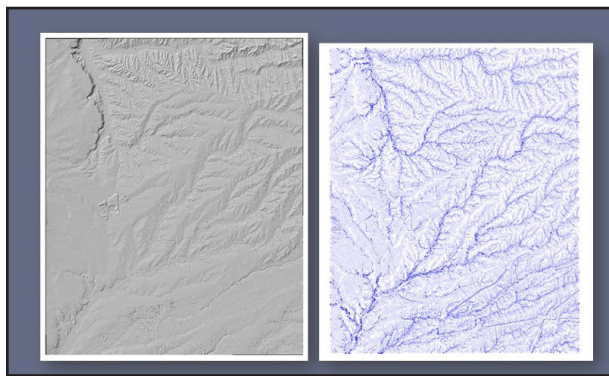


Figure 18. LiDAR and derived data.



Figure 19. Use 3D Elevation Program (3DEP) to inform NHD.

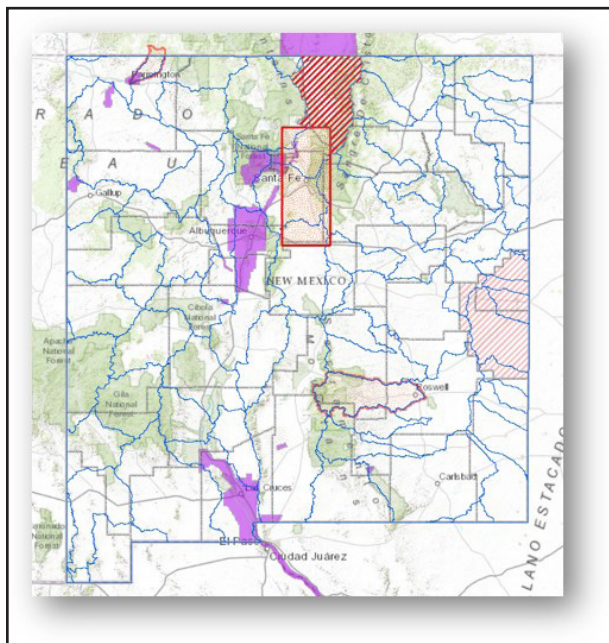


Figure 20. 3DEP acquisition status.



Figure 21. New Mexico Association of Regional Councils' Ristra Project.