West Texas Viewer

Help Document

October 18, 2021

Application Overview

The West Texas Viewer is a screening-level tool which displays and examines spatial data to help inform conservation decisions. (https://s3.amazonaws.com/DevByDesign-Web/Apps/RBB/index.html)

Introduction

The West Texas Viewer presents data inputs and data products resulting from the Respect Big Bend project which aims to proactively mitigate energy sprawl through cooperative landscape-scale conservation planning. The viewer includes data representing key ecological (i.e., intact landscapes, grasslands systems, riparian/wetland/spring systems, grassland and mountain connectivity areas, pronghorn and mule deer habitat) and socio-cultural values (i.e., recreational areas, viewsheds, hunting opportunities, dark sky areas) that are characteristic of the region. The cumulative values layer combines and summarizes these landscape values into a single conservation vision for the region. We also include, where possible, data forecasting the potential footprint to meet growing energy demand. We make the spatially-explicit data available to enable private, public, and other decision-makers to proactively consider the potential impacts of proposed projects to values identified by community stakeholders as important to the region and to guide thinking about how to avoid or reduce those impacts.

All data included in the West Texas Viewer are a mix of publicly available data, derived from publicly available sources, and/or data granted for use in the tool. We believe access to the data used as proxies for regional values and for inclusion in the final cumulative values layer and the forecasted energy footprints are important assets for conservation decision-making. The Respect Big Bend project team (see **Acknowledgement** section) has included all relevant datasets with the exception of a small handful of datasets currently undergoing review and revision by partners and scientists in the region. These exceptions include grassland connectivity, mountain/sky island connectivity, buildable solar areas, and buildable wind areas. For more information on these or any of the data included, please refer to the report (https://respectbigbend.org/final-report) or contact the Borderlands Research Institute (bri@sulross.edu).

Application Layout

The West Texas Viewer has three main features: data resource and reporting buttons on the left, a large central map display, and map function buttons on the right (Fig. 1). On the left, the data resource and reporting buttons allow for displaying and interacting with data layers associated with four categories: Ecological, Social, Energy, and Other Data. These data layers are displayed on the map and are modified via any of the associated layer tools (see **Data Display** section). Three buttons at the bottom left provide access to tools which define an area of interest (AOI), produce tabular reports associated with the spatial information within the defined AOI (see **Reporting** section) and provide

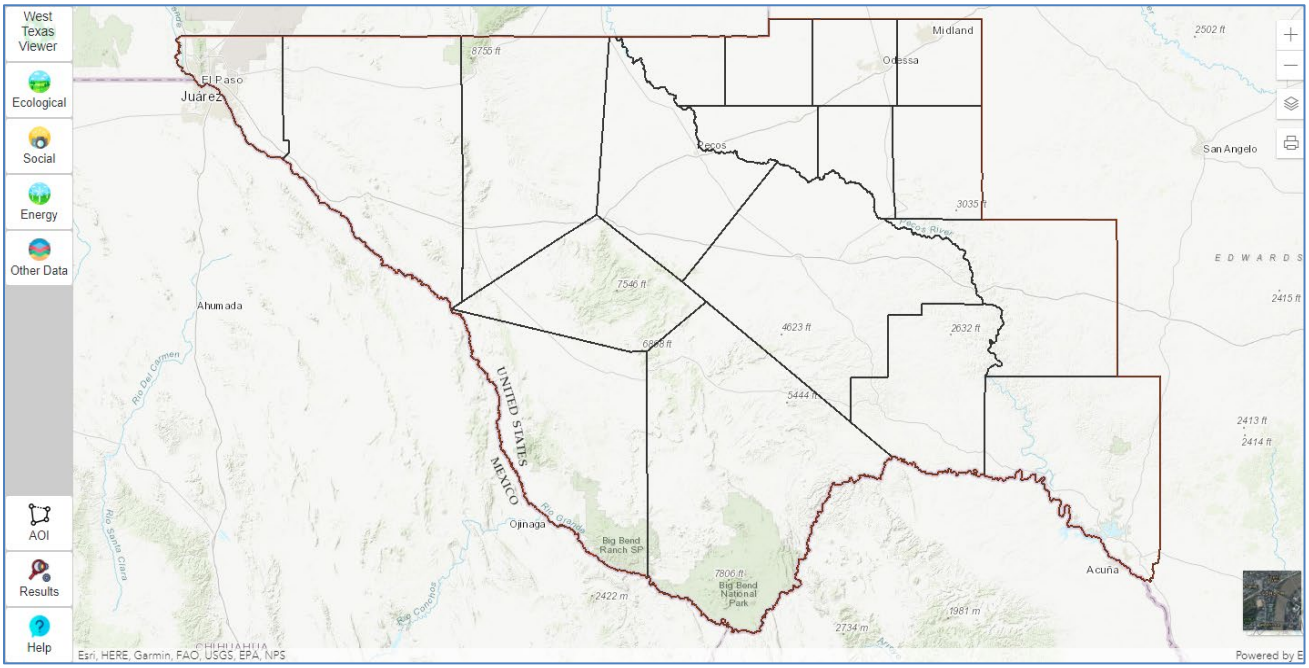

Fig. 1. Opening page of West Texas Viewer

access to some quick tool tips and this document. The map displays all data and has several inherent map navigational tools available by specific mouse actions. The five buttons on the right (from top to bottom): zoom the map display in or out, display the current legend for all data visible on the map, save and print maps, and change the background data displayed within the maps (see **Additional Map Tools and Functionality** section).

Data Display

To view data on the map, left mouse-click (here on described as click) on one of the four data buttons (i.e., Ecological, Social, Energy, and Other Data). This will display a data panel listing all layers specific to the button heading (Fig. 2). All panels can be closed by selecting a different button or clicking on the X in the upper right corner of the panel.

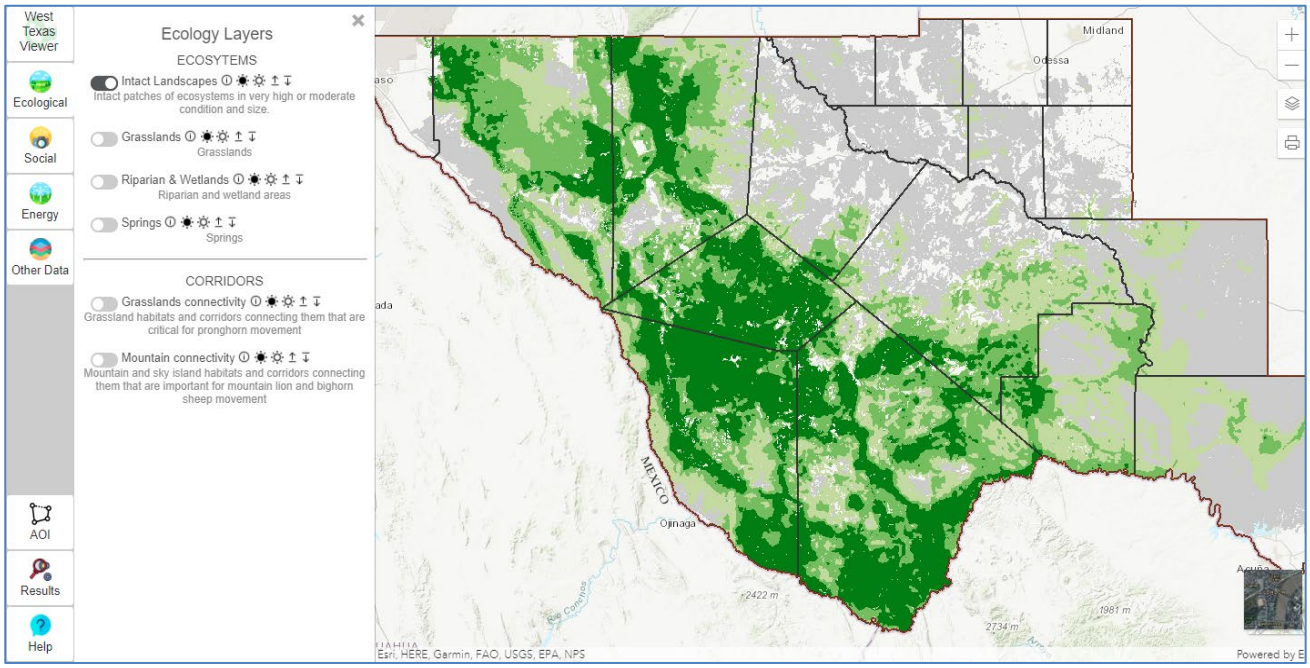

Fig. 2. Global Mapping Tool with data panel expanded and the Protected Areas layer visible from the Land realm.

All layers listed in the panel follow the same general layout as seen in Fig. 3. The slider bar to the left of the layer name toggles the visibility of that layer on the map. The info button ⓘ opens a window and provides a full description of the data layer including purpose, date, original data source/citation, a link to download the dataset, and an overview of how the layer was created. To close the layer info dialog, click on the X in the upper right-hand corner of the dialog or click anywhere within the web map viewer outside of the dialog. The two sun icons allow for the layer transparency to be decreased (dark sun icon) or increased (light sun icon); each click on either sun icon changes transparency by 10%. The two direction arrows (↧ ↥) move the layer up or down in the map draw order when the layer is visible on the map. The up arrow draws the layer on top of all other visible layers with the down arrow drawing it behind all layers. A few layers have a label button to see labels associate with the dataset; click on the dark label icon and labels disappear; click on the light label icon and they turn back on. Finally, below each layer name and icons is a short description of the layer.

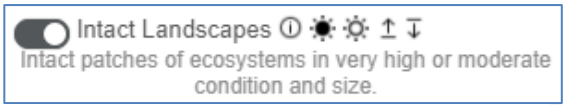

Fig. 3. Layer tools in data panel

Reporting

AOI Panel

The West Texas Viewer provides graphical and tabular reporting capabilities for an area of interest (AOI) that is either selected from a predefined country boundary or defined by the user through uploading an AOI polygon from a local shapefile or by screen digitizing an area on the map. All methods of selecting or creating an AOI are accessed by clicking on the AOI button which displays the Area of Interest panel. Regardless of the method used to define an AOI, a similar graphical and tabular report will be generated and displayed within the Results panel (see Results Panel below).

Initially when the AOI button is clicked, the SELECT AREAS by NAME subpanel is shown. For the Viewer, this option is limited to only country boundaries. The user can either select a county name from the dropdown lists or click on the

map to select a county. Selecting a county name will automatically center the map display on that county. Once a selection is made, clicking on the associated RUN COUNTY ANALYSIS button will highlight that county by outlining the boundary in black and open the Results panel displaying graphics and tables specific for that selected county. When just clicking on the map, a dialog box identifying the county with an accompanying ANALYZE button for the county provides quick access to the Results panel without having to use the dropdown menu.

To define an AOI from a shapefile or graphic, the DRAW or UPLOAD SHAPE button at the top of the AOI panel and to the right of the SELECT AREAS by NAME button must be clicked. This changes the AOI panel to subpanel support defining an AOI with either a shapefile or graphic (Fig. 4). First a name associated with the AOI is defined. Then by clicking on Start Sketching Analysis Area button the process of creating a graphic is initiated. This automatically changes the button to a red Cancel button which can be clicked while sketching an AOI to clear and restart the process. Clicking on the map starts drawing an area with subsequent clicks defining and outlining the AOI polygon. Once the entire area is defined, a double, left mouse-click completes the polygon and defines the new AOI. Once finished, the map is automatically zoomed to this new AOI. Then by clicking the RUN ANALYSIS ON SHAPE button, new results for that area are presented. Additionally, an AOI can be defined from an existing shapefile packaged within a single zipfile. At minimum the zipfile must contain the four necessary files used by a shapefile within any GIS (i.e., *.SHP, *.SHX, *.DBF, and *.PRJ). This zipfile is selected by either clicking on the Drag and drop… button/area and navigating to the zipfile through a windows file dialog or by simply dragging and dropping the file in the Drag and drop… button/area. Currently the application does not support analyzing more than one polygon within the shapefile but can process a multipart polygon. A zipped file containing a shapefile with more than one polygon will default to using the first polygon listed in the shapefile table. Once a zipfile is loaded, an outline of the polygon within the shapefile is automatically placed on the map with the map extent zooming to this polygon. Again clicking on RUN ANALYSIS ON SHAPE button will begin the process of calculating results for that AOI. Because this process involves running multiple overlay analyses, it may take several seconds depending on the size of the AOI. Once the analysis is complete the Results panel will open with a graphical and tabular report specific to that defined AOI.

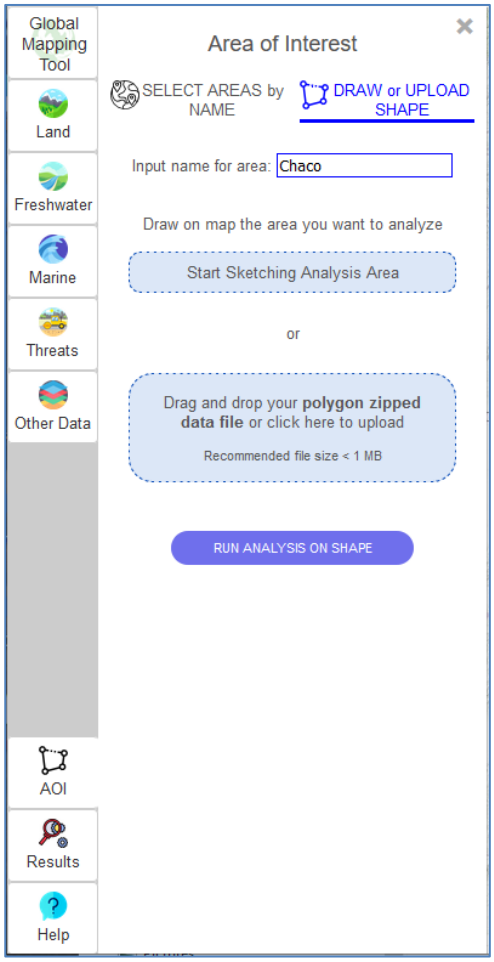

Fig. 4. AOI panel with DRAW or UPLOAD SHAPE selected

Results Panel

Once the AOI analysis is completed, the Results Panel is automatically displayed. This panel identifies the AOI results being displayed in a dropdown menu, charts the Cumulative Values Map by the acres of each class found within the AOI boundary, and provides several tables summarizing by acres the breakdown of all inputs to each of the cumulative classes (Fig. 5). The dropdown menu allows for changing the results panel output to any of the AOIs previously analyzed. The donut chart at the top of the report, summarizes by categories the cumulative value map. The chart displays interactively the class category, acres, and percent of AOI by hovering over any part of the chart. By clicking on the "*Show Cumulative Values Data +*" text located below and to the right of the chart, the full table is presented which reports the underlying data used for the chart. The chart coloring matches the corresponding map layer located within the Other Data panel. This layer is a summary of the combined distribution of all important landscape values mapped and accessible within the viewer. The tables preceding the chart provide a detailed breakdown of the individual landscape values used in producing the cumulative map. Each of these individual landscape values found in the tables also have an associated layer which can be displayed within the Viewer.

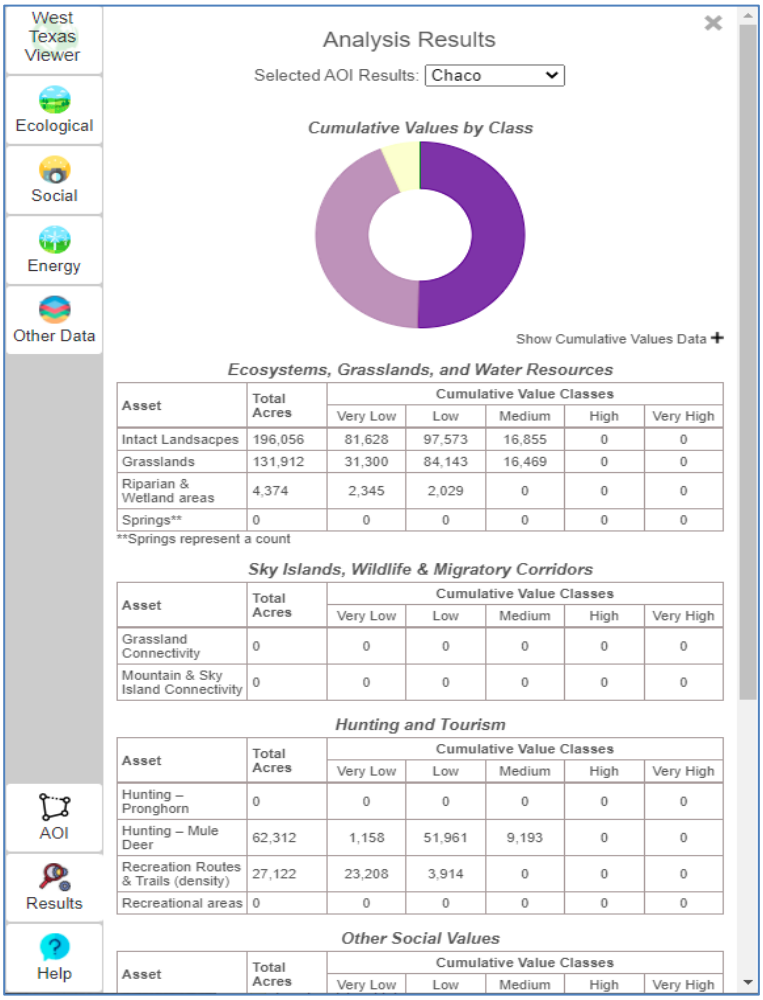

Fig. 5. Results panel. Bolded and larger text indicates select results heading viewed. For example, the panel on right displays AOI threats.

At the bottom of the Results panel, all results can be saved to a local HTML page by clicking on the Save All Result to HTML Page button. This produces a separate web page which then can be saved using any browser's Save Page As function. To maintain full functionality of the results, it is important to save the "**complete web page**". This saves all graphics and full functionality of the graphics and usually saves a folder and multiple files locally.

Additional Map Tools and Functionality

The Print button allows for saving and printing a map in one of two options: Layout and Map only. By clicking on Print button, an Export dialog (Fig. 6) is displayed. Using the Layout option, maps will contain a legend, scale bar and data sources. This option also provides a method to create a title for the map, assign the orientation and page size, and select a file format for the output. In the Advanced options an author and copyright statement can be added as well as a preferred map scale and DPI image resolution. Clicking the Export button after selecting the desired options creates the defined map image. Once the map is exported, a link to the file appears under the heading Exported files at the bottom of the dialog box. Click on this line to view the exported map (Fig. 7) and subsequently save the file. For a simple image showing only what is currently displayed in the application's map display, the user can click the Map only tab. This will create an image without all the map properties defined or any other map items such as a legend, scale bar, etc. **Note:**

Due to limits with regards to map spacing, layers with long legends or lengthy item descriptions may not be produced even when legend property is checked.

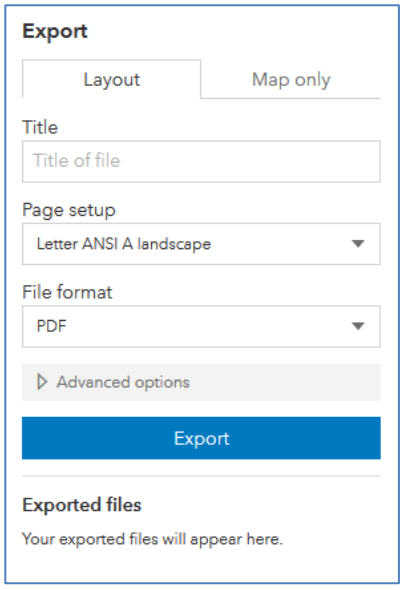

Fig. 6. Export dialog.

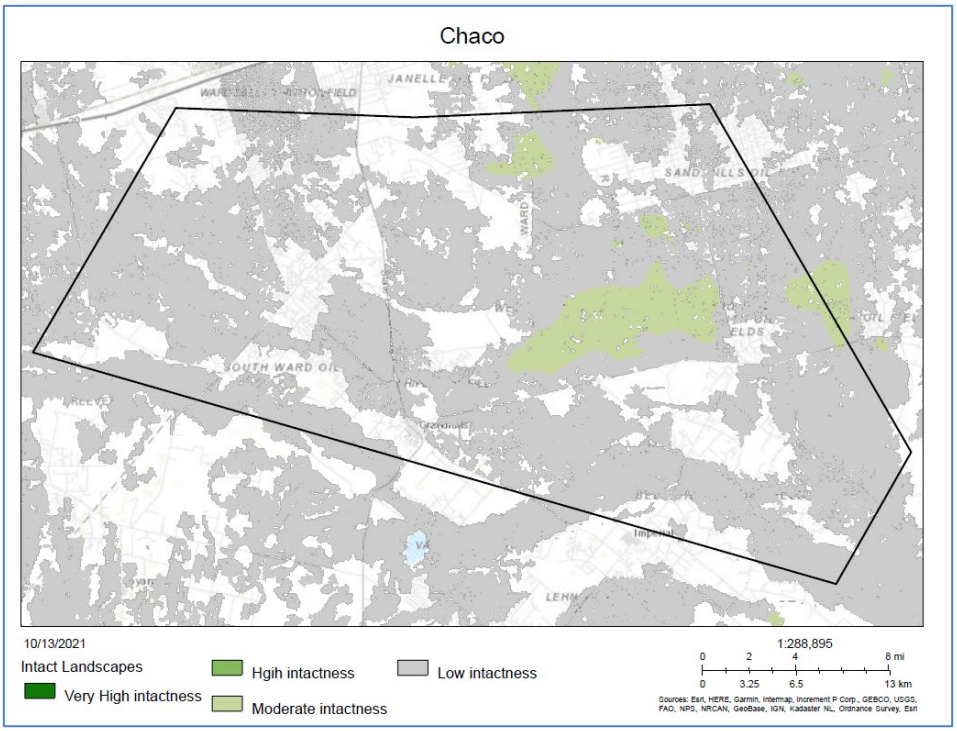

Fig. 7. Export map example

The Legend button opens a legend panel displaying all currently visible data seen within the map display. The full layer names with the classification descriptions are displayed in this dialog. Additionally, the draw order of the layers in the map display is represented by the order that the layers appear in the legend list with the last layer listed being display in front of the base map but behind all other layers.

Finally, there are several inherent map navigation functionalities built into the map display. These commonly used map navigation techniques are listed and described in Table 1. To avoid unsupported detailed mapping and analysis, the map display is limited to a maximum zoom threshold which is equal in size to approximately 4 km^2 area.

Table 1. Map Navigation Functions

Action	**Methods Available**
Zoom in - map center	Double click left mouse button, roll up mouse wheel, click plus icon
Zoom in - user defined area	Hold down *Shift* key and hold down left mouse button and drag mouse icon across map
Zoom out - map center	Hold down *Ctrl* key and double click left mouse button, roll down mouse wheel, click plus minus icon
Pan map	Hold down left mouse button and move mouse across map

Technical Description of Application

The **West Texas Viewer** was developed using HTML, CSS and JavaScript with mapping functionality built using the ArcGIS API for JavaScript. Maps being displayed and all analysis routines are built using ESRI ArcGIS Server technology. This application has been developed and tested for use in the most recent versions of Firefox, Internet Explorer, and Google Chrome but should also run in other compatible internet browsers.

Acknowledgements

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Data Team: The Nature Conservancy (Kei Sochi, Joseph Kiesecker, John Karges), Bureau of Economic Geology, The University of Texas at Austin (Jon Paul Pierre, Michael H. Young), Borderlands Research Institute, Sul Ross State University (Louis Harveson, Patricia M. Harveson, Billy Tarrant).

Web Application Development: The Nature Conservancy (Jim Oakleaf)