Colorado Solar Regional Mitigation Strategy & San Luis Valley-Taos Plateau Landscape Assessment

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Landscape Condition Model

One important model developed for the Landscape Assessment to assist in the evaluation of Conservation Element status and trends is the **Landscape Condition Model**. This model builds on a growing body of existing composite scoring methods that aim to characterize the relative ecological condition of landscapes (1-5). This model uses indicators of human modification to provide a measurable way to characterize condition. Indicators and their scores were selected for the Landscape Condition Model based upon knowledge of their amount and distribution in the study area and understood level of impact to natural systems (3,6,7). The Landscape Condition Model for this Landscape Assessment consists of a site impact score of human land uses (ranging from 0 to 1), reflecting the presumed level of ecological stress or impact (Table 1). Values close to 1.0 imply relatively little ecological impact from the land use. This relative range of values (0 to 1) is similar to the range of landscape condition values modelled in previous landscape modeling efforts (3-7).

Proximity to human modifications also affects ecological condition and can be spatially characterized in the landscape. Habitat quality and use by wildlife generally decreases with proximity to human developments. The Landscape Condition Model was parameterized with a maximum distance of influence of 4 km (Table 1). To characterize the influence of proximity to human modifications on ecological condition, each input data layer for the Landscape Condition Model was parameterized with a distance decay function that expressed a decreasing ecological impact with distance away from the mapped location of the feature (Table 1). This process involved the use of Euclidean Distance mapping tools and other geoprocesses (e.g., raster calculator) to spatially represent the functional relationship between condition value and distance away from the human land use indicator.

For this Landscape Assessment, the Landscape Condition Model was developed using datasets for existing development (current Landscape Condition Model) and for a near-term (i.e., 2015-2030) future timeframe using spatial data that project potential future human development.

Table 1. Landscape Condition Model impacting factors, site impact scores, and distance decay scores for the San Luis Valley – Taos Plateau Landscape Assessment.[1]

Human Land Use or Impact Factor	Site Impact Score[2]	Presumed Relative Stress[3]	Distance of Influence (m)[4]	Function[5]
Transportation				
Dirt roads, OHV trails	0.75	Low	500	linear
Local roads	0.3	Medium	1000	logistic
Primary highways	0.015	High	4000	logistic
Urban and Industrial Development				
Low density development	0.6	Medium	1000	logistic
Medium density development	0.35	Medium	2000	logistic
High density development	0.015	High	4000	logistic
Communication Towers	0.6	Low	200	linear
Powerlines / transmission lines	0.6	Low	200	linear
Mines and oil/gas well pad locations	0.2	High	1000	logistic
Urban Polygons	0.015	High	4000	logistic
High Impervious Surfaces	0.3	Medium	500	logistic
Urban Lights	0.05	High	4000	logistic
Managed and Modified Land Cover				
Pasture (landcover)	0.7	Low	500	linear
Grazing allotment polygons	0.7	Low	500	linear
Introduced vegetation	0.6	Medium	500	linear
Cultivated agriculture	0.35	Medium	2000	linear

[1] Modeling approach and parameters are adopted from the Landscape Condition Model prepared for the Mojave Basin and Range Rapid Ecoregional Assessment.
[2] Site Impact Score ranges between 0 and 1 and provides an indication of presumed ecological stress or impact. Lower values (closer to 0) indicate a greater site impact.
[3] Presume relative stress indicates the level of influence the impacting factor has relative to other impacting factors.
[4] Distance of influence is the minimum distance at which condition values approach 1.0.
[5] Distance decay functions for impacting factors with low or medium relative levels of stress were evaluated with linear or logistic functions. Distance decay functions for impacting factors with high relative levels of stress were evaluated with logistic functions.

Figure 1. Current Landscape Condition

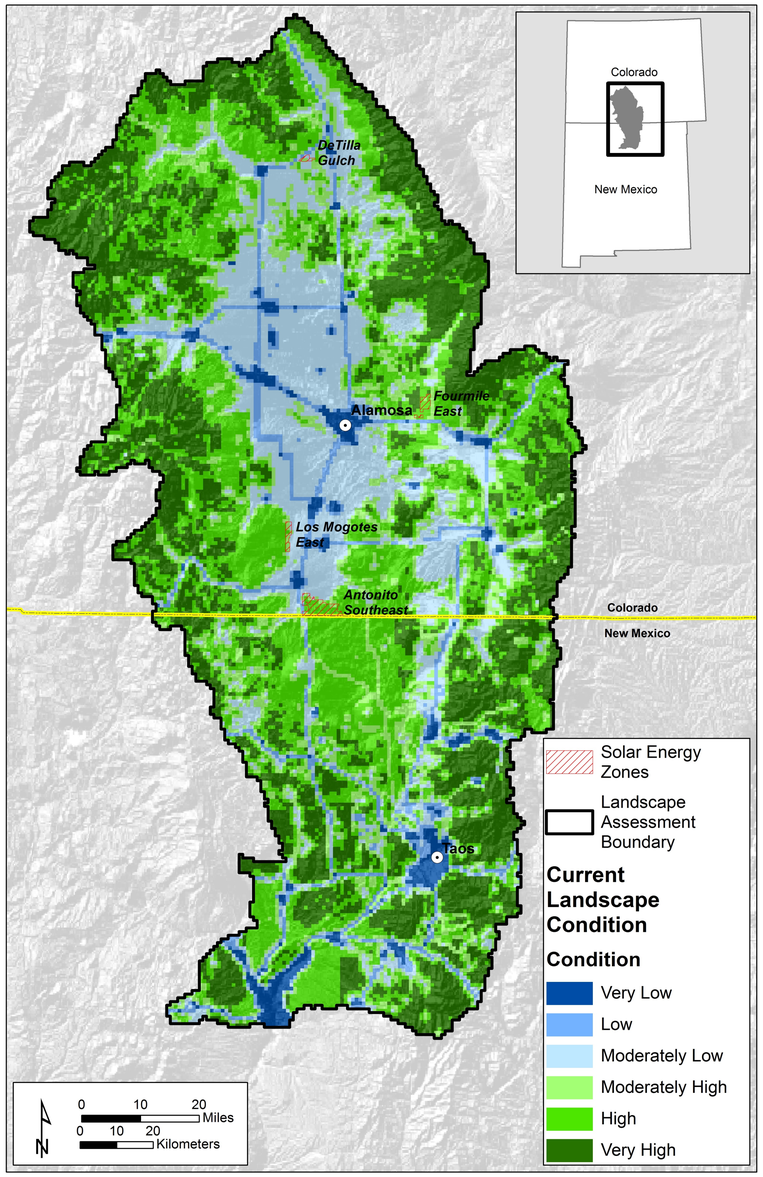
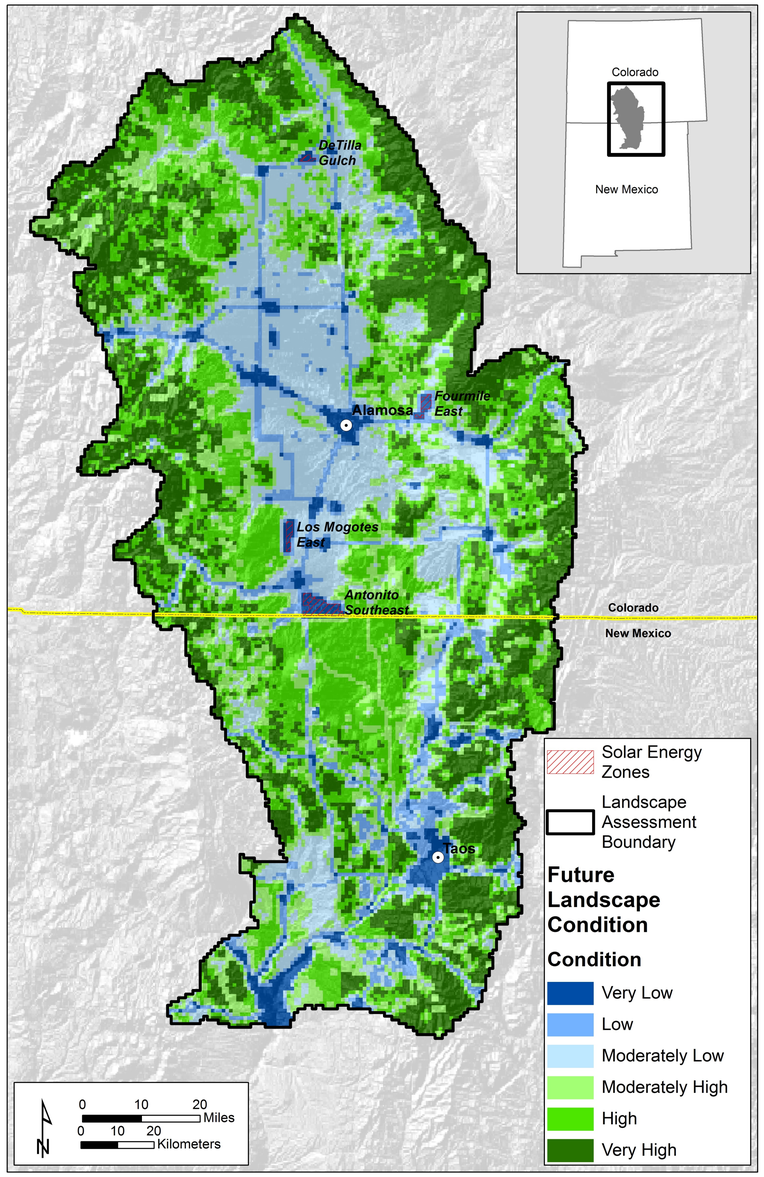
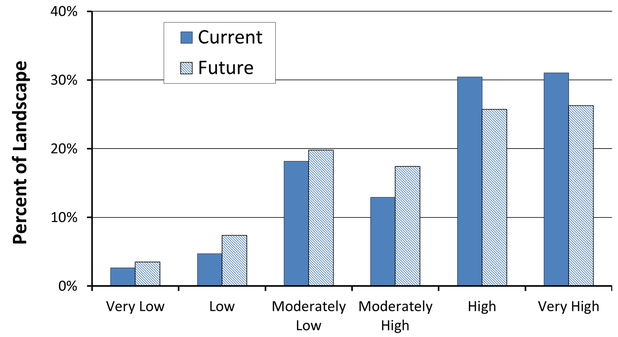


Figure 2. Future Landscape Condition (2015-2030)



Summary of current and future landscape condition categories in the study area.



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