

**Summary and metadata for an environmental justice analysis using data from
The Disappearing West**

27 July 2016

Submitted to:

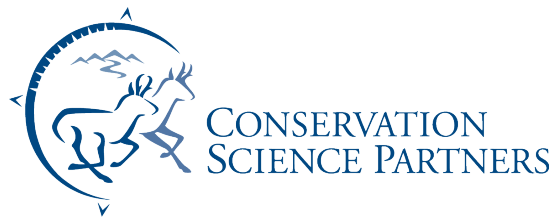
Center for American Progress

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Goal

The purpose of this analysis was to determine if communities of color (minorities) and low-income communities occupied areas that have experienced disproportionately greater levels of human modification and natural area loss. Specifically, we addressed two questions:

1. In 2011, which US Census tracts with a high percent of (a) minorities and (b) low income communities experienced disproportionately high levels of human modification?
2. Which tracts with a high percent of (a) minorities and (b) low income communities experienced the greatest loss of natural area, based on change between 2001 to 2011?

Methods

Minority tracts were identified using American Community Survey (ACS) 5-year survey data for 2007 to 2011 on racial population breakdowns. For this study, 'minority' is defined as all groups but non-Hispanic white. We calculated the percent minority for each US Census tract (2010) and classified a tract as 'minority tract' if its percentage was greater than the statewide tract-level median plus one standard deviation.

Low-income tracts were identified using ACS 5-year survey data for 2007 to 2011 on income to poverty ratio. For each tract, the percent low-income was calculated as the percentage of people earning less than two times the federal poverty level. If that percentage was greater than the statewide tract-level median plus one standard deviation, it was classified as a low-income tract. We then calculated the statewide tract-level mean as the mean value for each of the tracts, grouped by each state.

Mean degree of human modification was calculated in Google Earth Engine for each census tract based on the Disappearing West human modification layer for 2011. All other analyses were conducted in ArcGIS.

Results

Of the 15,561 tracts in the western US, we found 3,362 (21.6%) could be classified as minority and 3,283 (21.1%) as low-income for the period 2007 to 2011. Typically these were associated with more urban areas (Figure 1). We found that both low-income and minority tracts had higher average values of the degree of human modification in 2011, although minority tracts tended to have slightly higher human modification values (Tables 1, 2, and 3, Figure 2). We did not observe a strong relationship between low-income or minority tracts and the change in human modification from 2001-2011.

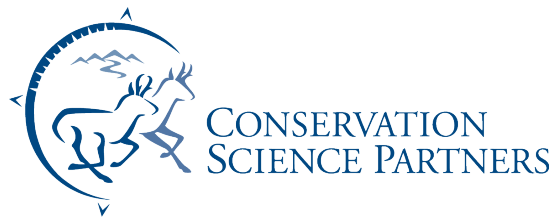


Table 1. Summary statistics for census tract-level human modification and natural area loss by minority and low-income tracts. Values shown here are the degree of human modification which range from 0.0 to 1.0.

		Minority	Non-minority	Low-income	Non low-Income
2011 Human Modification	Mean	0.8012	0.6830	0.7821	0.6889
	Median	0.8713	0.7764	0.8637	0.7807
	StDev	0.1992	0.2471	0.2206	0.2443
2001 to 2011 Natural Area Loss	Mean	0.0229	0.0307	0.0197	0.0315
	Median	0.0132	0.0168	0.0126	0.0169
	StDev	0.0311	0.0409	0.0238	0.0419

Table 2. The percentage of minority and non-minority tracts above or equal to or below the statewide tract-level mean human modification.

	Minority	Non-minority
Above	83.9	59.8
Equal to or below	16.1	40.2

Table 3. The percentage of low-income and non-low-income tracts above or equal to or below the statewide tract-level mean human modification.

	Low-Income	Non low-income
Above	79.5	61.1
Equal to or below	20.5	38.9

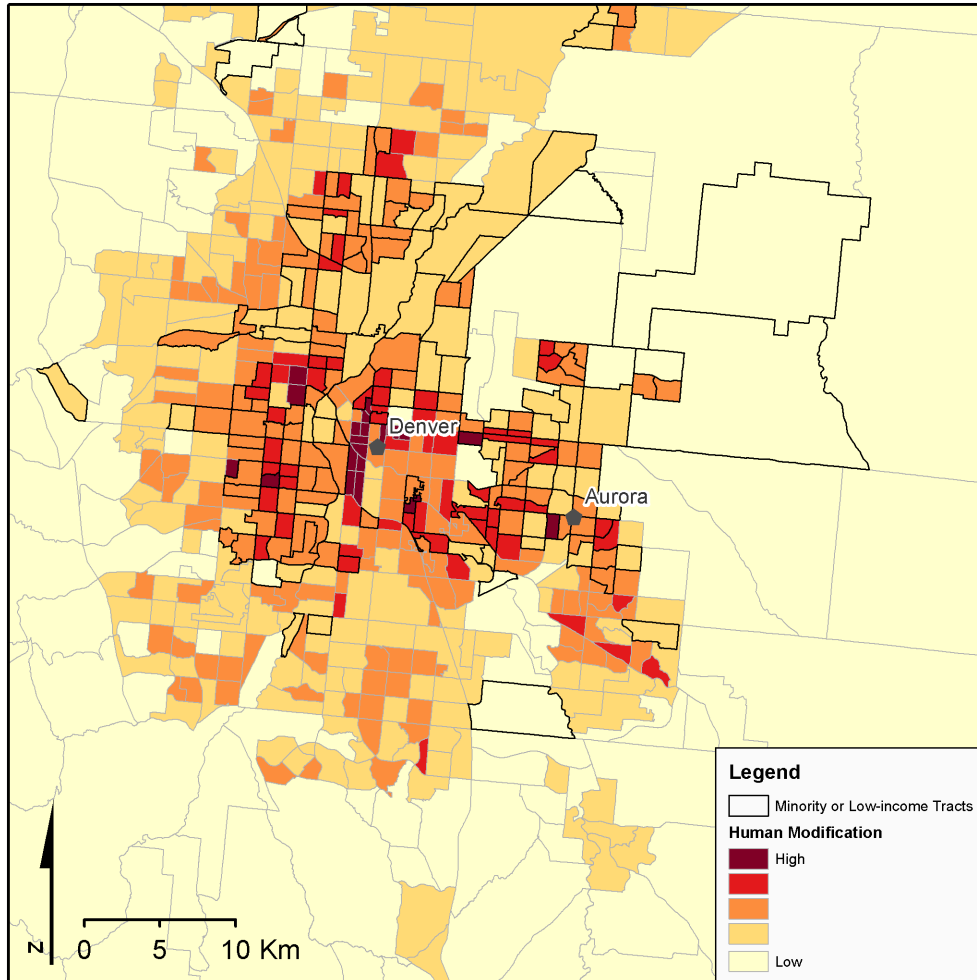


Figure 1. Map of tracts in the greater Denver area showing minority or low-income tracts outlined in black, with degree of human modification shown underneath.

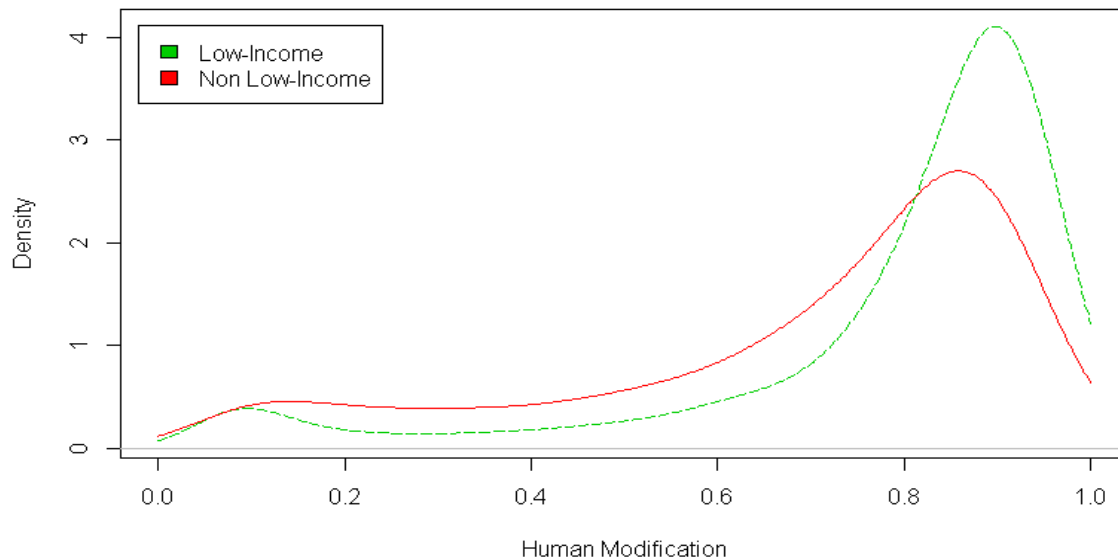
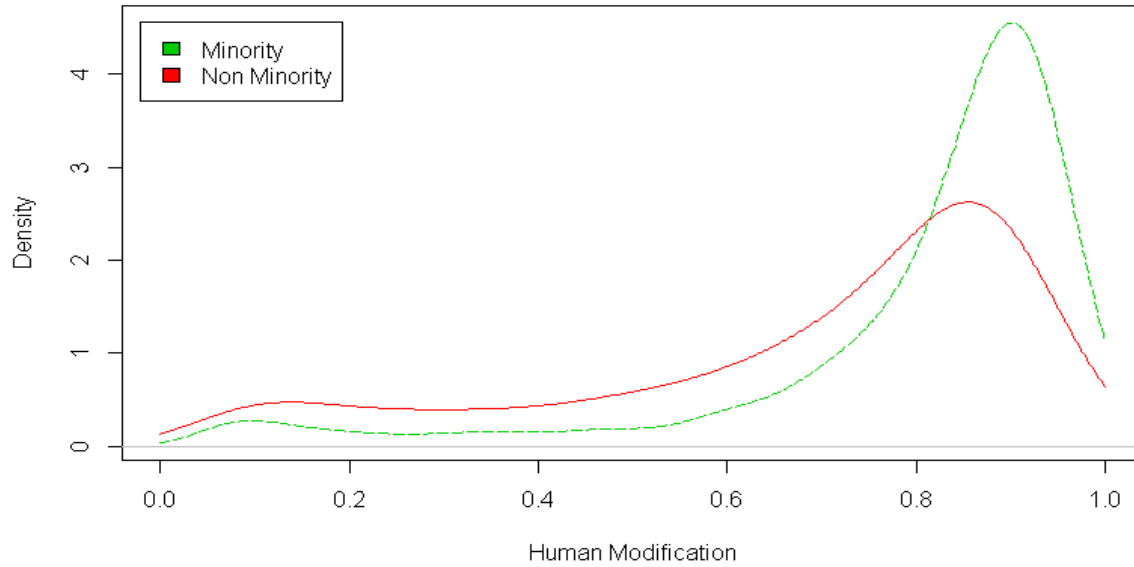
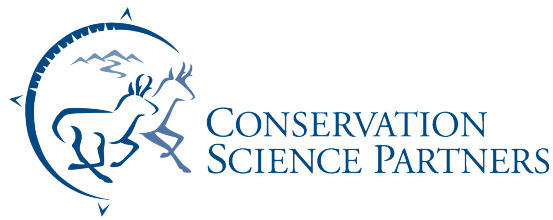


Figure 2. Minority tracts (upper) and low-income tracts (lower) were found to have higher values of human modification. The y-axis is displayed as density (rather than # of tracts) to enable direct comparison of the minority/non minority and low-income/non low-income groups, which have different numbers of tracts.



Products

The primary product of this analysis is a shapefile of 2011 United States Census tracts called “West_Tracts_CAP_EJ_20160726.shp” that contains the following attributes, in addition to the standard census boundary attributes (obtained from NHGIS, www.nhgis.org):

- a. GISJOIN: Unique identifier from the NHGIS to join the tabular data over to the boundaries.
- b. GEOID: State FIPS, County FIPS, Tract code concatenated.
- c. PercentMin: The percentage of the population that is minority, defined as all but non-white Hispanic.
- d. PercentLI: The percentage of the population that is low-income, defined as having a household income less than 2 times the federal poverty level. A value of -1 indicates that there was no data available for that tract.
- e. Minority: A binary variable indicating whether that tract was determined to be a minority tract. If the percent minority of that tract is greater than the corresponding state tract-level average plus one standard deviation, then 1, otherwise, 0. A value of -1 indicates that there was no data available for that tract.
- f. Low_Income: A binary variable indicating whether that tract was determined to be a low-income tract. If the percent minority of that tract is greater than the corresponding state tract-level average plus one standard deviation, then 1, otherwise, 0.
- g. MeanHm: The mean 2011 Disappearing West human modification pixel value for that tract.
- h. HmAboveAvg: A binary variable indicating whether or not the tract’s mean human modification is greater than the mean human modification of all tracts in the corresponding state. 1 indicates yes, 0 indicates no.
- i. MeanNAL: The mean natural area loss pixel value. Natural area loss was calculated as the 2011 human modification minus the 2001 human modification. A positive value means an increase in human modification, and a negative value mean a decrease in human modification from 2001 to 2011.
- j. NALAboveAy: A binary variable indicating whether or not the tract’s mean natural area loss is greater than the mean natural area loss of all tracts in the corresponding state. 1 indicates yes, 0 indicates no.
- k. medianLI: The median percent low-income of all tracts in the corresponding state.
- l. StDevLI: The standard deviation of the percent low-income for all tracts in the corresponding state.
- m. medianMI: The median percent minority for all tracts in the corresponding state.
- n. StDevMI: The standard deviation of the minority low-income for all tracts in the corresponding state.
- o. STmeanHm11: The mean human modification of all tracts in the corresponding state.
- p. STmeanNAL: The mean natural area loss of all tracts in the corresponding state.
- q. Population: The 2010 census population.
- r. EJlboth: The tracts that are either minority or low-income, and above state average human modification.
- s. EJlmin: The tracts that are both minority and above state tract-level average human modification.
- t. EJllowInc: The tracts that are both low-income and above state tract-level average human modification.