Soil-Geomorphic Change during Desertification

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The progressive degradation of vegetation and soils in arid, semiarid, and subhumid zones
Vegetation changes in the Jornada Basin from 1858 to 1998

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Abstract

Notes made by land surveyors in 1858 were utilized to estimate cover of grasses and shrubs on the Jornada Experimental Range (JER) and the Chihuahuan Desert Range Research Center (CDRRC) in the northern Chihuahuan Desert in southern New Mexico, USA. Portions of these areas have been previously assessed for historical vegetation dynamics but the entire 84,271 ha assessed in the 19th century has not been examined in total. In 1858, fair to very good grass cover occurred on 98% and 67% of the JER and CDRRC, respectively. Shrubs were present throughout both properties but 43% of the JER and 18% of the CDRRC were shrub free. Reconnaissance surveys, made to determine carrying capacity for livestock were made in 1915-1916 and 1928-1929 on the JER and in 1938 on the CDRRC, show that shrubs had made large increases in area occupied at the time of the surveys. Vegetation type maps were made of both properties in 1998. Mesquite (\textit{Prosopis glandulosa}) was the primary dominant on 59% of the JER in 1998 and creosotebush (\textit{Larrea tridentata}) was the primary dominant on 27% of the area. On the CDRRC mesquite and creosotebush were primary dominants on 37% and 46% of the area, respectively. Grass cover has decreased greatly with the increase in shrubs and only shrub control efforts have maintained the once abundant black

Fig. 4. Vegetation types on the Jornada Experimental Range where the listed species were the primary dominants in 1915–1916, 1928–1929, and 1998. A larger area was fenced at the southern end of the range in 1915-1916 but the area outside the dotted lines was not included in calculation of area.
Soil-Geomorphic Templates
Soil-Geomorphic Templates

Pattern upon which something is duplicated.
For example
Another example
How large is a Soil-Geomorphic Template?
Size of the Soil-Geomorphic Template is a matter of resolution, and it must be heterogeneous.
Soil-geomorphic change $\xrightarrow{\text{link}}$ Desertification
rhyolite alluvium
gypsiferous clay
soil

\[\text{erosion-sedimentation} \]

\[\text{lithic inheritance} \]

parent material
soil-geomorphic template
Desertification States

state #1  state #2

black grama grass on sandy soils

mesquite coppice dunes
Sandy Basin Floor Site

1750

1850

1950

2050

mesquite

black grama
Soil-geomorphic change \quad \text{link} \quad \text{Desertification}
Soil-geomorphic change

Desertification

*link*

*interacting, interrelated, interdependent system*