

Man as a Geomorphological Agent in the Tri-State Zinc-Lead District

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Landform features have claimed the attention of man since his ascendancy to world dominance. Only within the past 100 years, however, has he made an inquisitive and scientific investigation of landform orogeny and evolution. His attention has been drawn to the diastrophic and weathering-erosional features present in nature. Only occasionally and superficially has he given any attention to man's influence on landforms.

Indeed a new concept must be introduced before earth scientists can adequately measure the influence of man upon landforms. The scientists must first be made to realize that man *can, does and has* altered the physical landscape as well as the cultural.

Toward that end it appears perfectly logical to the author that the man-made 'canyons' at Hull Rust or Bingham are as real as the Palo Duro or Wind River Canyons. Man induced badlands in severely eroded areas of Oklahoma are as apparent as the naturally eroded badlands of the Dakotas. Piles of debris at mine mouths are without a doubt as noticeable as kames or drumlins; abandoned railroad embankments are certainly as noticeable as eskers or crevasse fills; Lake Mead is as real as Lake-of-the-Woods. In short, it appears clear to this author that landform features have been created—and destroyed by man. Man has been an aggradational and degradational agent as surely as has running water. The geomorphological cycle has been slowed, accelerated, and in some cases reversed by man's disturbance of nature's balance.

The primary objective of this study is to demonstrate, qualitatively, man's geomorphological influence in the Tri-State District. Time and space have prevented a thorough quantitative analysis, but the author presumes the few examples cited will suffice to prove that man has been an active geomorphological agent in northeastern Oklahoma, southeastern Kansas, and southwestern Missouri.

Waste piles are everywhere. Some of them are over 100 feet high and may cover several acres. Unless waste piles are removed because of demands for 'chat' vegetation will stabilize them, and isolated semi-permanent hills will become a part of the predominately plains landscape of the region. Even if all waste rock is removed (which appears highly unlikely), man has effected other geomorphological changes in the area, which can not be readily altered.

Subsidence has occurred throughout the area resulting in depressions not unlike sink holes in karst regions. One striking example of such subsidence can be observed in the downtown district of Picher. Several blocks have subsided as the result of underground mining and cave-ins. Further subsidence in Picher, and elsewhere in the region, will undoubtedly occur as mine pillars deteriorate.

Earthquake-like tremors have occurred due to subsidence and they will occur in the future. Subtle changes in the rate of underground and surface weathering will be more apparent as time goes on. This condition will prevail because of the exposure of underground rocks to the air and surface rocks to residual sulphur.

Unfortunately only the most obvious changes in the physical landscape, such as subsidence and the building of waste piles are readily noticeable. Only long time study can insure adequate measurement of the subtle changes wrought by the hand of man on the land forms of the Tri-State District.