

## LANDSCAPE DEVELOPMENT AND SPATIO-TEMPORAL VARIATION IN SOIL EROSION: EFFECTS OF SCALE AND THRESHOLDS

*Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, The Netherlands*

Soil erosion and degradation phenomena are widespread in dry land ecosystems in the world. It is of importance to understand the causes behind these processes as agriculture is strongly dependent of the soil as a resource. In general both climatic variations and human factors play a role but soil erosion may also be a natural geological process, creating new landscapes.

*Key words: soil erosion, scale, thresholds.*

Е. Л. Г. Каммерат

*Університет Амстердама, Нідерланди*

### ЭВОЛЮЦИЯ ЛАНДШАФТОВ, ЗАЛЕЖНОСТЬ ЭРОЗИИ ГРУНТОВ ОТ КООРДИНАТ У ПРОСТОРИ ТА ЧАСІ: ВПЛИВ МАСШТАБУ ТА МЕЖ

Процеси ерозії та деградації ґрунтів достатньо часто мають місце у посушливих екосистемах у всьому світі. Важливо розуміти механіку цих процесів, оскільки сільське господарство прямо залежить від ґрунтових ресурсів. Хоча зміни клімату, як і людський фактор, мають великий вплив на природні геологічні процеси, не варто забувати також про ґрунтову ерозію, яка може слугувати головною причиною появи нових ландшафтів.

*Ключові слова: ерозія ґрунту, масштаб, межі.*

Э. Л. Г. Каммерат

*Институт биоразнообразия и динамики экосистем, университет Амстердама, Нидерланды*

### ЭВОЛЮЦИЯ ЛАНДШАФТОВ, ЗАВИСИМОСТЬ ЭРОЗИИ ПОЧВ ОТ КООРДИНАТ В ПРОСТРАНСТВЕ И ВРЕМЕНИ: ВЛИЯНИЕ МАСШТАБА И ГРАНИЦ

Процессы эрозии и деградации почв достаточно часто имеют место в засушливых экосистемах во всем мире. Очень важно понимать механику этих процессов, поскольку сельское хозяйство во напрямую зависит от почвенных ресурсов. Хотя и изменения климата, и человеческий фактор имеют огромное влияние на естественные геологические процессы, не стоит забывать и о почвенной эрозии, которая может служить главной причиной появления новых ландшафтов.

*Ключевые слова: эрозия почвы, масштаб, границы.*

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In soil erosion studies the effect of scale is often incorporated in the concept of the sediment delivery ratio for a catchment and generally this ratio decreases with increasing size of the catchments as sediment relocated from soils is temporary stored in alluvial systems, like terraces. However looking in detail into these processes the picture might be more complicated. In this study an example is given for a an experimental catchment in SE Spain where these processes have been studied at different scales, ranging from the plot to the catchment scale with a data set covering more than 12 years.

Plot, hillslope and catchment data with regard to sediment and runoff were collected and vegetation structure changes were also determined using remote sensing techniques applying landscape metrics. Runoff and hence sediment transfer showed clearly different responses with regard to scale related thresholds, such as bare area-plant patch characteristics at the finest scale, vegetation structure at the hillslope scale and terracing at the catchment scale (fig. 1). Vegetation patterns and connectivity patterns changed considerably, not only in semi-natural lands but especially in abandoned lands. Furthermore it was observed that erosion

rates, as measured on the plots were very small, and that sedimentation rates in a small downstream water retention reservoir were higher than the plot erosion rates. The erosion rate on the broadest scale was rather extreme for individual events. From landscape reconstruction data and incision rates, including C14 dating, it became clear that incision rates are currently very high, but over periods of hundreds of years show a large variation, with even periods where deposition dominated. These results seem to be contradicting and will be discussed in terms of land use effects and the of concept sediment pulses through landscapes which might at least partly explain the results observed. Furthermore this may affect our opinion on these fragile landscapes where soil erosion is prominent, as currently measured rates may incorporate also inherited effects from the past, either natural or human induced.

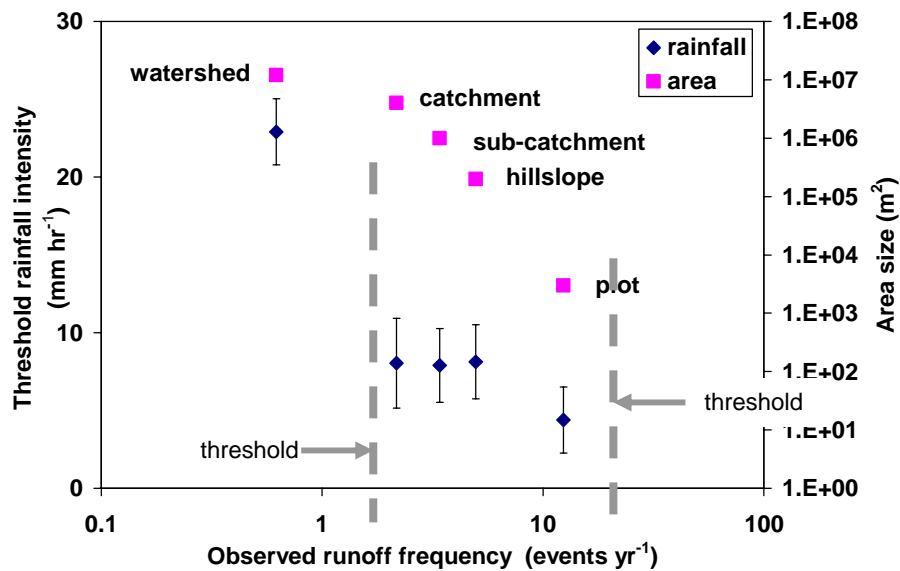


Fig. 1. Runoff thresholds in relation rainfall intensity and runoff absorbing structures (vegetation and terraces)

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