

Mapping of channel extent and gully erosion risk

We have analysed the Reef Trust Lidar elevation data using algorithms that assess the current extent of erosive channels, and the areas at risk of future gully erosion. The purpose of these datasets is to provide rapid initial assessment of gullies, and areas prone to gully erosion, to identify priorities for further investigation.

Data available here: <https://data.csiro.au/collection/csiro:52249>

Data products

The two datasets available are (1) a map of existing gullies and erosive channels, and (2) a map showing areas susceptible to future gully erosion.

Existing gullies and erosive channels

The extent of existing gullies and erosive channels is mapped according to a pre-defined geometric model (Figure 1). This data enables:

- A quick assessment of the total area of erosive channels.
- Identification of individual gullies and gully networks.

Grids can be downloaded in GeoTIFF format where values of 1 indicate an erosive channel and 0 indicates unchanneled land.

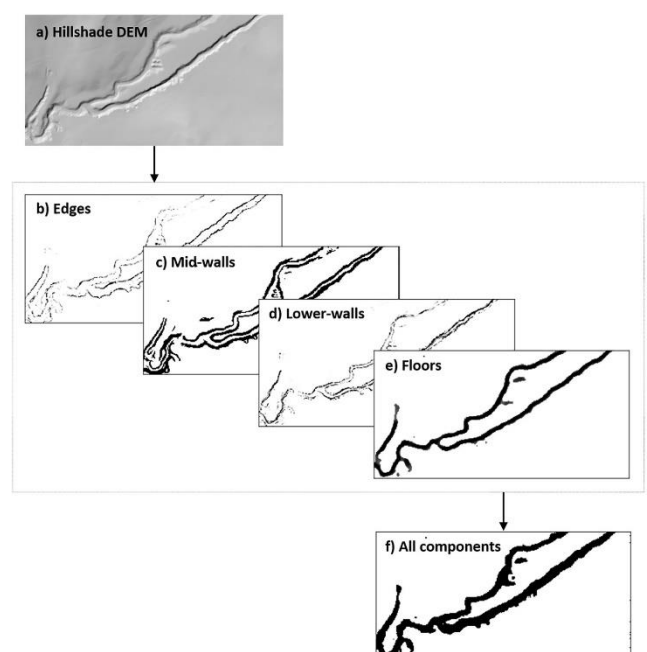


Figure 1: Identification and compilation of components of a gully. (a) Hillshade DEM of the gully. (b) Edges identified using positive profile curvature. (c) Steep walls. (d) Low negative profile curvature values at base of walls. (e) Feature floors with low slope and locally low position. (f) All four landform element components combined.

Areas at risk of gullying

Areas assessed to be at risk of gully erosion (Figure 2) are identified using hydrological indices found to correlate with gully formation including catchment area, slope and topographic areas prone to saturation (Moore et al. 1988; Walker et al., 2020). This data enables:

- Assessment of the potential for a gully to expand.
- Identification of locations vulnerable to gully erosion where a gully does not yet exist.

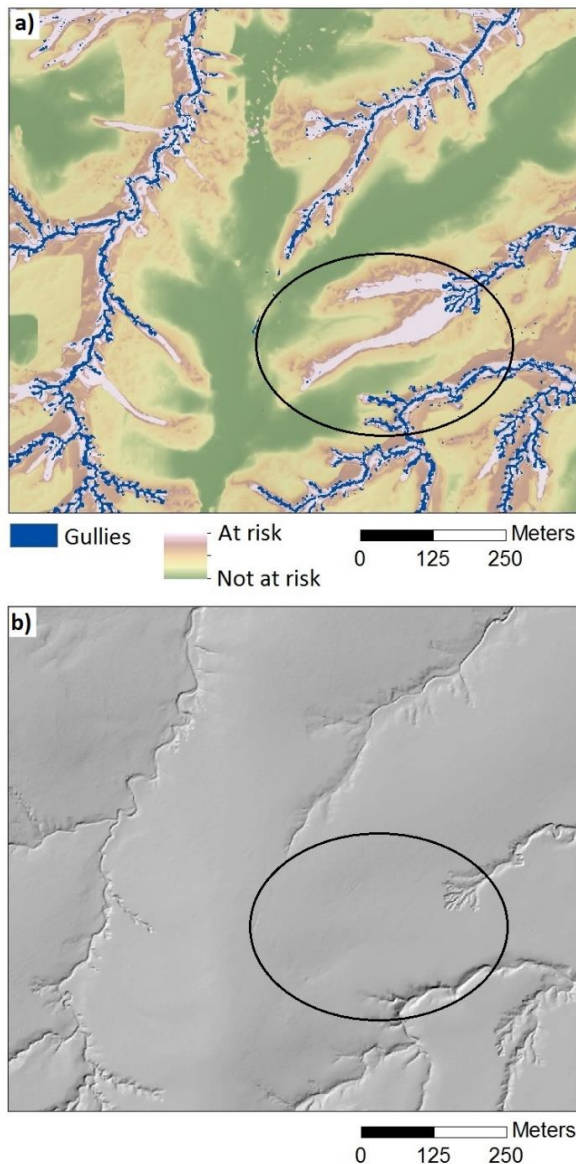


Figure 2: Panel a) shows areas predicted to be at risk overlain by mapped gullies. Panel b) shows a hillshade DEM for the same area. The black oval shows a gully predicted to have potential for future expansion.

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Grids can be downloaded in GeoTIFF format, where higher values indicate higher risk of future gullying.

Intended uses for the datasets

The dataset provides a rapid assessment of areas that may be of interest for gully remediation, or for comparing potential gully candidates within an area selected for remediation works.

- Mapped gullies with larger adjacent areas at risk of gullying may be higher priorities for management.
- The datasets are intended to target further investigation of recent gully activity using historic imagery and onsite assessment.
- Results are based on topographic analysis and do not consider variations in auxiliary landscape variables such as vegetation, soils, or climate.
- The datasets do not identify what gully management actions may be suitable or effective

Synthesis

The value of this data is to provide an initial rapid assessment of potential gully erosion management areas and individual gullies. Comparison between two gullies can indicate which has greater potential for future erosion and hence is likely to be a better erosion management candidate. Landscapes affected by gully erosion that have a larger number of areas at risk, but currently un-gullied, have greater potential for preventative gully management. Landscapes where gullies have occupied most of the potential area may erode more slowly but the cumulative sediment yields may still be significant.

References

- [Walker et al. 2020](#) S.J. Walker, S.N. Wilkinson, A.I. van Dijk, P.B. Hairsine. A multi-resolution method to map and identify locations of future gully and channel incision *Geomorphology*, 107115
- [Moore et al. 1988](#) I. Moore, G. Burch, D. Mackenzie Topographic effects on the distribution of surface soil water and the location of ephemeral gullies. *Transactions of the ASAE*, 31 (1988), pp. 1098-1107

For further information

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