The authors present a set of GIS tools for the analysis of erosion and sediment yield at river basin scale and propose an application to a 573 km^2 watershed in California. The tools developed are easily applicable and could help watershed managers in objectively prioritizing sediment sources and recognizing areas for sediment storage.
I wish to recommend some refinements in the introduction and in the description of methods

<u>Section 1: Introduction and Objective</u>

Sediment trapping by dams and gravel mining could be mentioned amongst the processes that cause channel incision (Kondolf, 1997; Surian and Rinaldi, 2003).

More papers (e.g., Brasington et al., 2000, Fuller et al., 2003; Picco et al., 2013) on the assessment of channel erosion and aggradation by means of DEM differencing could be cited, including the work by Wheaton et al. (2010), which provided an important advance in uncertainty assessment.

<u>Section 3: Methods</u>

Line 23 of page 4 enounces that Eq. 1 employs slope gradient and local topographic convergence: the variable *S*, which apparently corresponds to slope, could be clearly defined.
More details could be provided on the variation of the parameter *b* with topographic convergence.

Page 5, lines 24-25: "Eq. 2 simulates that grasses are less effective…" This is a rather strong simplification of the complex interactions between vegetation cover and erosion. What evidences support this ranking in the effectiveness of vegetation types in the studied area? The authors could consider the relations of their approach with methods commonly used to evaluate the influence of vegetation on erosion, such as USLE – RUSLE C-factor.

Equation 3: it can be noted that the conversion factor is equivalent sediment delivery ratio (Walling, 1983), although GEP is an index of erosion, not a quantitative measure of gross erosion.

Sediment yield is a measure of sediment output from a watershed: it incorporates erosion and within watershed redeposition of eroded material. It is a measure lumped at watershed scale, and is dependent on watershed size. Transposing to other sites within the catchment the value of sediment yield computed at the catchment outlet, or ascribing it to land portions, as it has been done in this paper, is thus questionable. Such a transposition could be legitimate provided that the variable is considered an index and not a direct quantification of local sediment yield.
Sediment yields reported for different sectors of the studied watersheds (e.g., Figs. 4 and 5) should be presented as values of an index that enables framing the local susceptibility to erosion in the context of sediment yield assessed at the river basin scale.

Section 3.6
The small DEM cell size requires to provide some technical details on the assessment of drainage area. Channel width in most cross sections is presumably much greater than DEM cell size (2 m). If

applied to single DEM cells, the algorithms for upstream watershed extraction and drainage area assessment would fail to identify the whole upstream area. Some information on how this issue was managed could be provided.

References

Brasington, J., Rumsby, B.T., McVey, R.A., 2000. Monitoring and modelling morphological change in a braided gravel-bed river using high resolution GPS-based survey. Earth Surface Processes and Landforms 25, 973–990.

Fuller, I.C., Large, A.R.G., Milan, D.J., 2003. Quantifying channel development and sediment transfer following chute cutoff in a wandering gravel-bed river, Geomorphology, 54, 307-323.

Kondolf, G.M., 1997. Hungry Water: Effects of Dams and Gravel Mining on River Channels. Environmental Management, 21, 533–551.

Picco, L., Mao, L., Cavalli, M., Buzzi, E., Rainato, R., Lenzi, M.A., 2013. Evaluating short-term morphological changes in a gravel-bed braided river using terrestrial laser scanner. Geomorphology, 201, 323-334, DOI: 10.1016/j.geomorph.2013.07.007

Nicola Surian, Massimo Rinaldi, 2003. Morphological response to river engineering and management in alluvial channels in Italy, Geomorphology, 50, 307-326.

Walling, D.E., 1983. The sediment delivery problem. Journal of Hydrology, 65, 209-237.

Wheaton, J.M., Brasington, J., Darby, S.E., Sear, D.A., 2010. Accounting for uncertainty in DEMs from repeat topographic surveys: improved sediment budgets. Earth Surf. Process. Landf., 35, 136–156, doi:10.1002/esp.1886