GIS 4 Geomorphology

Geomorphometry of Mountain Landscapes & Upland Watersheds…a little Wildlife, too

Hack's Stream-Length

Hack's Stream-Length Index (1973):

SL = (Δheight / Δlength) x L

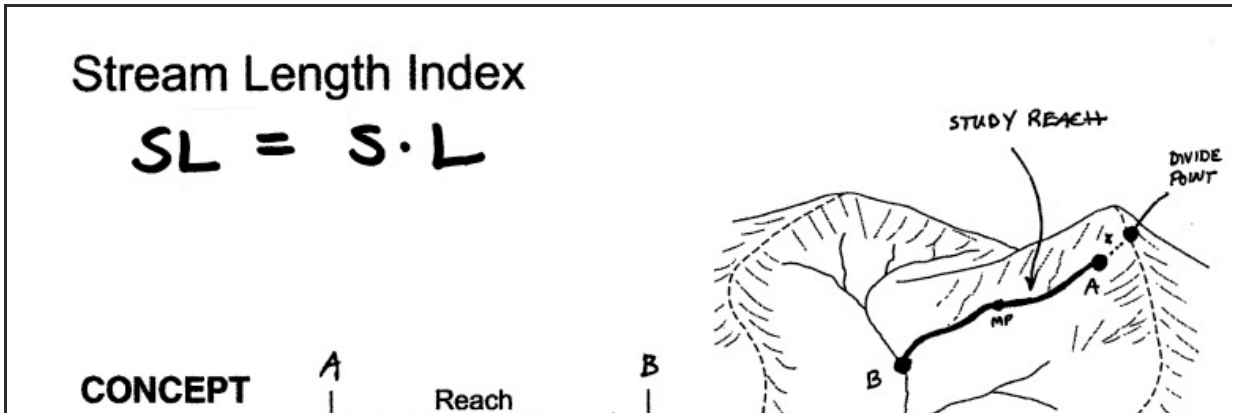
** Δlength must always be smaller than L*

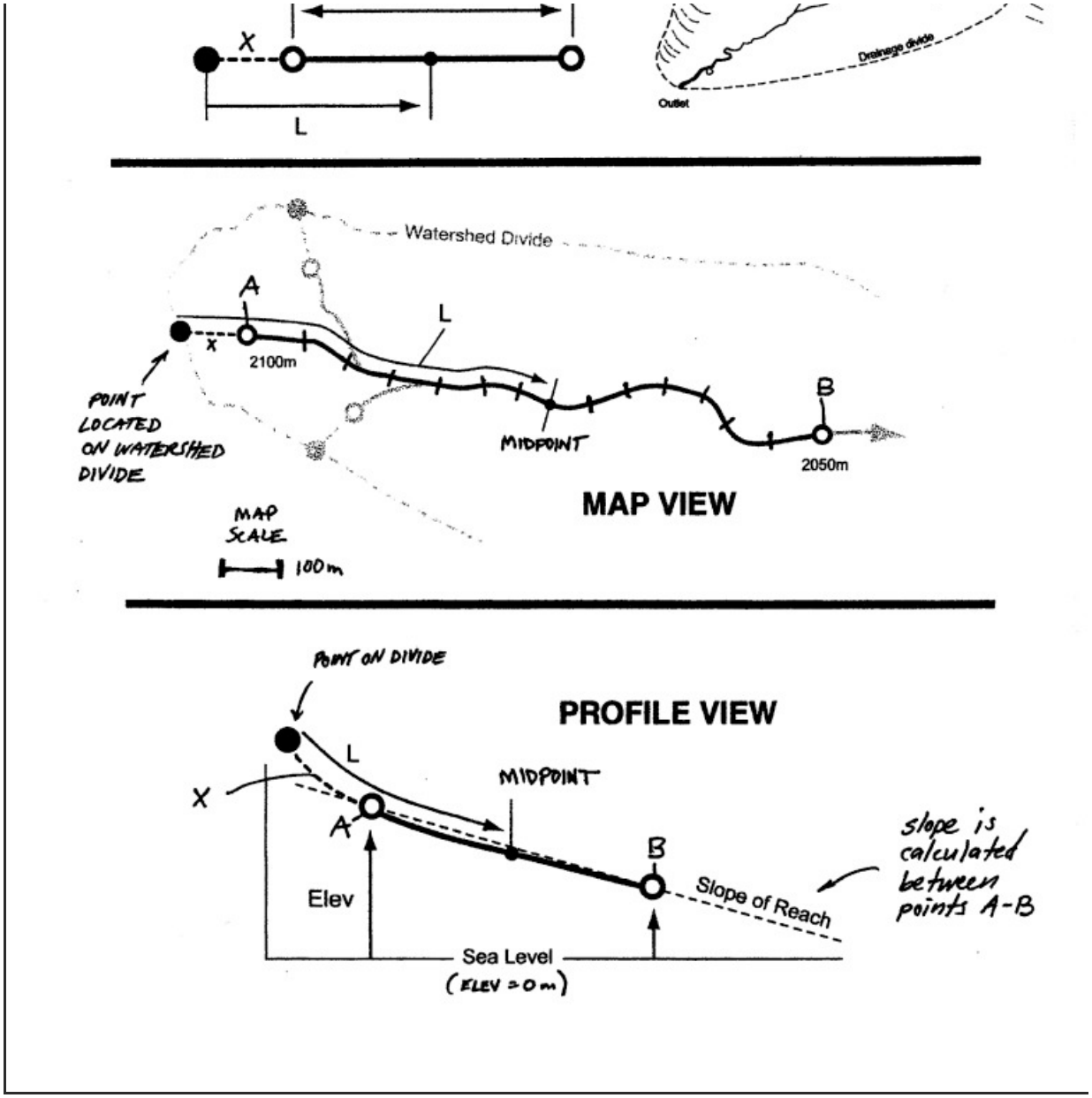
Thanks to R.K. Kaushal for correcting my formulas! I'm such a dope.

	A	B	C	D	E	F	G	H	I	J	K
	Reach ID	X-Dist	Slope (S)	Reach Length	Cum Length	Half L	Length (L)	Elev Max	Elev Min	Delta h	SL
1	1	300	0.027054108	998	998	499	799	2100	2073	27	21.616
2	2	300	0.053475936	935	1933	467.5	1765.5	2073	2023	50	94.412
3	3	300	0.022446689	891	2824	445.5	2678.5	2023	2003	20	60.123
4	4	300	0.016563147	966	3790	483	3607	2003	1987	16	59.743
	Formulas -->	*Fixed*	*J3/D3*	*Measured*	*(D2+E1)*	*D2/2*	*E1+F2+B2*	*Measured*	*Measured*	*H2-I2*	*C2*G2*

Add These to Determine Lengths of L1, L2, L3, and L4				
L1 -->	300	499		799
L2 -->	799	499	467.5	1765.5
L3 -->	1765.5	467.5	445.5	2678.5
L4 -->	2678.5	445.5	483	3607

Click for PDF of figure below.





Mapping of SL Index values at the landscape scale is done, first by calculating index values for all streams in a region, second by using Inverse Distance Weighting (IDW) or another interpolation tool on the point values, and third by breaking the IDW surface into 5-10 classes for display. Use natural breaks or another means of assignin class break values.

Refs

Etchebehere et al. (2004) Revista do Instituto de Geociências da USP – Série Científica 4

Fonseca & Augustin (2011)

Hack (1957) USGS Professional Paper 294-B

Hack (1973) USGS report

McKeown et al. (1988) USGS Bulletin 1807

Monteiro et al. (2010) UNESP Geociências 29
Perez-Pena et al. (2009) ESP&L 34
Seeber & Gornitz (1983) Tectonophysics 92
Troiani (2008) Geomorphology 102
Zhang et al. (2011) Geomorphometry.org

Zhang et al. (2011)