The purpose of this spreadsheet is to estimate the relative contributions of different land uses to the alteration of the natural hydrology within Rivanna watersheds. It is rather simplistic but could serve as a starting point for refinements or the ident ification of data needs.

The spreadsheet is based on the following:

contribution to hydrologic alteration = f (relative area, degree of land conversion)

... or, in other words, the contribution to hydrologic alteration by each land use is a function of the relative contributing area of the land use and the degree – or intensity – of land conversion (and consequently the hydrologic response) relative to an *ideal* land cover. An ideal land cover is one that has no negative impact on streams.

As you probab ly know, curve number is a standard hydrologic attribute that represents how much runoff a particular land use and soil type will generate due to a particular rainfall amount. The closer the number is to 100, the more intense (more impervious) the land us e is. Here is a link to a standard table of curve numbers: http://www.ecn.purdue.edu/runoff/documentation/scs.htm .

For the purposes of this model, I assume that an ideal land cover is a forest (woods) in good condition – think Shenandoah National Park. Thus, I use the difference in curve number between each land use and that of a good forest to represent the degree of land conversion. I then weight this number by the relative land area of each land use to compute the relative impact score.

Points to note:

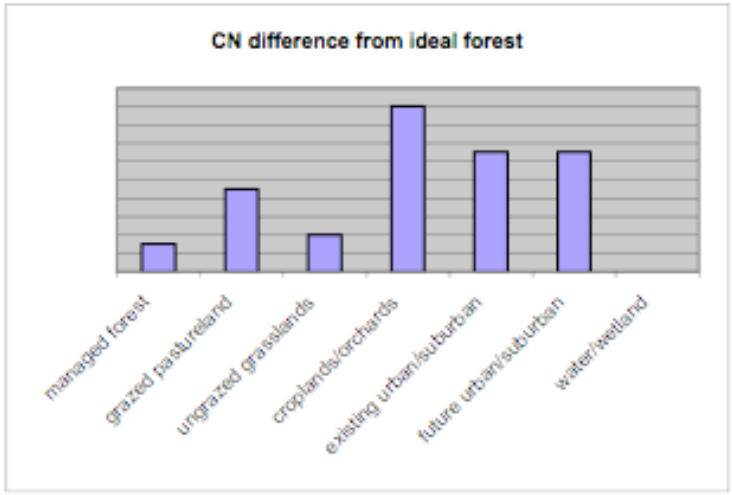
- I assume that most forest cover within the watershed is less than ideal in that it is either a managed or urban forest; thus, I assign for forests within the watershed a curve num ber that is greater than that of an ideal forest, equivalent to a forest in *fair* condition.
- even though surface water has a very high curve number (all rainfall results in "runoff" since there is no infiltration), the existence of water doesn't negatively affect stream health; therefore, I remove this affect from the spreadsheet by "zeroing it out"
- there are many comments embedded within cells

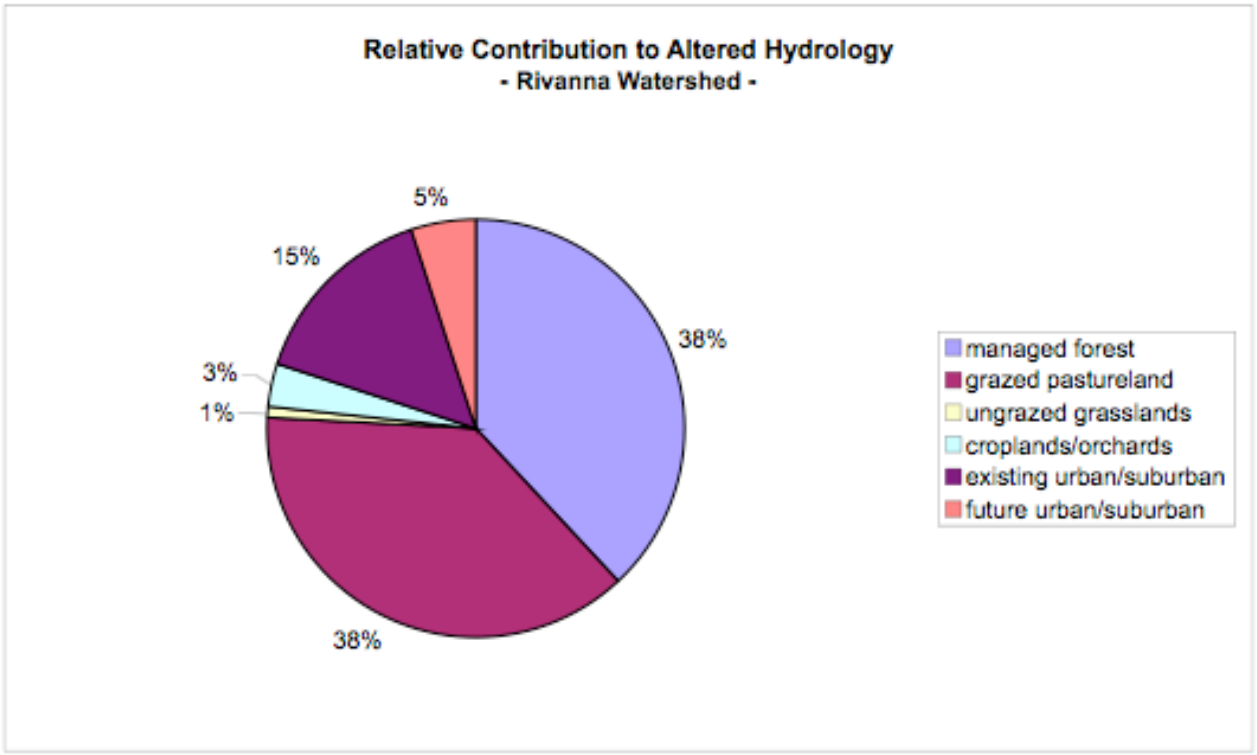
The final outcome (graphically summarized by the pie charts) indicate that:

- forests and pastureland within the Riv anna watershed likely contribute significantly to the alteration of hydrology – accounts for three quarters of the overall alteration in the case of the Rivanna as a whole
- urban areas, despite their smaller portion of the land use, logically have a substan tial affect, especially for the more urbanized Moore's Creek watershed (accounts for 55% of total alteration)

Contribution of Various Land Uses to Altered Hydrology
-- entire Rivanna watershed

land use	percent	acres	CN	diff from ideal forest	relative impact score
managed forest	66%	324,720	73	3.00	974160
grazed pastureland	22%	108,240	79	9.00	974160
ungrazed grasslands	1%	4,920	74	4.00	19680
croplands/orchards	1%	4,920	88	18.00	88560
existing urban/suburban	6%	29,520	83	13.00	383760
future urban/suburban	2%	9,840	83	13.00	127920
water/wetland	2%	9,840	98	0.00	0
ideal forest			*70*		
total	**100%**	**492,000**			





Contribution of Various Land Uses to Altered Hydrology
-- Moore's Creek watershed

land use	percent	acres	CN	diff from ideal forest	relative impact score
urban forest	56.2%	12,560	73	3.00	37680
grasslands	14.7%	3,285	79	9.00	29567
low-density residential	9.8%	2,190	78	8.00	17521
med-density residential	8.6%	1,922	81	11.00	21142
urban	9.9%	2,213	94	24.00	53101
water/wetland	0.8%	179	98	0.00	0
ideal forest			*70*		
total	**100.0%**	**22,349**