Supplemental Material

Table S1. Sinuosity (S_{sn}) values and their interpretation.

S_{sn}	Interpretation
1.0 - 1.05	Straight
1.06 - 1.30	Low Sinuosity
1.31 – 3.0	Meandering

Adapted from Schumm [45].

Table S2. Bank height ratio (BHR) values with accompanying stability assignment.

BHR	Stability Category
1.0	Stable
1.1	Moderately Stable
1.45	Unstable
1.63	Highly Unstable

Adapted from NMSU [46].

Table S3. Bank height (BH) and Bank Angle (BA) values with accompanying category assignment.

BH (m)	BA (deg)	Category
1.0-1.1	0-20	Very Low
1.11-1.19	21-60	Low
1.2-1.5	61-80	Medium
1.6-2.0	81-90	High
2.1-2.8	91-119	Very High
> 2.8	> 119	Extreme

Adpated from Rosgen [34].

Table S4. Entrenchment ratio (ER) and Bank Full width:Bank Full Depth ratio (BFW:BFD) values with accompanying category assignment.

ER			BFW:BFD	
Value	Category		Value	Category
< 1.4	Entrenched		< 12	Low
			> 12	Moderate to High
1.4-2.2	Moderately Entrenched		> 12	Moderate
> 2.2	Slightly Entrenched		< 12	Very Low
			> 12	Moderate to High

Adapted from USDA [47].

Table S5. Year, satellite sensor, horizontal spatial resolution, and classification schemes used to develop land cover/C-factor data.

Year	Satellite Sensor	Spatial Resolution (m)	Classification Scheme
1981	Landsat MSS	80	Unsupervised
1985	Landsat TM	30	Unsupervised
1989	Landsat TM	30	Unsupervised
1994	Landsat TM	30	Unsupervised
1997	Landsat TM	30	Supervised

Table S6. Mean, maximum, minimum, and standard deviation as decimal percents of watershed area in either Crop, Fallow, Grass, or Tree/Shrub.

Statistic	Crop	Fallow	Grass	Tree/Shrub
Watershed/Reservoir 11				
Mean	0.084	0.015	0.815	0.077
Std. Deviation	0.063	0.020	0.072	0.038
Maximum	0.158	0.051	0.901	0.126
Minimum	0.010	0	0.721	0.029
Watershed/Reservoir 14				
Mean	0.089	0.013	0.709	0.062
Std. Deviation	0.490	0.017	0.051	0.041
Maximum	0.156	0.042	0.775	0.139
Minimum	0.018	0	0.651	0
Watershed/Reservoir 20				
Mean	0.092	0.003	0.723	0.170
Std. Deviation	0.104	0.006	0.149	0.085
Maximum	0.317	0.017	0.958	0.285
Minimum	0.015	0	0.459	0.016
Watershed/Reservoir 21				
Mean	0.111	0.004	0.824	0.052
Std. Deviation	0.080	0.008	0.074	0.048
Maximum	0.269	0.020	0.911	0.155
Minimum	0.035	0	0.688	0.007
Watershed/Reservoir 22				
Mean	0.209	0.012	0.649	0.102
Std. Deviation	0.046	0.024	0.046	0.027
Maximum	0.263	0.062	0.722	0.143
Minimum	0.127	0	0.585	0.058
Watershed/Reservoir 23				
Mean	0.375	0.001	0.571	0.023
Std. Deviation	0.106	0.003	0.0964	0.014
Maximum	0.506	0.009	0.712	0.044
Minimum	0.216	0	0.457	0.007
Watershed/Reservoir 24				
Mean	0.389	0.005	0.558	0.058
Std. Deviation	0.097	0.011	0.094	0.019
Maximum	0.471	0.030	0.752	0.088
Minimum	0.179	0	0.479	0.035
Watershed/Reservoir 26				
Mean	0.423	0.003	0.537	0.010
Std. Deviation	0.055	0.006	0.054	0.003
Maximum	0.523	0.016	0.606	0.016
Minimum	0.348	0	0.435	0.006
Watershed/Reservoir 31				
Mean	0.157	0.011	0.634	0.172
Std. Deviation	0.023	0.012	0.038	0.031
Maximum	0.184	0.029	0.670	0.232
Minimum	0.128	0	0.560	0.148

Table S6. Continued.

Statistic	Crop	Fallow	Grass	Tree/Shrub
	Watershed/Reservoir 39			
Mean	0.076	0.007	0.760	0.134
Std. Deviation	0.056	0.008	0.107	0.056
Maximum	0.180	0.017	0.861	0.240
Minimum	0.024	0	0.556	0.076
	Watershed/Reservoir 41			
Mean	0.070	0.006	0.723	0.174
Std. Deviation	0.036	0.008	0.087	0.055
Maximum	0.120	0.019	0.854	0.266
Minimum	0.021	0	0.595	0.100
	Watershed/Reservoir 42			
Mean	0.077	0.005	0.783	0.105
Std. Deviation	0.039	0.008	0.042	0.030
Maximum	0.121	0.022	0.842	0.150
Minimum	0.003	0	0.712	0.077

Table S7. Watershed basin relief (W_{rlf}), percentage of watershed having slopes $\geq 21°$ ($\%W_{slope\geq}$), watershed valley length (W_{vl}), stream thalweg length (S_{thal}), stream slope (S_{slope}), and stream sinuosity (S_{sn}) for each watershed.

	Watershed Variables			Stream Variables		
ID	W_{rlf} (m)	$\%W_{slope\geq21}$	W_{vl} (m)	S_{thal} (m)	S_{slope} (m/m)	S_{sn}
11	70.0	3.4	5163	5258	0.013	1.02
14	62.6	0.4	4475	4691	0.013	1.05
20	44.8	1.2	3392	4204	0.011	1.24
21	38.0	0.9	1761	1844	0.021	1.05
22	38.3	9.7	1820	2279	0.017	1.25
23	40.9	1.3	2821	3544	0.012	1.26
24	56.2	1.6	4700	6115	0.010	1.30
26	49.7	0.8	11002	13196	0.004	1.20
31	77.8	3.0	8770	9749	0.008	1.11
39	48.1	0.3	3525	3888	0.012	1.10
41	39.2	0.3	2193	2268	0.017	1.03
42	50.1	0.7	2156	2227	0.022	1.03

Table S8. Percentage of 100-m stream buffer area having slopes ≥ 21º (%Cor$_{slope≥21}$), ratio of %Cor$_{slope≥21e}$ to W$_{vl}$ (Cor$_{slope≥21}$:W$_{VL}$), and percentage of buffer area with low, moderate, or high K-factor soils (%Cor$_{LK}$, %Cor$_{MK}$, %Cor$_{HK}$) for each watershed.

Watershed ID	%Cor$_{slope≥21}$	Cor$_{slope≥21}$: W$_{VL}$	%Cor$_{LK}$	%Cor$_{MK}$	%Cor$_{HK}$
11	3.7	3.35	70.6	29.3	0.0
14	1.2	2.15	100.0	0.0	0.0
20	5.6	8.10	52.7	47.1	0.14
21	36.8	13.19	25.1	74.9	0.0
22	8.9	36.77	12.2	83.0	4.8
23	13.9	8.94	10.3	89.0	0.7
24	7.0	17.97	5.8	84.2	10.0
26	4.8	9.86	0.3	73.8	25.9
31	34.7	5.27	12.0	83.0	5.0
39	0.6	1.96	87.0	13.1	0.0
41	8.4	1.75	100.0	0.0	0.0
42	9.7	4.21	95.0	3.2	1.8
11	3.7	3.35	70.6	29.3	0.0

Table S9. Within-channel, stream segment weighted values of bank full depth (BFD), bank full width (BFW), ratio of BFW to BFD (BFW:BFD), entrenchment ratio (ER), bank angle (BA), bank height ratio (BHR), channel depth (CD), channel width (CW), ratio of CW to CD (CW:CD), channel cross-sectional area (CA), and horizontal stream surface area as a percentage of watershed drainage area (FWA_%W$_A$) for each watershed.

Watershed ID	BFD (m)	BFW (m)	BFW: BFD	ER	BA (deg)	BHR	CD (m)	CW (m)	CW: CD	CA	FWA _%W A
11	0.34	28.1	99.3	1.91	12.9	3.57	1.5	37.1	34.6	34.5	4.0
14	0.33	11.4	41.2	3.31	11.5	5.37	1.7	33.7	38.1	21.6	1.5
20	0.57	14.6	33.3	2.10	17.1	5.82	3.3	36.5	15.3	88.8	2.3
21	0.68	17.7	24.0	1.97	20.1	3.57	3.5	30.5	10.1	104.3	2.2
22	0.81	10.8	15.0	2.10	26.1	7.03	5.1	40.3	8.4	117.9	3.2
23	0.83	9.6	12.5	2.97	16.1	5.07	40.1	13.1	98.0	98.0	5.7
24	0.67	19.1	66.0	1.56	16.7	7.78	3.5	40.5	23.4	133.8	3.5
26	0.60	8.7	23.0	1.82	17.8	5.33	3.4	25.3	10.7	72.3	1.9
31	1.29	14.6	12.9	2.88	18.7	3.22	5.3	46.9	9.8	155.7	2.4
39	0.41	22.6	82.4	8.94	7.1	2.30	1.1	70.5	129.2	60.9	4.4
41	0.47	24.2	64.0	8.94	7.3	1.62	1.1	37.5	40.6	41.2	4.2
42	0.22	3.8	13.5	3.55	6.8	2.88	1.2	16.3	9.1	16.9	1.9

Table S10. Within-channel, stream segment weighted values of weighted soil sand and silt fractions (IC_{Sa} and IC_{Si}, respectively), percent of streambed and streambank soils that have low, moderate, or high K-factors (%IC_{LK}, %IC_{MK}, and %IC_{HK}), a weighted K-factor value IC_K, and the plasticity index (IC_{PI}) for each watershed.

Watershed ID	IC_{Sa}	IC_{Si}	%IC_{LK}	%IC_{MK}	%IC_{HK}	IC_K	IC_{PI}
11	55.0	29.0	62.9	36.6	0.4	0.27	8.2
14	65.0	19.0	100.0	0.0	0.0	0.20	6.4
20	53.0	24.0	56.6	36.9	0.4	0.26	8.4
21	54.0	30.0	44.3	55.7	0.0	0.26	11.8
22	41.0	35.0	3.5	96.2	0.3	0.35	7.9
23	45.0	33.0	33.3	66.7	0.0	0.32	10.7
24	48.0	33.0	8.1	91.9	0.0	0.33	10.6
26	15.0	56.0	0.4	99.6	0.0	0.38	17.3
31	59.0	30.0	37.6	62.2	0.2	0.31	9.5
39	63.0	21.0	80.9	19.1	0.0	0.22	6.3
41	61.0	18.0	100.0	0.0	0.0	0.19	4.6
42	62.0	20.0	98.2	1.8	0.0	0.20	6.3

Table S11. Normalized difference of estimated reservoir sedimentation with first-order adjustment for stream channel, stream bank, and gully contributions of sediment (NDRes_adj) from GIS-based RUSLE model simulations using the USDA [41] and Garbrecht [39] sediment delivery ratios (SDR) for each watershed (ID) in Group 2. The change in NDRes_adj (ΔNDRes_adj) between the two is also shown.

Watershed ID	ND_{Res_adj} (%)		ΔND_{Res_adj} (%)
	Using USDA SDR	Using Garbrecht SDR	
14	-75.4	-63.3	+12.1
20	-76.3	-54.8	+21.5
21	-66.6	-50.8	+15.8
31	-62.5	-27.9	+34.6
39	-61.5	-35.6	+25.9
41	-49.0	24.3	+73.3
42	-64.8	18.7	+83.5

Table S12. Root mean square error (RMSE), multiple coefficient of determination (129) (R^2), and adjusted R^2 for alternative linear regression models. The P-value for each (130) model is also shown. (131)

# Model Variables	Variable(s) Used	RMSE (%)	R^2	Adjusted R^2	P-value
1	IC_K	12.1	0.397	---	0.0281
1	WS_K	11.7	0.429	---	
2	IC_{Si}, FWA_%W_A	8.8	0.710	0.640	0.0038
2	WS_{HK}, FWA_%W_A	8.2	0.749	0.694	
3	IC_K, FWA_%W_A, BFD	7.1	0.834	0.772	0.0017
3	W_A, WS_{LK}, W_{vl}	6.6	0.858	0.804	
4	IC_K, FWA_%W_A, ER, CD	5.2	0.923	0.879	0.0005
4	W_A, W_{rlf}, FWA_%W_A, IC_{Sa}	3.4	0.967	0.947	
5	IC_K, FWA_%W_A, CA, CW, IC_{Sa}	3.1	0.976	0.955	< 0.0001
5	W_A, WS_K, S_{slope}, S_{sn}, BHR	1.1	0.997	0.944	

(132)
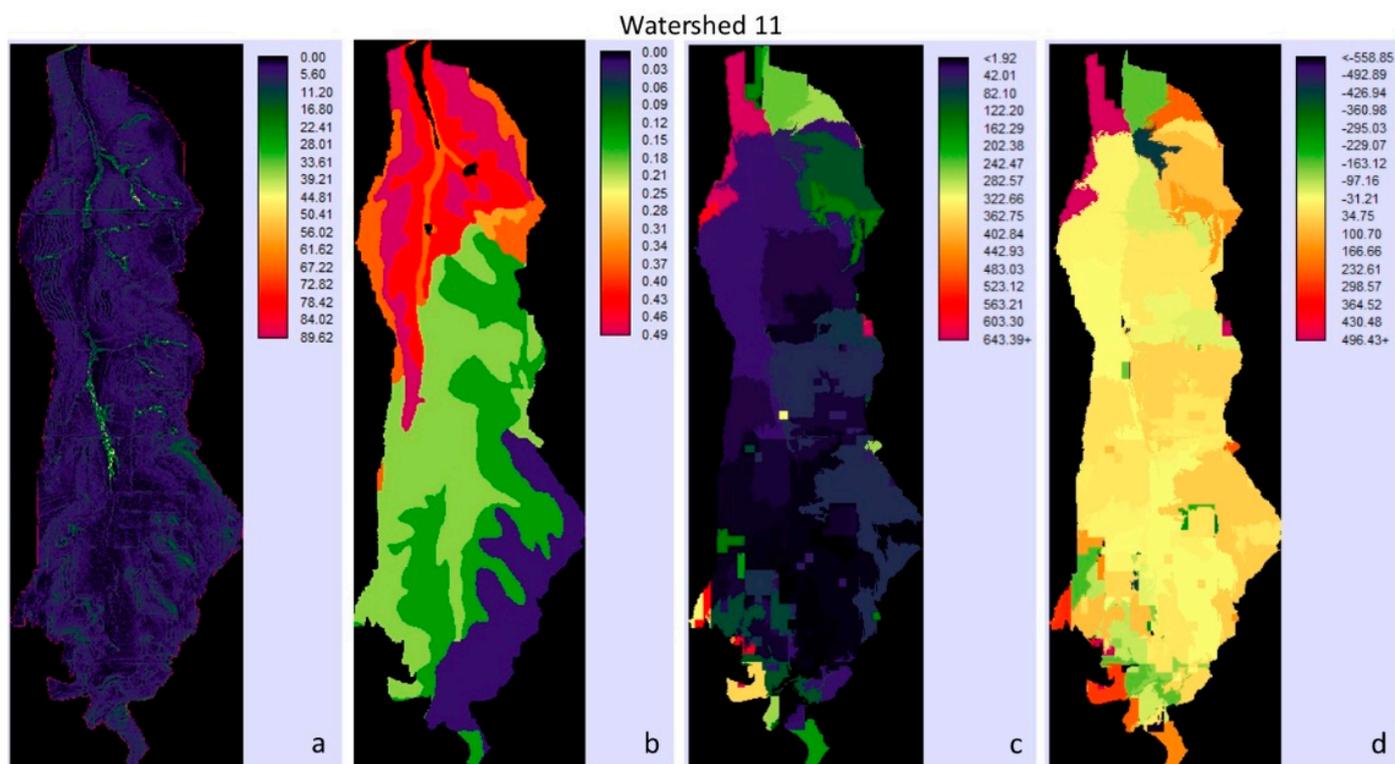
(133)

Figure S1. Watershed 11 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total (134) annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric (135) tons yr^{-1}). The total soil loss and net soil loss images are for 1981. (136)
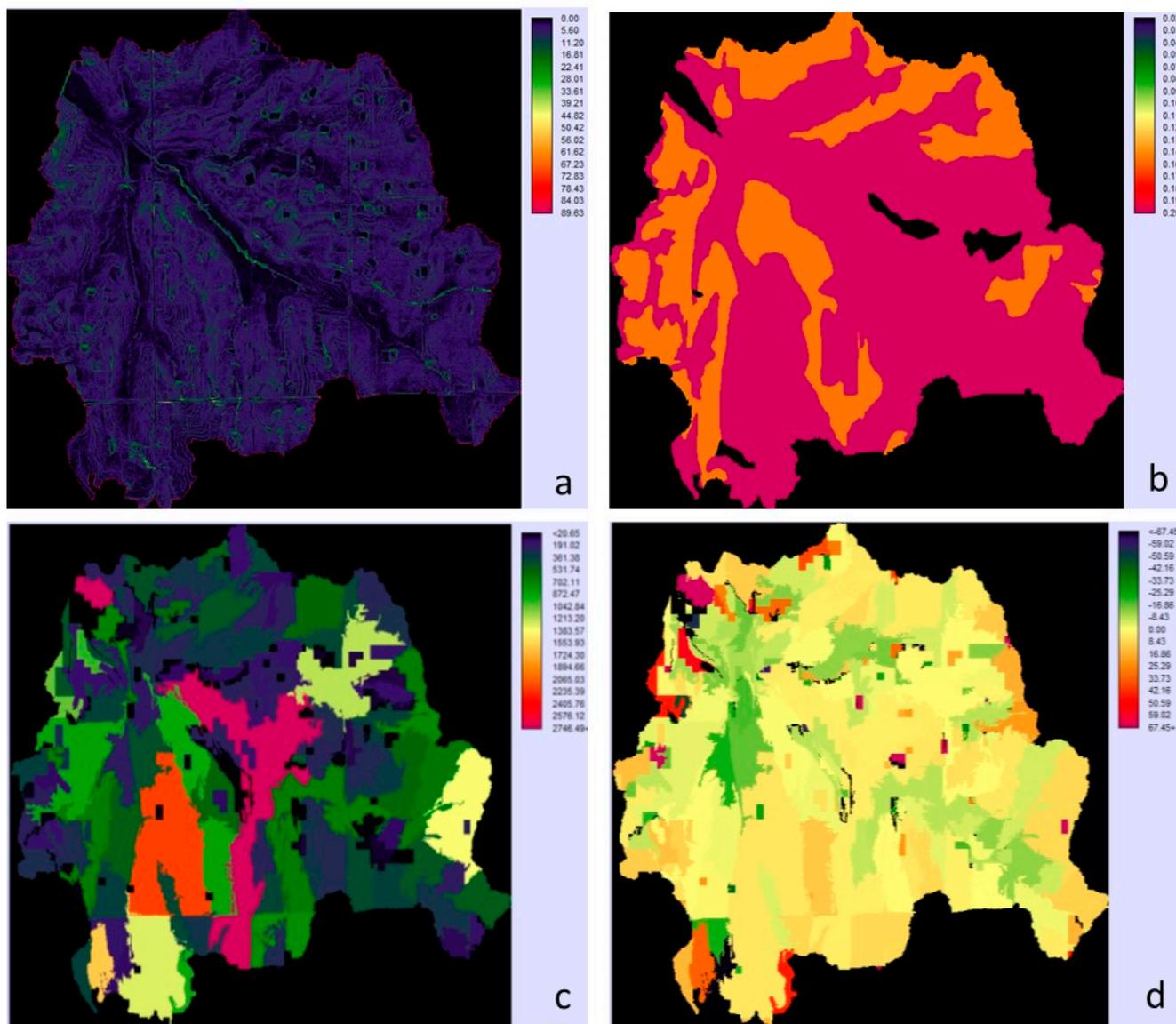
Figure S2. Watershed 14 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr⁻¹), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr⁻¹). The total soil loss and net soil loss images are for 1981.
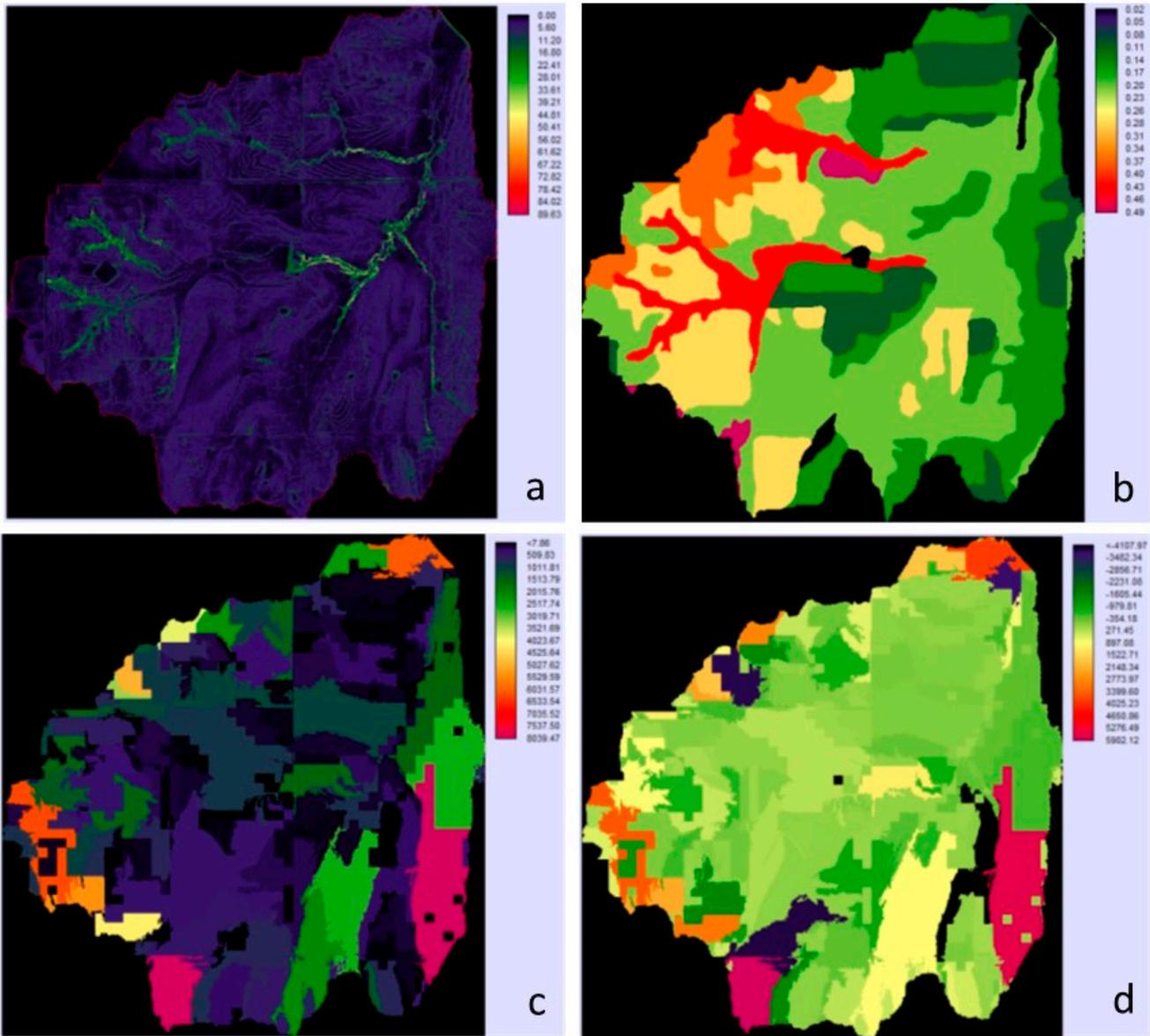
Watershed 20

Figure S3. Watershed 20 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
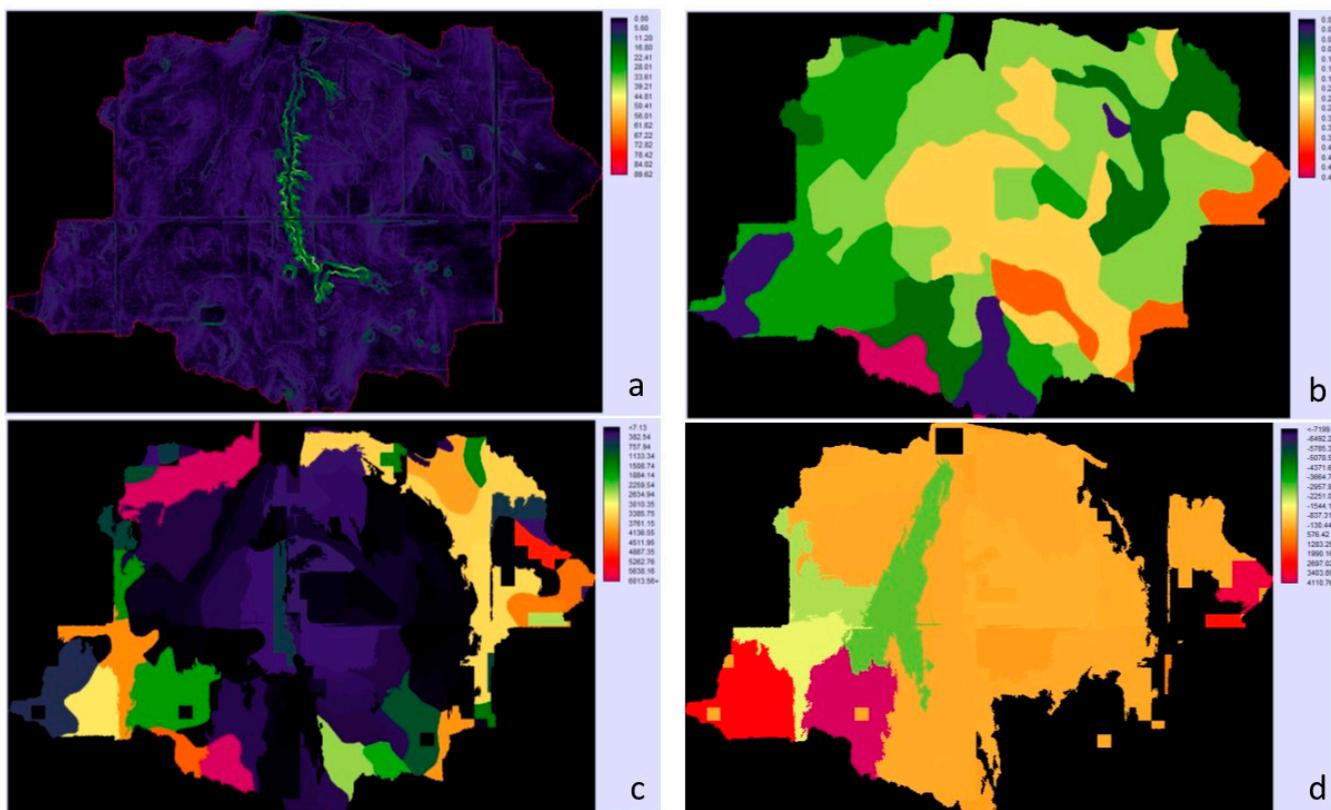
Watershed 21

Figure S4. Watershed 21 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.

Watershed 22

152
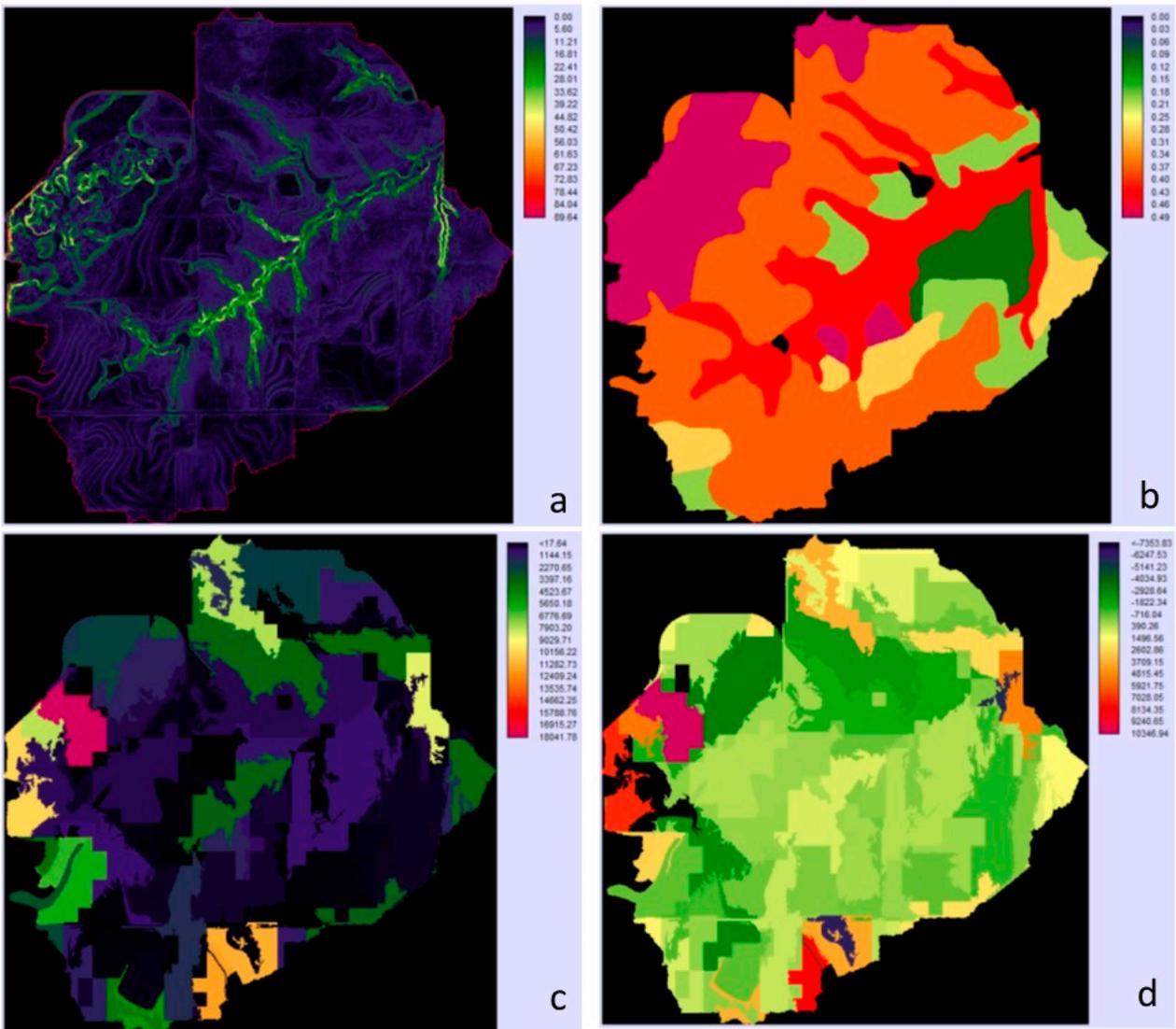
Figure S5. Watershed 22 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr⁻¹), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr⁻¹). The total soil loss and net soil loss images are for 1981.

153
154
155

156

Watershed 23

157
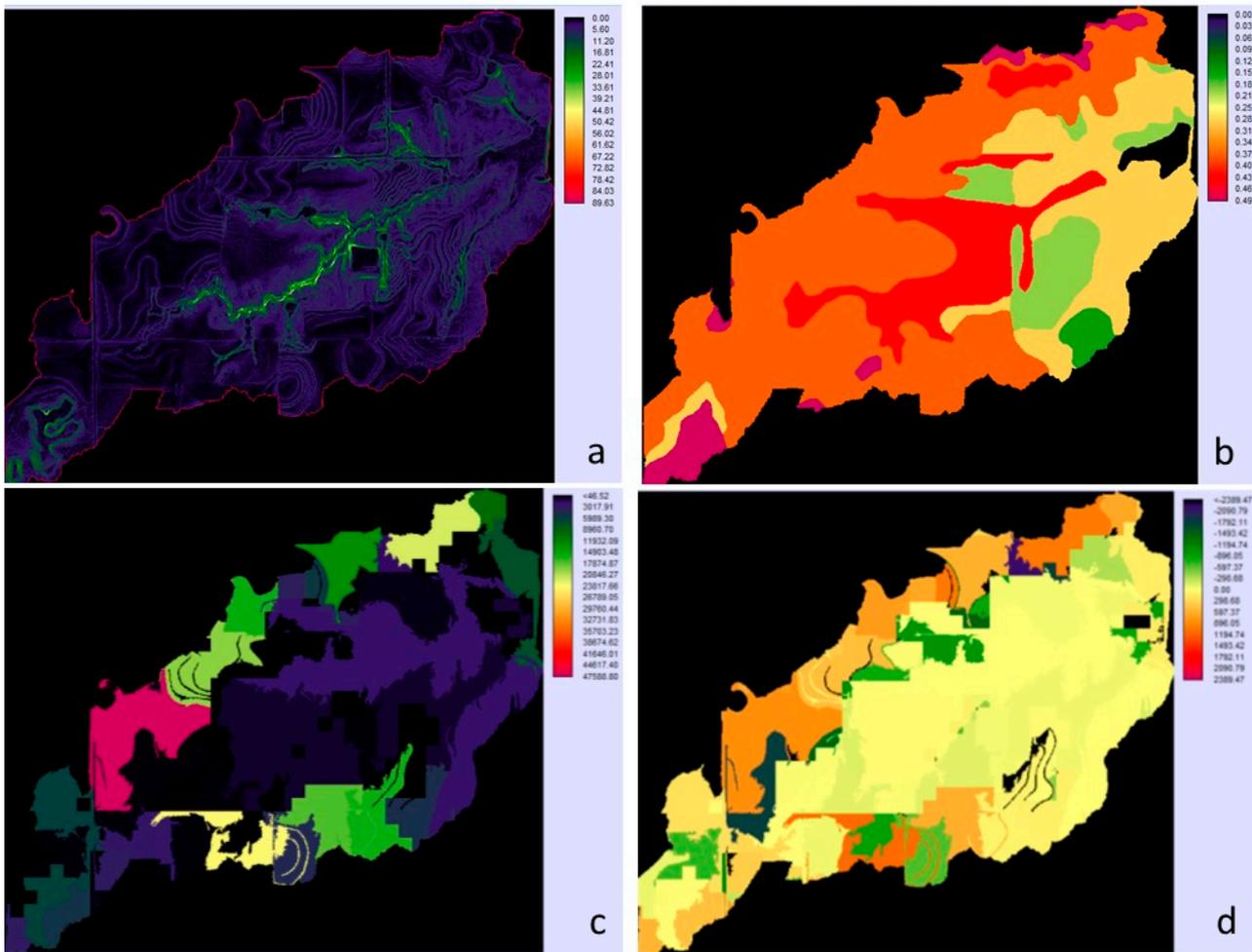
Figure S6. Watershed 23 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE 158
total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each 159
patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981. 160

161

Watershed 24
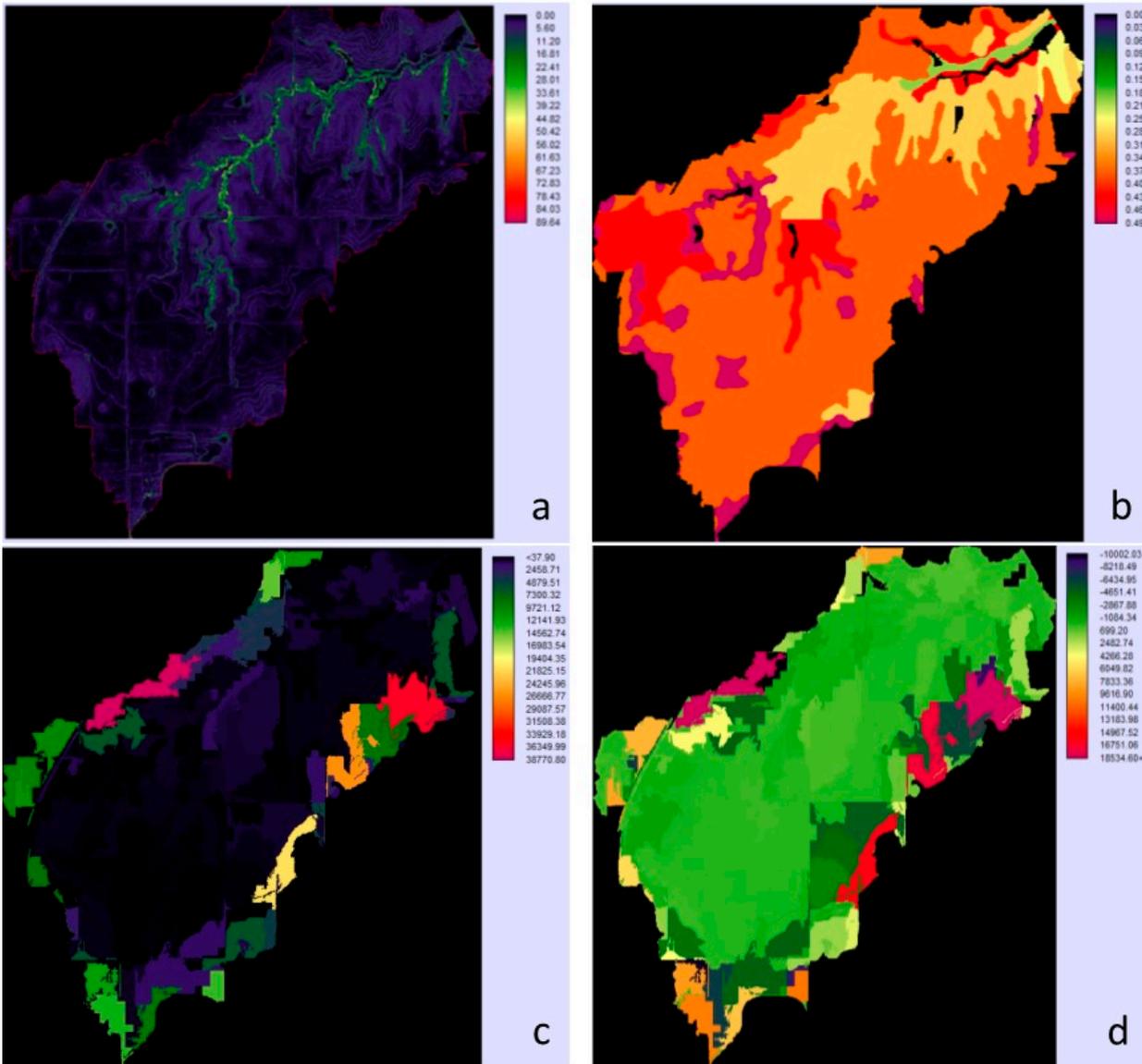
Figure S7. Watershed 24 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
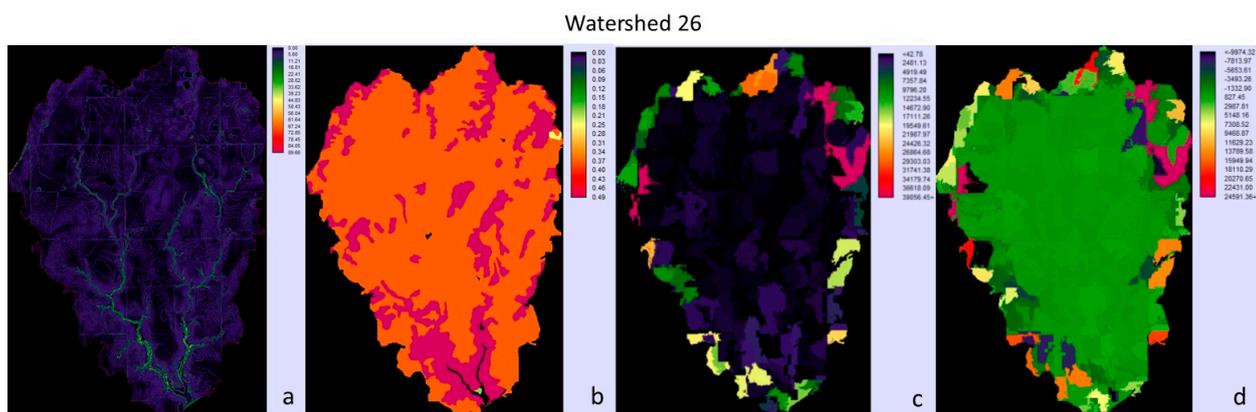
Watershed 26

Figure S8. Watershed 26 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
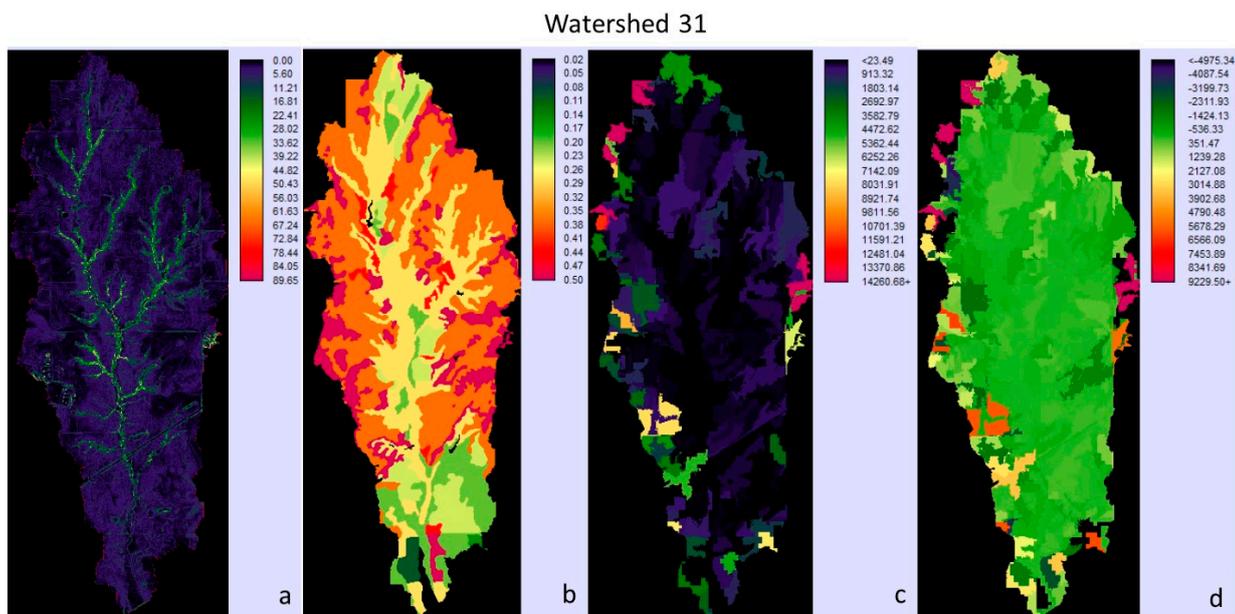
Watershed 31

Figure S9. Watershed 31 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
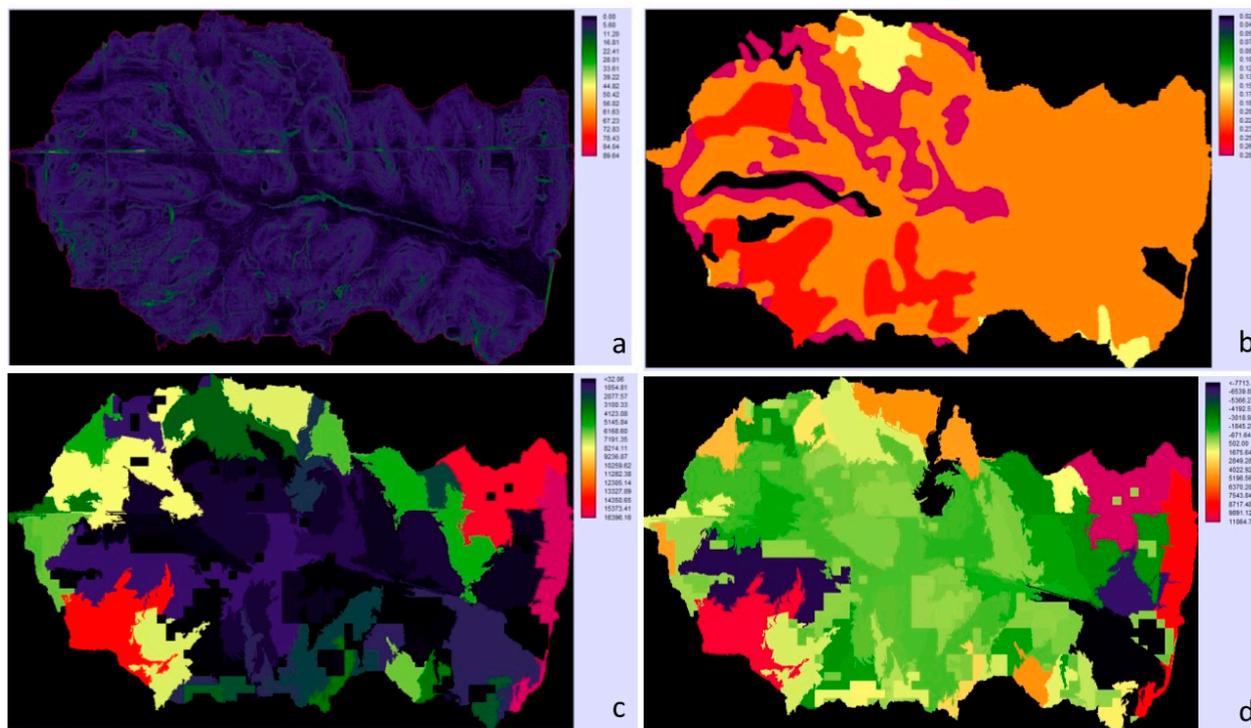
Watershed 39

Figure S10. Watershed 39 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
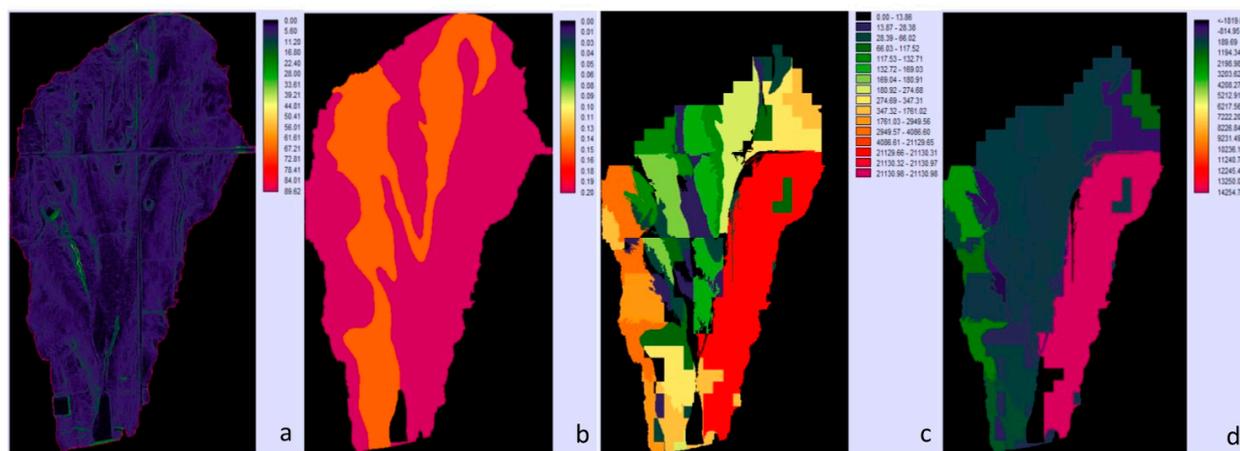
Watershed 41

Figure S11. Watershed 41 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
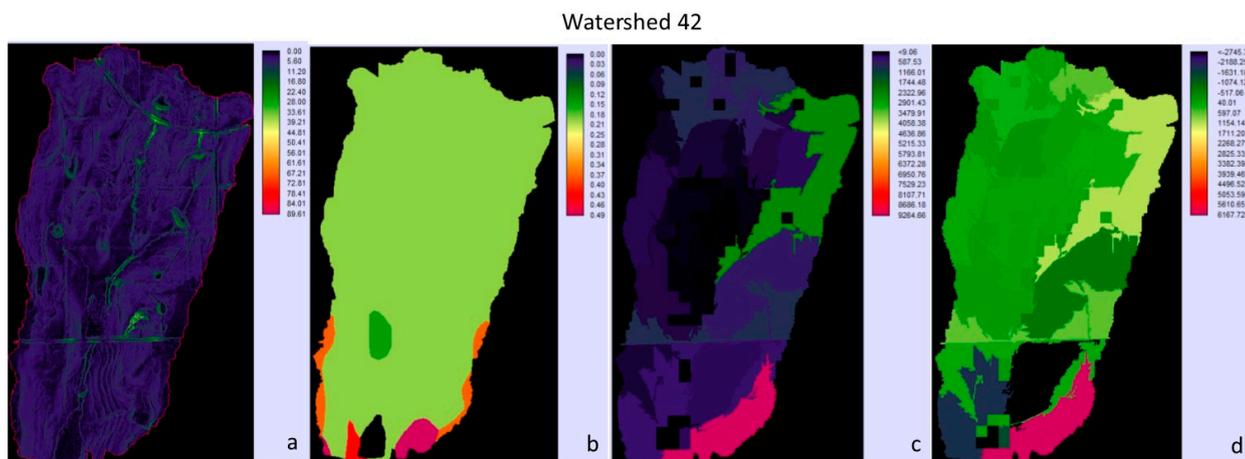
Watershed 42

Figure S12. Watershed 42 GIS images of a) slope (deg), b) K-factor [(metric ton*ha*hr)/(ha*MJ*mm)], c) RUSLE total annual soil loss for each patch (metric tons yr^{-1}), and d) SEDIMENTATION net annual soil loss for each patch (metric tons yr^{-1}). The total soil loss and net soil loss images are for 1981.
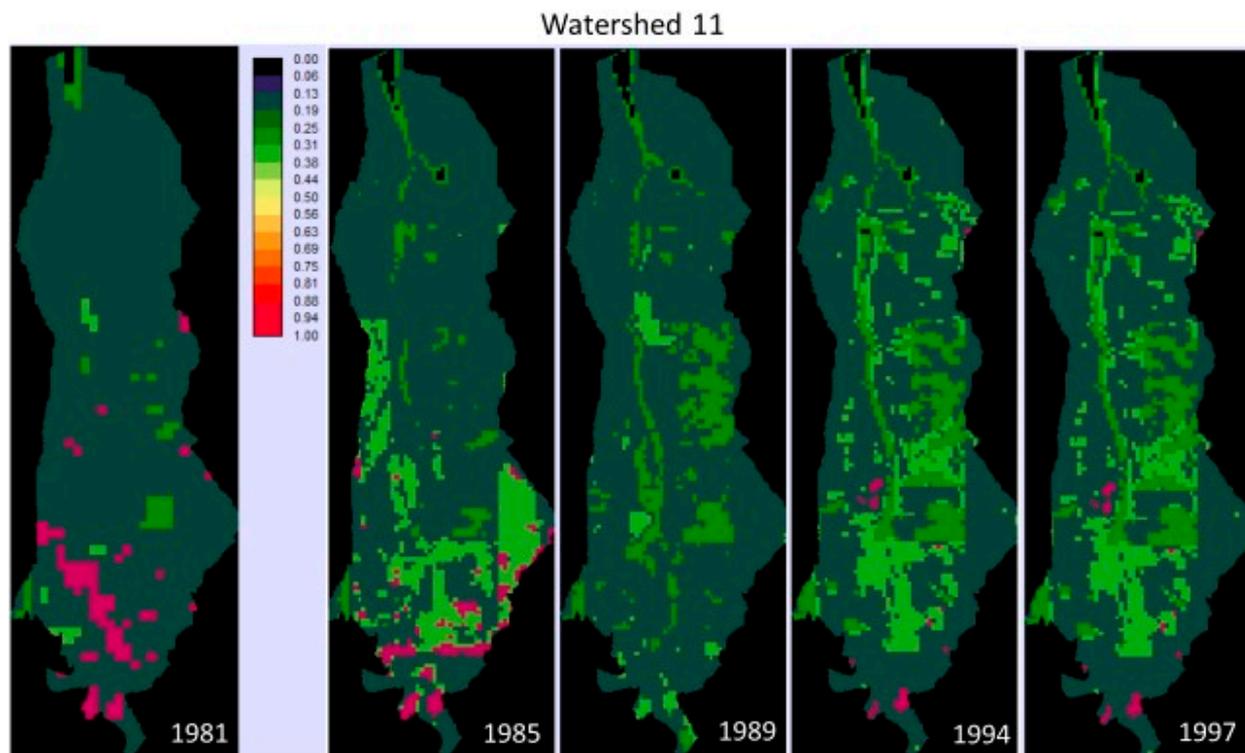
Figure S13. C-factor images for Watershed 11.
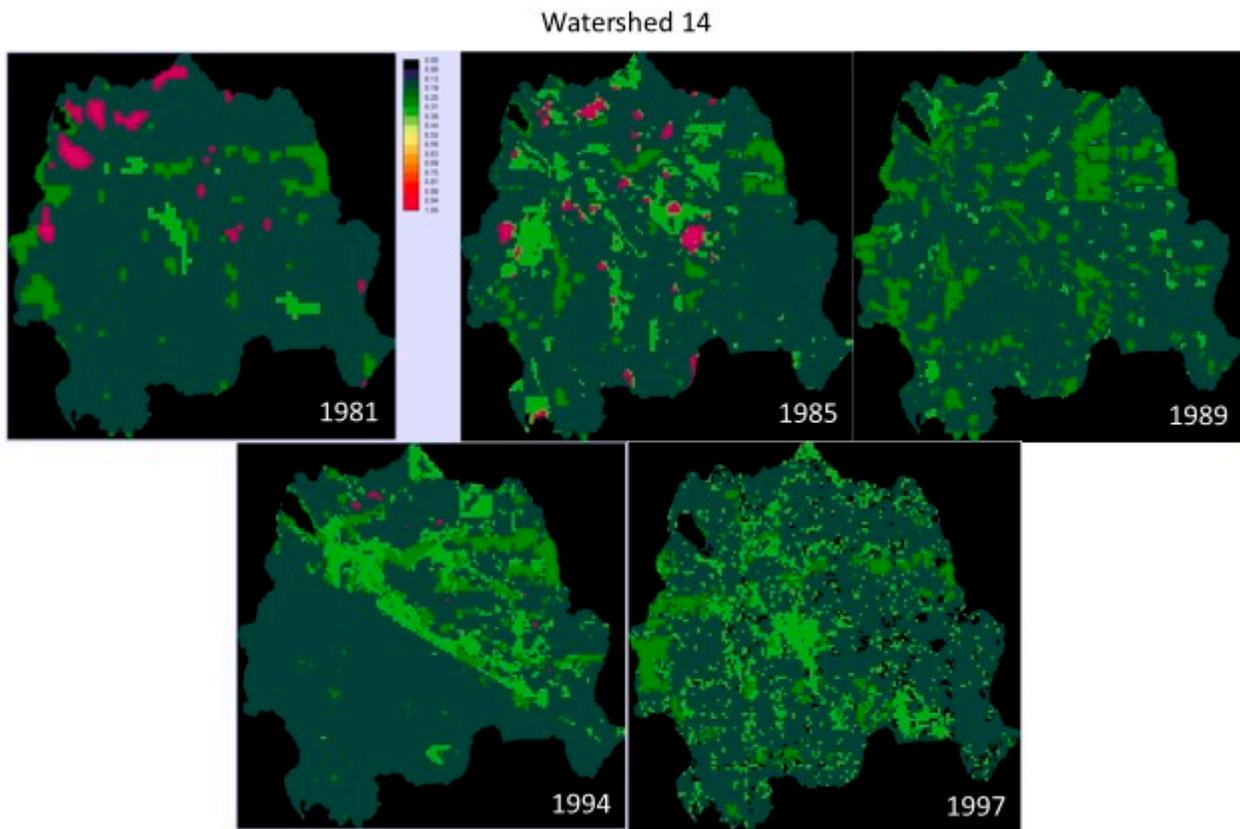
Figure S14. C-factor images for Watershed 14.
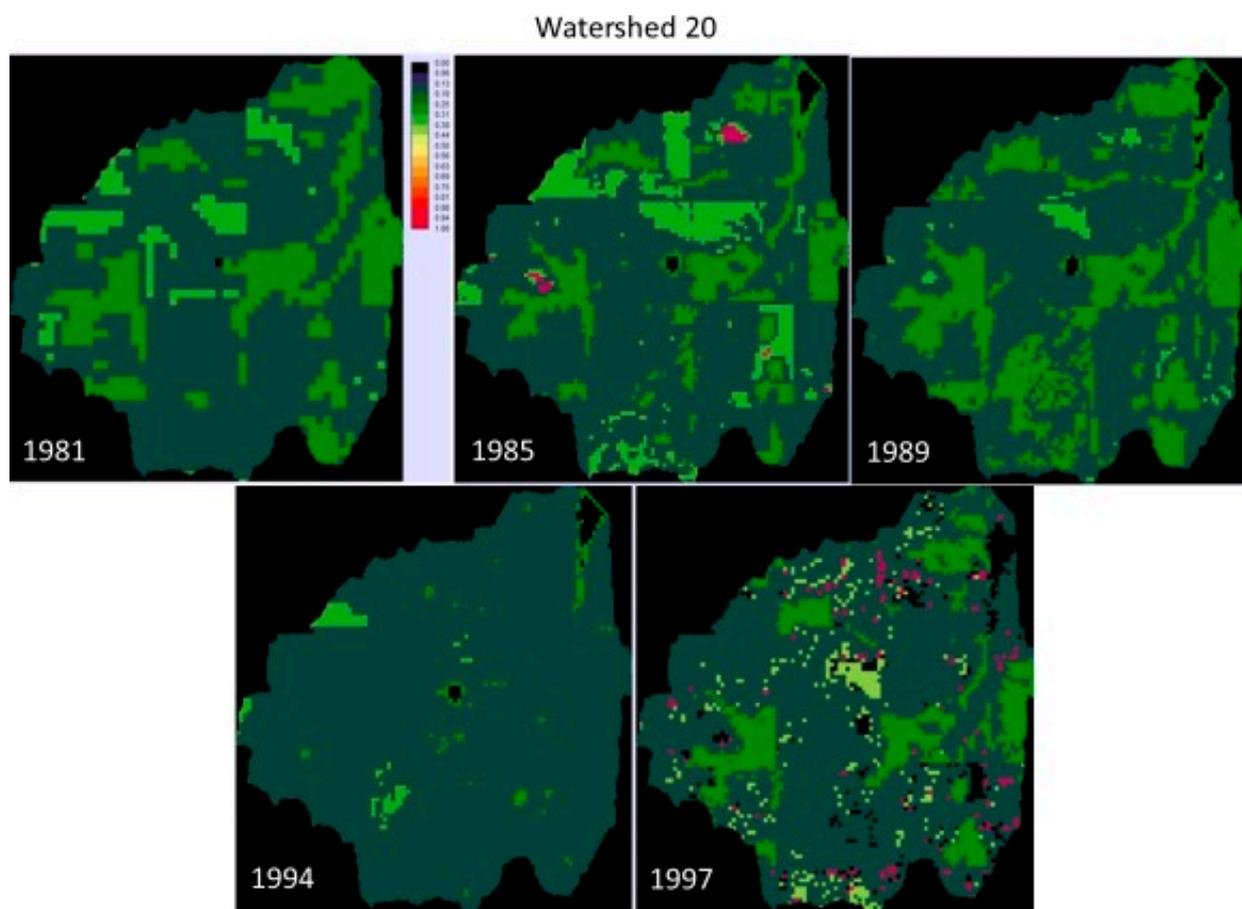
Watershed 20

Figure S15. C-factor images for Watershed 20.
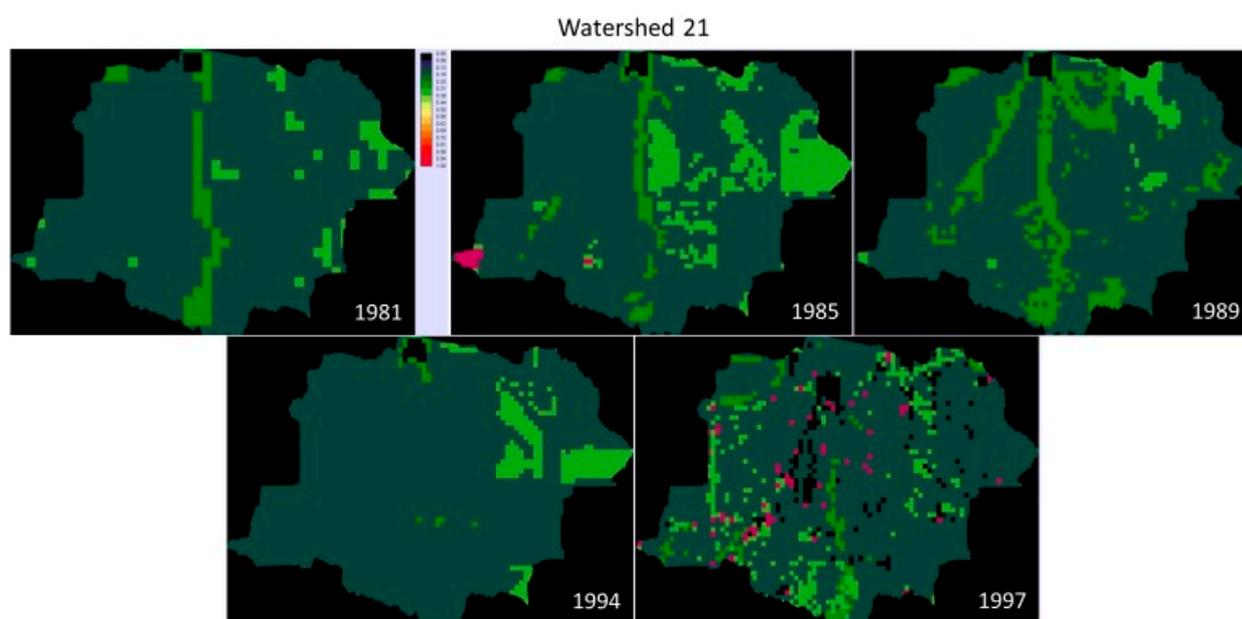
Watershed 21

Figure S16. C-factor images for Watershed 21.
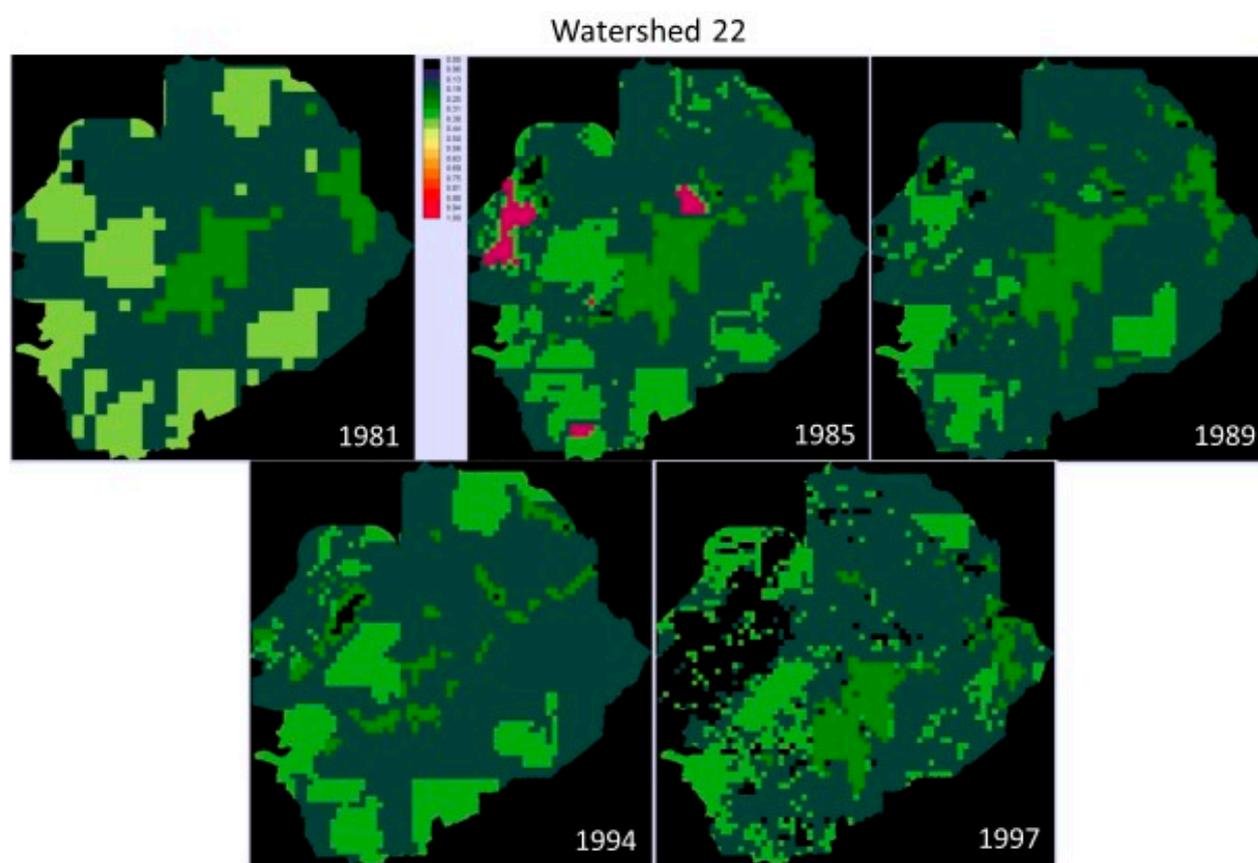
Figure S17. C-factor images for Watershed 22.
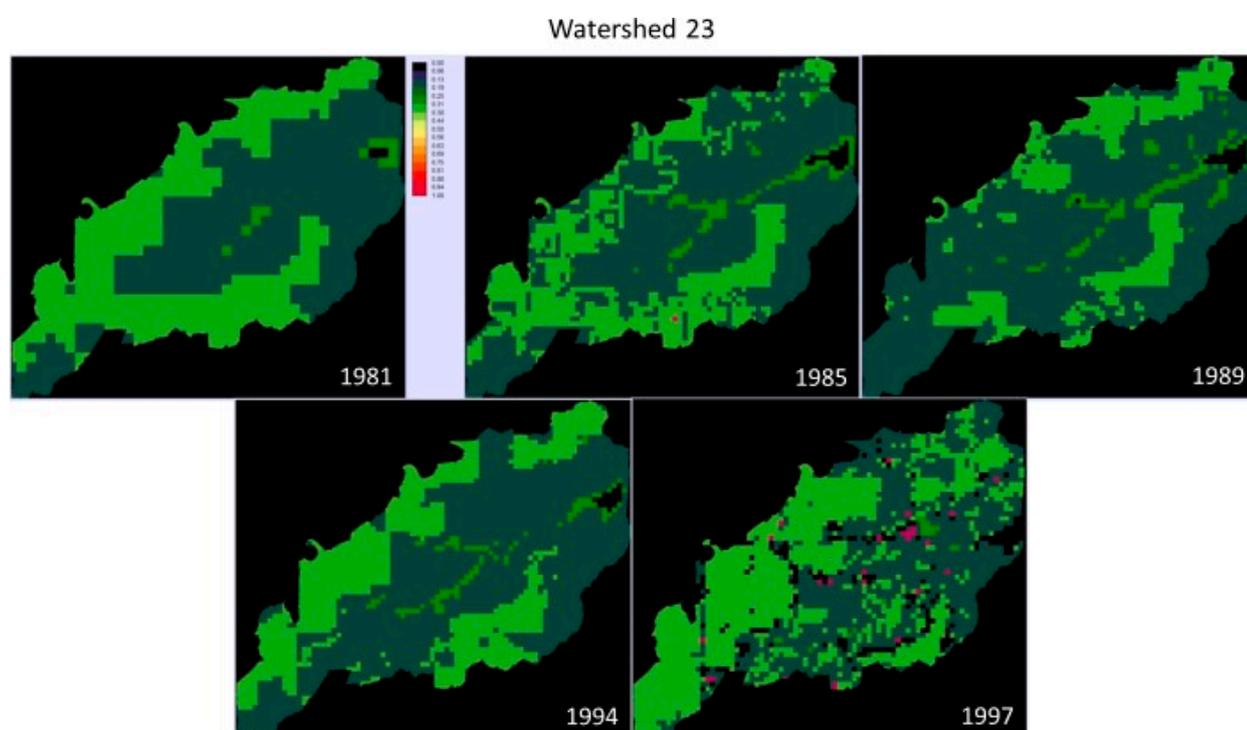
Figure S18. C-factor images for Watershed 23.
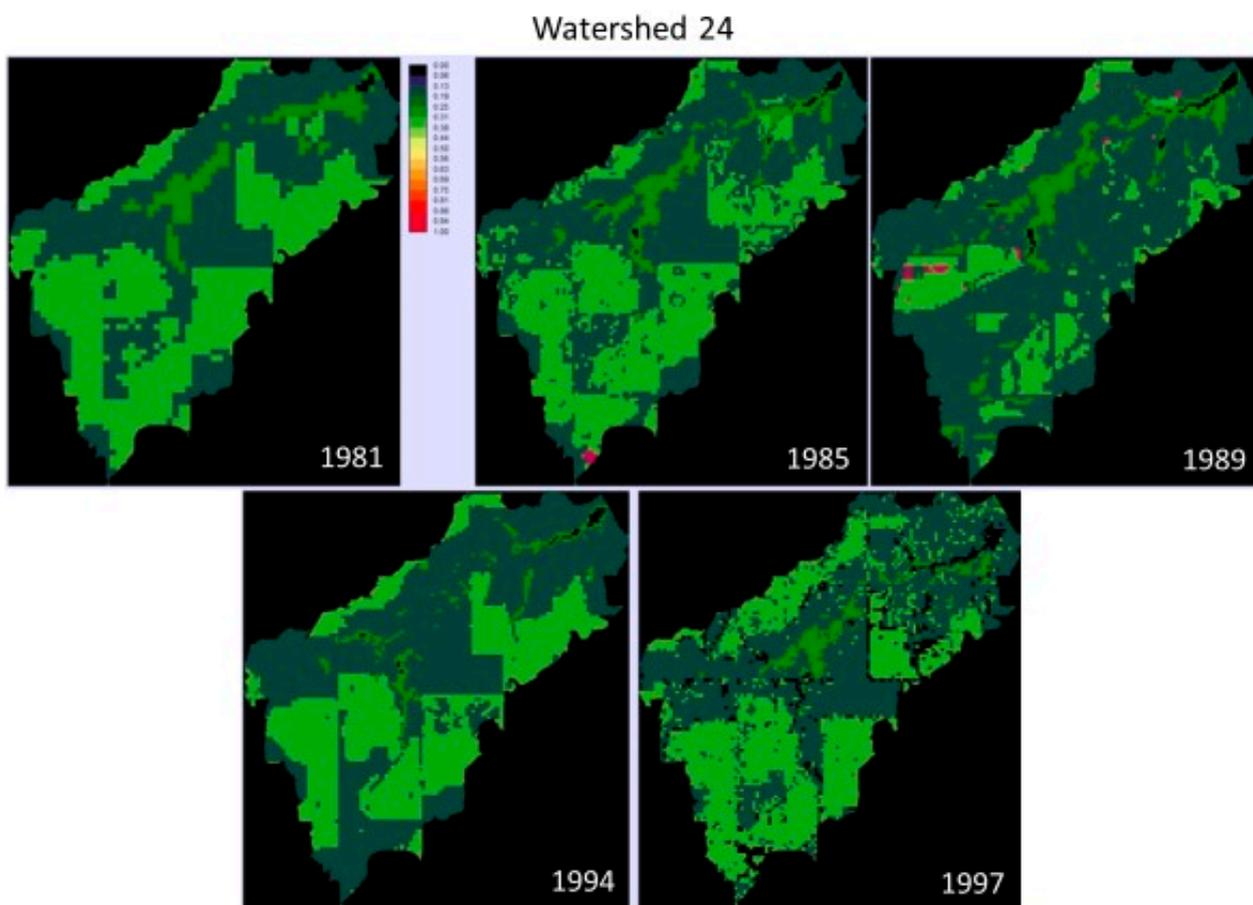
Figure S19. C-factor images for Watershed 24.
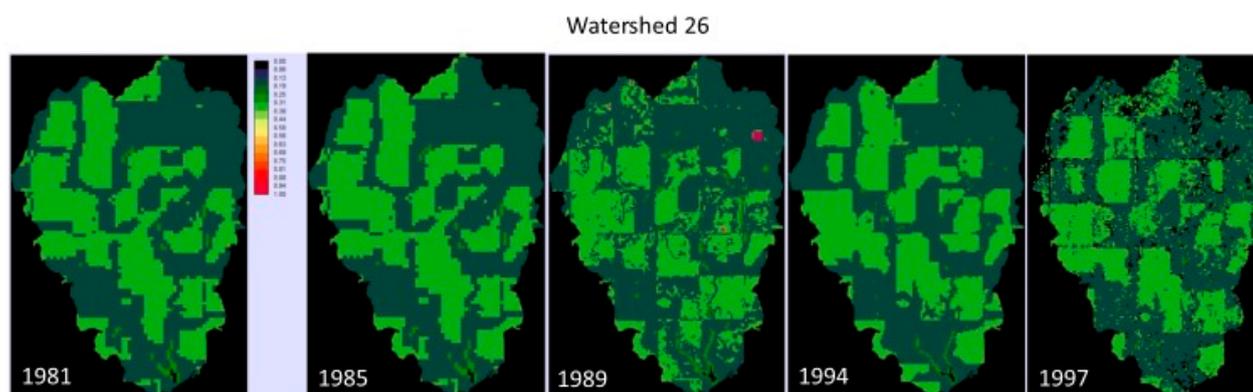

Figure S20. C-factor images for Watershed 26.
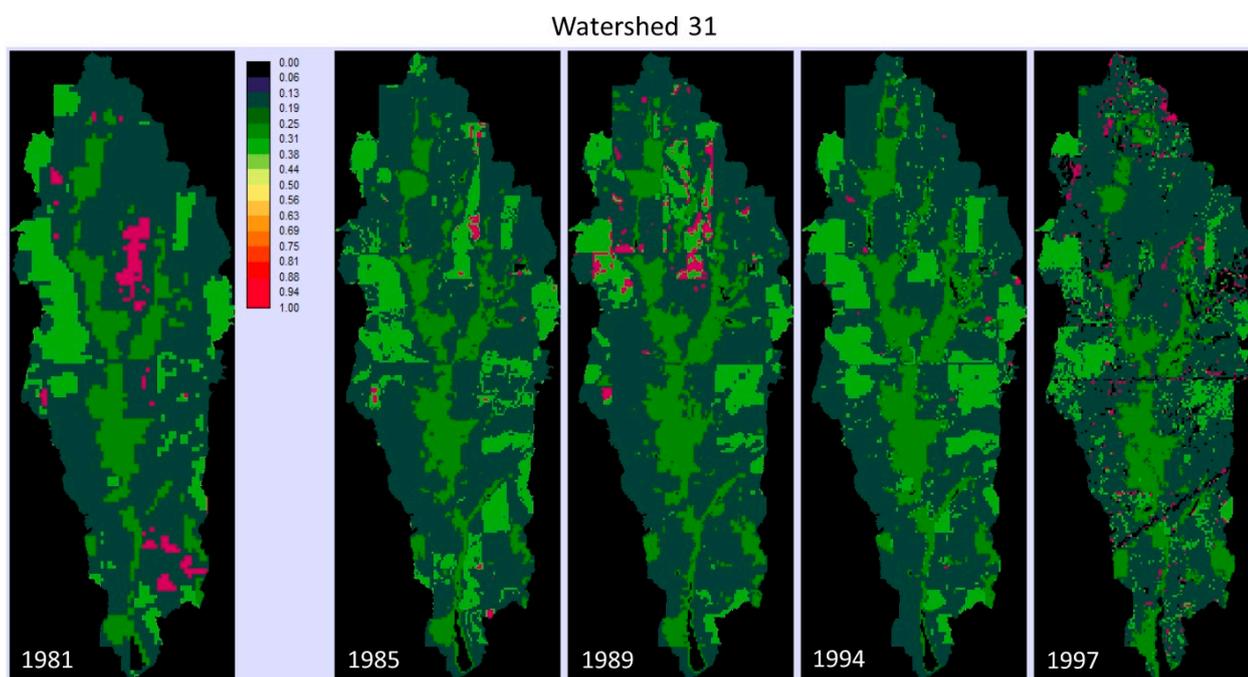
Watershed 31

Figure S21. C-factor images for Watershed 31.
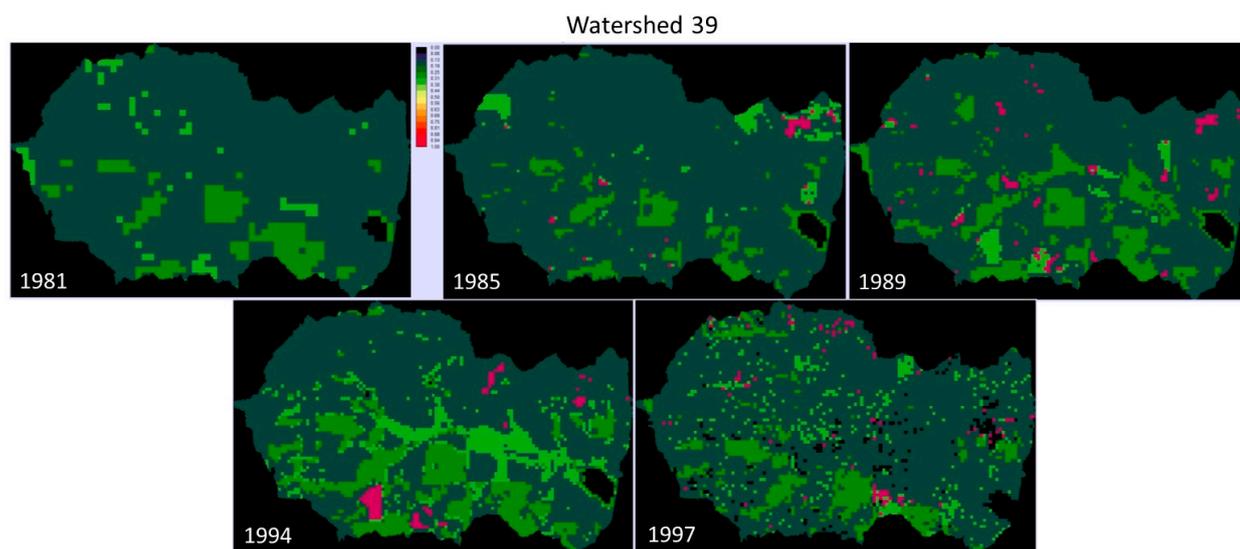
Watershed 39

Figure S22. C-factor images for Watershed 39.
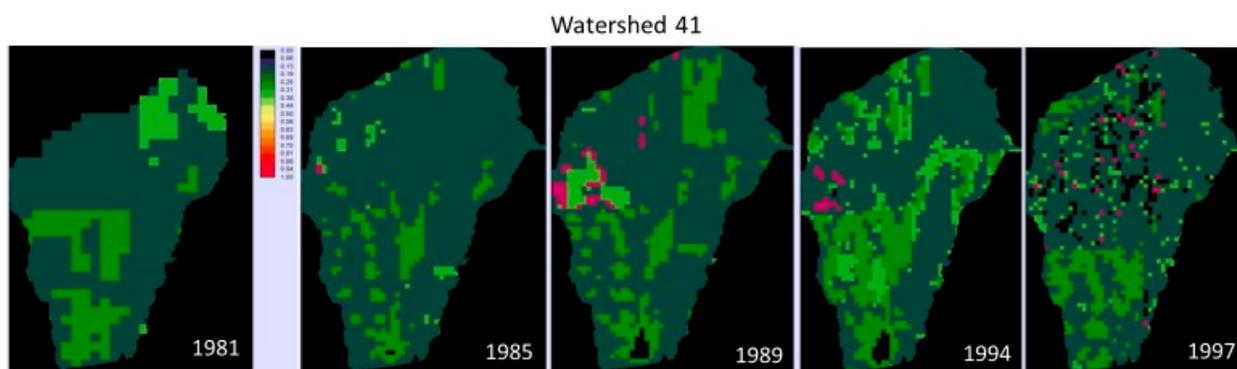
Figure S23. C-factor images for Watershed 41.
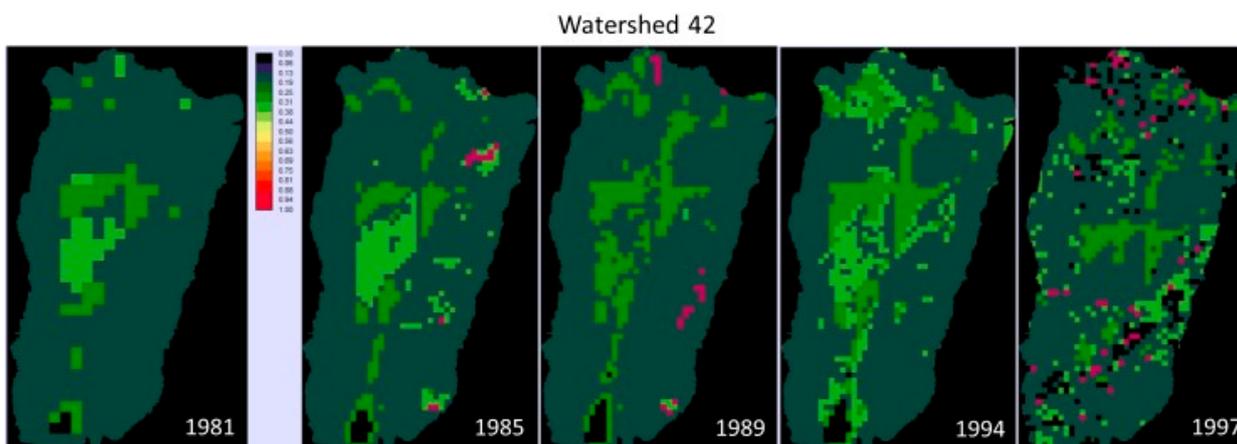
Figure S24. C-factor images for Watershed 42.