

Supplementary Data: Rill Erosion and Soil Quality in Forest and Deforested Ecosystems with Different Morphological Characteristics

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Table S1. Soil quality indicators of samples collected in the four hillslopes of Saravan Forestland Park (Northern Iran).

Soil Quality Indicator		Condition											
		D						F					
		S			N			S			N		
		Aspect			Aspect			Aspect			Aspect		
		Position			Position			Position			Position		
		US	MS	LS	US	MS	LS	US	MS	LS	US	MS	LS
SaC (%)	Mean	12.3	12.7	13.0	12.7	13.1	13.3	18.4	18.7	19.2	18.7	19.1	19.5
	Std.												
	Dev.	0.17	0.34	0.36	0.26	0.39	0.43	0.42	0.39	0.22	0.41	0.39	0.24
SiC (%)	Mean	48.1	47.9	47.7	47.9	47.6	47.5	47.3	47.2	46.8	47.1	46.9	46.7
	Std.												
	Dev.	0.35	0.54	0.45	0.42	0.51	0.52	0.37	0.41	0.13	0.26	0.22	0.10
ClC (%)	Mean	39.6	39.4	39.3	39.4	39.3	39.2	34.4	34.2	34.0	34.2	34.0	33.9
	Std.												
	Dev.	0.26	0.17	0.15	0.17	0.17	0.13	0.41	0.33	0.29	0.45	0.38	0.28
OM (%)	Mean	1.70	1.78	1.87	2.09	2.09	2.10	3.02	3.02	3.04	3.38	3.44	3.50
	Std.												
	Dev.	0.31	0.41	0.32	0.38	0.32	0.39	0.18	0.20	0.18	0.12	0.24	0.26
BD (kg m ⁻³)	Mean	159	155	155	155	1539	152	140	137	136	138	136	135
	Std.												
	Dev.	1	9	1	9	102.6	6	6	7	9	0	1	4
AS (%)	Mean	0.41	0.68	0.83	0.59	0.76	0.91	1.11	1.26	1.51	1.41	1.62	1.91
	Std.												
	Dev.	0.05	0.07	0.07	0.06	0.07	0.04	0.06	0.06	0.14	0.23	0.12	0.04
CCE (%)	Mean	2.93	2.66	2.23	2.71	2.42	2.11	1.85	1.60	1.38	1.61	1.32	1.11
	Std.												
	Dev.	0.05	0.11	0.10	0.09	0.11	0.04	0.07	0.31	0.16	0.22	0.18	0.08
SMR (gCO ₂ kg ⁻¹ of soil)	Mean	0.07	0.07	0.09	0.11	0.13	0.14	0.18	0.19	0.21	0.21	0.21	0.23
	Std.												
	Dev.	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.00
RWD (kg m ⁻³)	Mean	0	0	0	0	0	0	0.45	0.56	0.68	0.52	0.62	0.76
	Std.												
	Dev.	0	0	0	0	0	0	0.02	0.03	0.05	0.05	0.06	0.06
SP (%)	Mean	40.0	41.2	41.5	41.2	41.9	42.4	46.9	48.1	48.3	47.9	48.7	48.9
	Std.												
	Dev.	0.62	0.39	0.29	2.86	3.87	3.62	2.69	2.41	2.20	2.56	2.46	2.26
AW (%)	Mean	11.0	10.0	9.0	13.0	12.0	11.0	15.0	13.0	13.0	17.0	15.0	14.0
	Std.												
	Dev.	0.82	2.83	1.83	1.41	0.82	0.82	2.00	1.41	0.00	1.41	2.94	1.83

Notes: D = deforested hillslope; F = forest hillslope; S = south; N = north; US = upper slope; MS = middle slope; LS = lower slope; SaC = sand content; SiC = silt content; ClC = clay content; OM = organic matter content; BD = bulk density; AS = aggregate stability; CCE = calcium carbonate equivalent; SMR = soil microbial respiration; RWD = root weight density; SP = soil porosity; AW = available water.

Table S2. Hydraulic parameters of flume experiments on soil samples collected in the four hillslopes of Saravan Forestland Park (Northern Iran).

Slope (%)	Flow Discharge (L s ⁻¹)	Flow Depth (m)	Hydraulic Radius (m)	Flow Velocity (m s ⁻¹)	Shear Stress (Pa)	Unit Stream Power (m s ⁻¹)
12	0.00022	0.004	0.004	0.220	4.522	0.026
	0.00033	0.005	0.005	0.340	5.599	0.041
	0.00044	0.006	0.006	0.430	6.657	0.052
	0.00056	0.007	0.007	0.520	7.796	0.062
	0.00067	0.008	0.008	0.610	8.912	0.073
16	0.00022	0.003	0.003	0.240	4.862	0.038
	0.00033	0.004	0.004	0.360	6.176	0.058
	0.00044	0.005	0.005	0.460	7.750	0.074
	0.00056	0.006	0.006	0.550	9.015	0.088
	0.00067	0.007	0.007	0.630	10.530	0.101
19	0.00022	0.003	0.003	0.260	5.072	0.049
	0.00033	0.004	0.003	0.390	6.297	0.074
	0.00044	0.004	0.004	0.490	7.847	0.093
	0.00056	0.005	0.005	0.610	9.372	0.116
	0.00067	0.006	0.006	0.690	11.200	0.131

Table S3. Soil detachment capacity for different soil slopes and flow discharges simulated in flume experiments on samples collected in the four hillslopes of Saravan Forestland Park (Northern Iran).

Slope (%)	Flow Discharge (L s ⁻¹)	Soil Detachment Capacity (kg s ⁻¹ m ⁻²)											
		Condition											
		D						F					
		S			N			S			N		
		Aspect			Position			Aspect			Position		
		LS	MS	US	LS	MS	US	LS	MS	US	LS	MS	US
12	0.00022	0.013	0.013	0.015	0.012	0.012	0.012	0.006	0.006	0.006	0.003	0.004	0.004
	0.00033	0.017	0.018	0.019	0.015	0.016	0.016	0.007	0.008	0.008	0.004	0.004	0.005
	0.00044	0.026	0.026	0.027	0.021	0.021	0.021	0.009	0.009	0.009	0.007	0.007	0.007
	0.00056	0.030	0.031	0.034	0.026	0.027	0.029	0.010	0.011	0.013	0.008	0.008	0.009
	0.00067	0.040	0.042	0.043	0.036	0.036	0.038	0.015	0.016	0.016	0.010	0.012	0.012
16	0.00022	0.018	0.017	0.019	0.016	0.015	0.016	0.005	0.007	0.007	0.004	0.004	0.004
	0.00033	0.025	0.025	0.028	0.024	0.024	0.024	0.009	0.011	0.011	0.006	0.007	0.007
	0.00044	0.038	0.041	0.041	0.034	0.036	0.036	0.014	0.014	0.015	0.008	0.009	0.010
	0.00056	0.058	0.059	0.061	0.051	0.052	0.054	0.017	0.018	0.019	0.015	0.015	0.015
	0.00067	0.064	0.065	0.067	0.055	0.059	0.061	0.021	0.023	0.025	0.016	0.018	0.019
19	0.00022	0.025	0.025	0.025	0.017	0.018	0.018	0.009	0.009	0.009	0.005	0.005	0.005
	0.00033	0.032	0.035	0.037	0.027	0.027	0.029	0.013	0.014	0.014	0.009	0.010	0.010
	0.00044	0.053	0.055	0.058	0.048	0.050	0.051	0.018	0.018	0.018	0.014	0.014	0.014
	0.00056	0.071	0.071	0.072	0.063	0.065	0.067	0.021	0.023	0.025	0.018	0.018	0.020
	0.00067	0.075	0.078	0.079	0.071	0.072	0.072	0.027	0.027	0.029	0.022	0.023	0.024

Notes: D = deforested hillslope; F = forest hillslope; S = south; N = north; US = upper slope; MS = middle slope; LS = lower slope.