

Supplementary Material
Assessment of Practices for Arresting Shallow Valley-Bottom Gullies in the (Sub-)Humid Ethiopian Highlands

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Table S1. Measured gully dimensions (length, width, and depth) and calculated area and volume of soil.

Gully ID	Length (m)			Average Width (m)			Average Depth (m)			Area (m ²)			Volume of Soil Loss (m ³)		
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016
C1	3.7	2.35	0.42	8.7	9.4	8.6	3.03	3.4	3.1	26.4	32.0	26.7	97.5	75.1	11.2
C2	2.8	0	1.50	1.65	2.5	3	1.77	1.25	1.6	2.9	3.1	4.8	8.2	0.0	7.2
C3	1.1	0	1.20	4.5	4.2	4.5	1.97	1.8	1.97	8.9	7.6	8.9	9.8	0.0	10.6
C4	1.2	0	0.50	1.35	2	3.6	1.2	1.15	1.43	1.6	2.3	5.1	1.9	0.0	2.6
C5	1.8	0.65	19.60	2.3	1.85	2.3	1.8	1.6	1.8	4.1	3.0	4.1	7.5	1.9	81.1
C6	3.3	3.25	1.20	3.15	2.8	3.1	1.1	0.9	1.1	3.5	2.5	3.4	11.4	8.2	4.1
V1	7	3	2.80	31	28	28.7	2.7	2.1	1.5	83.7	58.8	43.1	585.9	176.4	120.5
V2	23	7	2.50	8	13	14.5	2.1	2.4	2.9	16.8	31.2	42.1	386.4	218.4	105.1
R1	11	0	0.00	4.5	4.7	5.2	2.31	2.6	2.3	10.4	12.2	12.0	114.3	0.0	0.0
R2	0	0	0.00	2.2	3	3.5	2.335	1.75	1.6	5.1	5.3	5.6	0.0	0.0	0.0
S1	0	1.1	0.35	2.5	2.9	3.83	0.88	1	1.2	2.2	2.9	4.6	0.0	3.2	1.6
RV1	22.5	0	0.00	4.1	4.8	4.81	1.2	1.8	1.64	4.9	8.6	7.9	110.7	0.0	0.0
RV2	2	0	0.00	5.5	6	6	2	1.8	1.4	11.0	10.8	8.4	22.0	0.0	0.0
RV3_B	0	0	0.00	2.9	3	3.01	1.75	1.25	1.45	5.1	3.8	4.4	0.0	0.0	0.0

Table S2. The profitability of gully rehabilitation techniques

Gully ID	Area of gully head (a) (m ²)	Area Loss per year (b) (m ²)	Area of closure upstream from head (C) (m ²)	Total cost of a structure (d) (ETB)	Total cost of structure per unit area (e) (m ²)	Income from closure per unit area (f) (ETB/m ²)	Benefit of grazing per unit area (g) (ETB/m ²)	Net income per unit area (h=f-g) (ETB/m ²)	Total income (i=c*h) ETB	Area loss due to gully expansion after treatment (j=h*b) ETB	Income from the gully area per m ² (k=i/a)	Net income (L=k-e) (ETB/m ²)	PV of cost (ETB)	PV of benefit (ETB)	NPV (ETB)
V1	37.3	127.12	3100.00	1023.0	23.2	3.15	0.50	2.65	8215	337	211	188	50	1274	1224
V2	15.0	103.75	3570.00	4146.0	77.9	3.15	0.50	2.65	9461	275	612	534	168	3627	3459
R1	9.7	16.50	400	253.0	14.2	3.15	0.50	2.65	1060	0	109	95	31	645	614
R2	1.6	0.00	390	251.0	83.0	3.15	0.50	2.65	1034	0	633	550	179	3731	3552
S1	0.7	1.51	0	40.0	28.0	3.15	0.50	2.65	0	4	-6	-34	60	-231	-291
RV1	2.2	30.75	485	309.0	79.5	3.15	0.50	2.65	1285	0	595	516	171	3499	3327
RV2	5.0	3.67	295	265.0	34.5	3.15	0.50	2.65	782	0	156	122	74	827	752
RV3₈	2.5	0.00	275	300.0	84.7	3.15	0.50	2.65	729	0	292	207	183	1403	1220

where PV is the present value, NPV is the net present value, and m² is the square meter.

Table S3. Pre-rehabilitation status of all gullies in the Ene-Chilala watershed.

Gully ID	Total length (m)	Average Width (m)	Average Depth (m)	Gully Head slope (°)	Surface slope above gully head (°)	Channel Slope (°)	Runoff Contributing area (ha)	Presence of cracks near the head	Land use
C1	34.7	8	2.4	85	2.9	10.2	0.3	No	Grazing
C2	37.5	1.9	2	80	1.2	6.3	0.5	yes	Grazing
C3	35	4	1.9	78	2.8	11.3	0.1	no	Grazing
C4	21	1.8	0.9	86	1.2	4.6	7.9	yes	Grazing
C5	41	1.85	1.6	81	3.4	0.0	0.1	yes	Grazing
C6	39	4	0.85	75	1.7	1.2	0.1	no	Grazing
V1	146	28	2.7	89	5.7	3.4	13.6	No	Grazing
V2	23	8	2.2	87	5.1	5.4	11.5	Yes	Grazing
S1	29.6	2.1	0.5	77	5.4	4.3	0.1	No	Grazing
R1	48.5	5.6	2.6	78	1.7	3.2	0.3	yes	Grazing
R2	18.5	2.7	1.2	81	3.4	6.8	3.3	no	Grazing
RV1	39.6	3.5	0.7	87	5.1	5.4	6.0	yes	Grazing
RV2	22	5	1.5	89	3.4	4.6	10.9	yes	Grazing
RVB1	23	2.5	1.45	90	2.9	6.8	0.1	yes	Grazing

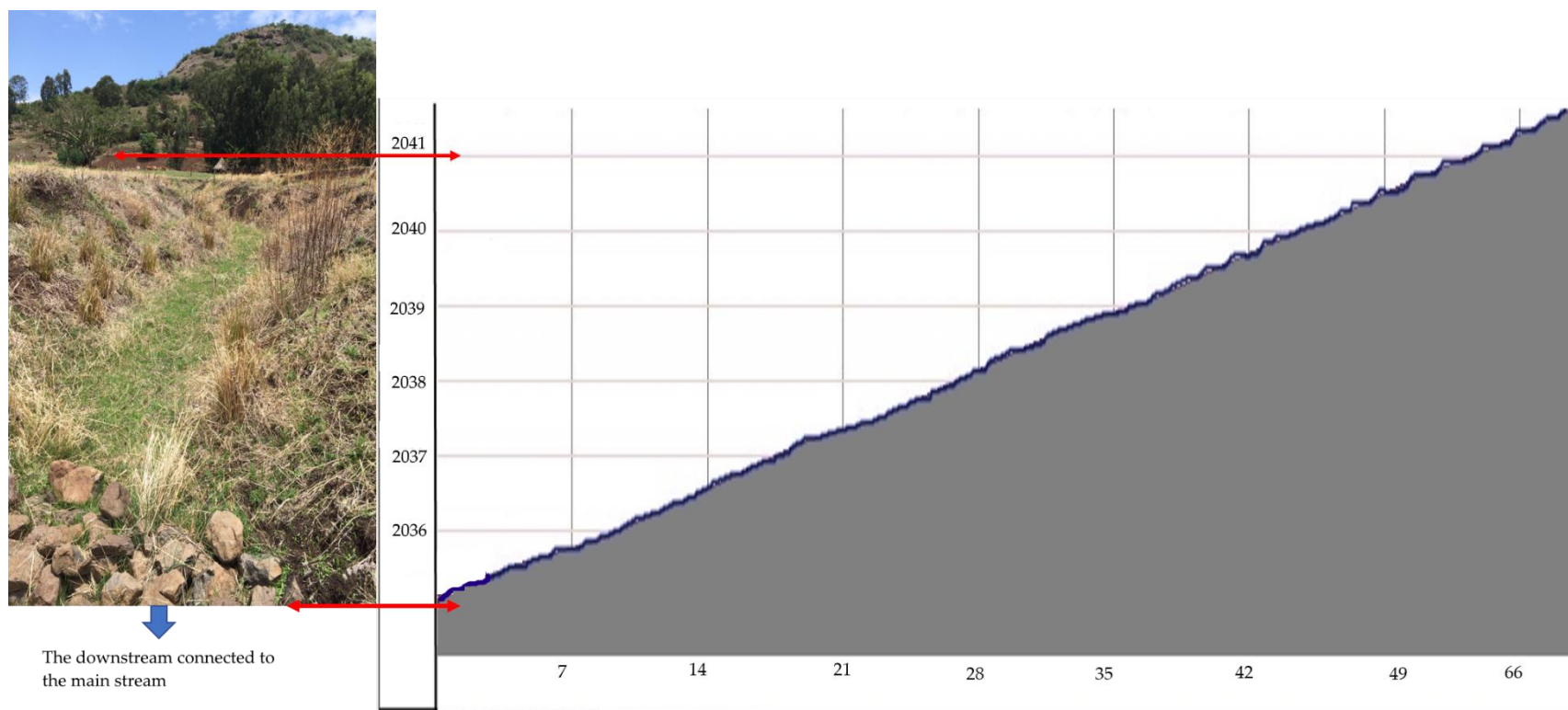


Figure S1. The longitudinal profile of gully RV1 with the left picture displaying the top view of the gully and the right graph show the gully profile drawn from the Google earth elevation profile view.



Figure S2. Pre- and post-rehabilitation practices in the Ene-Chilala watershed. (a) pre-gully rehabilitation at RV2 and (b) post rehabilitation at the same gully. (c) shows the pre-rehabilitation at RVB1 and (d) post rehabilitation at the same gully.



Figure S3. Extending gully head treatments through consultative meetings and field visits with community, development agents and regional natural resource management experts in the Ene-Chilala watershed.