

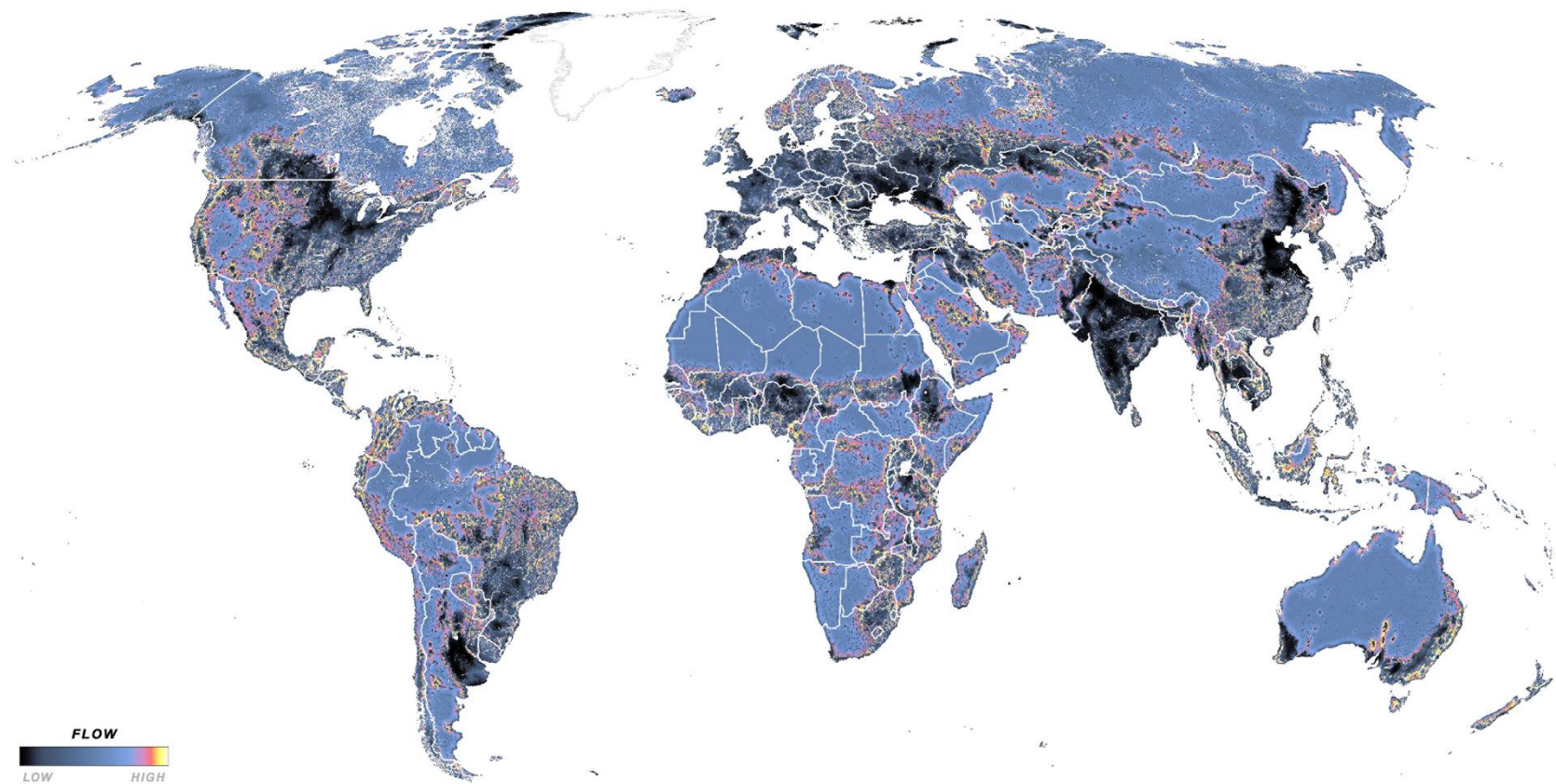


Fig S1 | Global continuous connectivity Global connectivity of the world's terrestrial natural lands modeled using omnidirectional connectivity modeling. Low connectivity areas (darker colors) can be found in human modified areas and high connectivity (yellows) can be found in pinch points and corridors across areas with human modification.

Table S1 | Distribution of resistance, flow, potential flow, and normalized flow values for each connectivity category. Global connectivity categories were defined for each output layer based on thresholds identified by Cameron et al. 2022 and data distribution across resistance values.

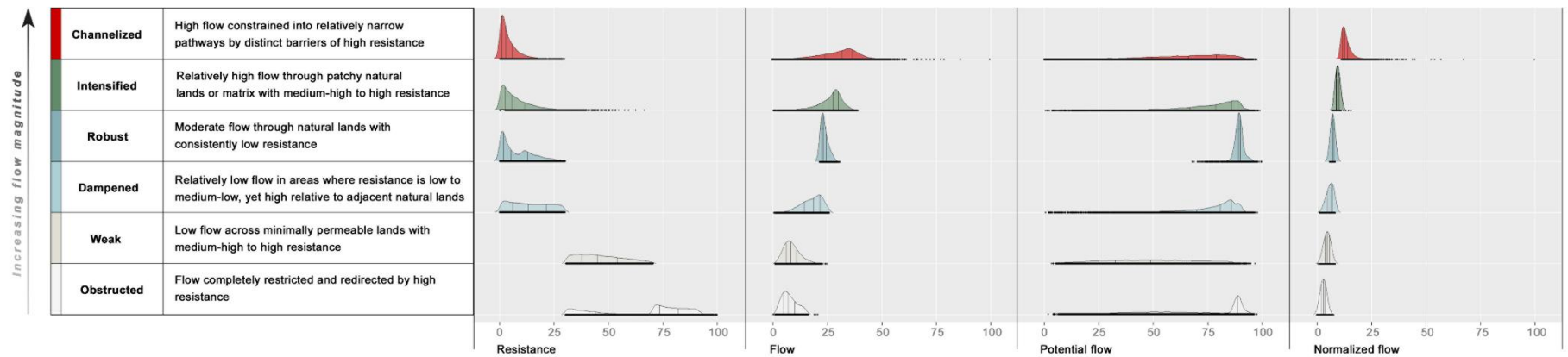


Table S2 | Percentage of connectivity categories by biome.

Biome	Channelized	Dampened	Diffuse Intensified	Robust	Total	Weak	Impeded Obstructed	Total
Boreal Forests/Taiga	1.0	37.4	7.7	52.0	97.0	1.7	0.4	2.0
Deserts & Xeric Shrublands	0.6	17.1	4.8	71.3	93.2	5.4	0.9	6.3
Flooded Grasslands & Savannas	2.6	30.0	10.1	41.6	81.7	13.4	2.3	15.7
Mediterranean Forests, Woodlands & Scrub	5.8	28.0	12.2	18.0	58.2	33.9	2.1	36.0
Montane Grasslands & Shrublands	1.0	44.0	6.9	42.2	93.1	5.4	0.6	5.9
Temperate Broadleaf & Mixed Forests	5.4	28.4	16.0	8.7	53.1	38.2	3.4	41.5
Temperate Conifer Forests	3.4	34.1	15.6	40.1	89.8	5.5	1.3	6.8
Temperate Grasslands, Savannas & Shrublands	3.2	29.8	10.6	21.3	61.7	33.6	1.4	35.1
Tropical & Subtropical Coniferous Forests	5.8	32.2	23.1	30.6	86.0	6.3	2.0	8.3
Tropical & Subtropical Dry Broadleaf Forests	5.5	32.7	14.1	14.6	61.3	31.4	1.7	33.1
Tropical & Subtropical Grasslands, Savannas & Shrublands	1.8	32.5	9.9	45.6	88.0	9.6	0.6	10.2
Tropical & Subtropical Moist Broadleaf Forests	4.4	29.1	13.0	38.9	81.0	12.9	1.8	14.6
Tundra	2.1	47.4	11.2	39.0	97.6	0.2	0.1	0.3

Table S3 | Percentage of connectivity flow categories by continent.

Continent	Channelized	Diffuse				Weak	Impeded	
		Intensified	Robust	Dampened	Total		Obstructed	Total
Africa	1.2	7.2	57.8	26.2	91.1	7.0	0.6	7.6
Asia	3.8	11.2	32.7	29.7	73.6	20.8	1.9	22.7
Europe	2.6	8.6	41.6	28.1	78.3	18.1	1.0	19.1
North America	3.4	15.0	23.5	41.8	80.3	14.7	1.6	16.3
Oceania	2.2	5.9	68.7	16.4	91.0	6.1	0.7	6.9
South America	2.1	11.5	44.1	32.6	88.2	8.7	1.1	9.8

Table S4 | Percentage of global Omniscape connectivity categories within countries greater than 10,000 km².

Country	ISO Code	Channelized	Intensified (Diffuse)	Dampened (Diffuse)	Robust (Diffuse)	Obstructed (Impeded)	Weak (Impeded)	Impeded
Afghanistan	AFG	1.4	12.1	47.7	33.0	0.3	5.6	5.9
Albania	ALB	9.5	22.0	33.4	10.9	2.3	21.9	24.2
Algeria	DZA	0.5	2.2	9.3	84.5	0.5	3.0	3.5
Angola	AGO	0.3	5.6	26.4	65.6	0.4	1.7	2.1
Argentina	ARG	1.5	8.9	28.4	42.7	0.8	17.7	18.5
Armenia	ARM	14.1	18.0	38.5	2.2	1.8	25.5	27.3
Australia	AUS	1.5	5.0	14.4	72.0	0.7	6.4	7.2
Austria	AUT	5.6	13.2	26.8	13.6	3.2	37.7	40.9
Azerbaijan	AZE	13.8	15.8	29.2	0.9	2.2	38.1	40.3
Bahamas	BHS	81.0	10.0	5.3	0.0	1.5	2.3	3.8
Bangladesh	BGD	1.6	5.7	15.3	1.4	1.0	75.0	75.9
Belarus	BLR	10.5	13.2	29.8	0.6	1.2	44.7	45.9
Belgium	BEL	0.3	7.7	2.2	3.6	12.8	73.4	86.2
Belize	BLZ	11.4	40.7	34.5	4.3	2.5	6.7	9.2
Benin	BEN	6.4	21.3	45.9	1.9	0.5	23.9	24.4
Bhutan	BTN	0.3	17.6	44.5	35.8	1.1	0.8	1.9
Bolivia	BOL	0.2	4.5	29.9	61.8	0.5	3.0	3.5
Bosnia and Herzegovina	BIH	10.0	18.6	31.1	16.6	7.2	16.5	23.7
Botswana	BWA	0.1	3.9	20.1	74.7	0.3	0.9	1.2
Brazil	BRA	2.4	12.8	36.7	37.6	1.1	9.4	10.5
Bulgaria	BGR	11.1	12.8	26.3	1.0	1.1	47.7	48.8
Burkina Faso	BFA	3.7	12.4	65.3	3.1	0.3	15.2	15.5
Burundi	BDI	4.3	6.0	53.4	0.2	0.6	35.5	36.2
C. A. R.	CAF	0.0	0.7	13.2	85.5	0.5	0.1	0.6
Cambodia	KHM	7.3	24.3	25.3	0.9	0.3	41.9	42.2
Cameroon	CMR	0.8	12.7	31.3	47.2	1.1	6.9	8.0
Canada	CAN	2.4	14.5	58.4	18.0	0.4	6.3	6.7
Chad	TCD	0.7	5.4	21.4	68.7	0.1	3.7	3.8
Chile	CHL	5.4	17.4	38.6	32.0	1.2	5.4	6.6
China	CHN	2.0	10.3	37.0	30.6	2.1	18.0	20.1
Colombia	COL	1.2	15.6	26.4	53.2	1.5	2.1	3.6
Congo	COG	0.1	4.4	22.2	72.2	0.6	0.5	1.1
Costa Rica	CRI	13.7	22.5	36.1	9.2	3.7	14.7	18.4
Croatia	HRV	10.2	13.3	27.3	5.3	2.4	41.5	43.9
Cuba	CUB	24.8	14.7	29.3	1.6	0.7	29.0	29.7
Czech Republic	CZE	4.2	13.0	12.3	1.3	3.4	65.9	69.2
D.R. Congo	COD	0.4	7.5	27.6	62.0	1.3	1.3	2.5
Denmark	DNK	4.5	10.1	0.9	0.0	4.4	80.2	84.6

Djibouti	DJI	0.3	15.3	44.1	38.8	0.5	0.9	1.4
Dominican Republic	DOM	14.9	24.2	37.3	6.8	2.8	14.0	16.8
East Timor	TLS	33.2	25.2	33.0	0.0	0.3	8.4	8.7
Ecuador	ECU	5.2	18.1	30.3	37.6	2.5	6.3	8.8
Egypt	EGY	0.2	4.3	20.7	68.9	1.7	4.1	5.9
El Salvador	SLV	6.8	13.8	33.7	11.2	3.7	30.8	34.5
Equatorial Guinea	GNQ	3.3	4.7	39.8	48.2	2.4	1.7	4.0
Eritrea	ERI	0.6	12.4	51.4	34.0	0.2	1.6	1.8
Estonia	EST	16.8	17.1	33.3	2.3	1.3	29.3	30.5
Ethiopia	ETH	2.4	9.0	38.6	36.6	0.3	13.1	13.4
Falkland Islands	FLK	57.8	29.1	12.6	0.0	0.0	0.5	0.5
Finland	FIN	4.4	19.5	48.0	13.6	0.7	13.8	14.5
France	FRA	3.9	9.3	14.1	16.7	2.7	53.4	56.1
Gabon	GAB	0.1	2.3	19.4	77.1	0.7	0.3	1.0
Gambia	GMB	7.2	9.8	45.0	0.0	1.0	37.1	38.0
Georgia	GEO	7.7	26.5	32.3	11.3	1.9	20.3	22.1
Germany	DEU	3.3	11.7	9.0	1.4	5.4	69.3	74.7
Ghana	GHA	6.0	16.8	46.1	13.0	2.9	15.3	18.2
Greece	GRC	17.0	18.8	25.1	3.6	2.0	33.5	35.6
Guatemala	GTM	7.4	18.2	36.3	20.0	5.5	12.6	18.1
Guinea	GIN	0.2	8.9	43.9	44.7	1.0	1.3	2.3
Guinea-Bissau	GNB	2.3	21.3	48.3	26.3	0.5	1.4	1.9
Guyana	GUY	0.0	1.1	15.0	81.8	1.4	0.8	2.2
Haiti	HTI	23.1	25.7	37.2	7.3	1.1	5.5	6.6
Honduras	HND	6.3	22.4	35.9	20.7	6.9	7.8	14.7
Hungary	HUN	2.4	8.4	10.9	0.2	2.5	75.6	78.1
Iceland	ISL	5.6	16.0	63.7	12.6	0.1	2.0	2.1
India	IND	5.5	8.9	20.8	2.4	1.9	60.5	62.4
Indonesia	IDN	12.8	17.7	24.7	24.1	4.0	16.8	20.7
Iran	IRN	3.3	12.9	32.3	36.4	1.1	14.1	15.2
Iraq	IRQ	2.2	8.3	28.3	42.8	1.0	17.5	18.5
Ireland	IRL	4.1	13.2	11.3	16.5	1.7	53.2	54.9
Israel	ISR	3.0	22.7	17.9	8.1	12.0	36.4	48.3
Italy	ITA	7.3	12.6	14.0	4.4	6.8	55.0	61.7
Ivory Coast	CIV	2.2	14.7	41.6	30.9	2.7	8.1	10.8
Jamaica	JAM	28.0	24.1	31.8	0.0	2.1	14.0	16.2
Japan	JPN	14.3	20.5	24.2	4.6	9.0	27.5	36.5
Jordan	JOR	1.2	13.4	13.8	61.6	2.3	7.7	9.9
Kazakhstan	KAZ	1.7	10.4	27.0	49.7	0.7	10.6	11.3
Kenya	KEN	2.0	10.6	29.5	42.7	0.5	14.7	15.2
Kuwait	KWT	0.8	20.5	27.6	23.8	5.7	21.6	27.3
Kyrgyzstan	KGZ	1.9	19.4	50.8	17.3	0.8	9.8	10.6

Laos	LAO	1.9	23.2	35.1	31.2	0.5	8.1	8.5
Latvia	LVA	9.6	16.3	38.8	2.8	0.7	31.9	32.6
Lebanon	LBN	7.9	15.3	20.7	1.6	4.4	50.2	54.5
Lesotho	LSO	5.9	25.9	51.5	0.9	0.4	15.4	15.8
Liberia	LBR	1.3	28.0	43.4	24.7	1.2	1.4	2.6
Libyan A. J.	LBY	0.0	0.9	7.8	90.0	0.5	0.9	1.3
Lithuania	LTU	6.4	11.6	26.2	0.7	1.3	53.8	55.1
Madagascar	MDG	0.7	13.5	54.8	28.2	0.3	2.5	2.7
Malawi	MWI	10.0	13.0	28.4	0.2	0.5	48.0	48.4
Malaysia	MYS	9.4	18.7	21.6	20.6	6.2	23.5	29.7
Mali	MLI	0.6	5.4	23.4	65.1	0.1	5.3	5.4
Mauritania	MRT	0.0	0.9	8.8	90.1	0.1	0.1	0.2
Mexico	MEX	3.6	17.8	34.4	30.6	1.9	11.7	13.6
Moldova	MDA	3.3	3.5	7.4	0.0	1.4	84.4	85.8
Mongolia	MNG	0.0	1.2	15.7	82.7	0.2	0.2	0.4
Montenegro	MNE	6.6	27.2	37.9	18.5	3.6	6.2	9.8
Morocco	MAR	2.1	8.5	31.7	40.7	0.8	16.1	17.0
Mozambique	MOZ	1.1	18.3	41.6	34.5	0.4	4.1	4.6
Myanmar	MMR	2.8	21.6	33.7	21.0	0.6	20.3	20.9
Namibia	NAM	0.2	2.0	25.3	71.4	0.8	0.4	1.2
Nepal	NPL	2.9	14.9	62.9	5.3	0.5	13.6	14.1
Netherlands	NLD	1.7	6.9	0.5	0.1	13.0	77.8	90.8
New Zealand	NZL	8.6	24.7	46.0	12.2	1.6	7.1	8.6
Nicaragua	NIC	8.3	21.4	39.1	24.0	1.6	5.5	7.2
Niger	NER	0.3	2.8	12.8	77.6	0.1	6.4	6.5
Nigeria	NGA	5.1	13.7	33.0	5.5	1.3	41.4	42.7
North Korea	PRK	5.4	28.1	37.8	5.7	0.6	22.4	23.0
North Macedonia	MKD	18.8	18.2	33.3	2.8	1.5	25.4	27.0
Norway	NOR	7.7	30.6	46.5	8.8	0.5	5.9	6.4
Oman	OMN	1.3	9.5	27.5	58.2	1.8	1.8	3.6
Pakistan	PAK	1.5	8.1	39.0	24.4	1.2	25.8	27.0
Panama	PAN	18.3	27.2	42.7	6.2	0.7	4.9	5.6
Papua New Guinea	PNG	5.8	10.5	34.6	48.2	0.4	0.6	1.0
Paraguay	PRY	2.4	14.1	39.2	34.1	0.4	9.8	10.2
Peru	PER	0.1	8.0	24.5	64.4	1.3	1.6	3.0
Philippines	PHL	25.4	17.1	16.6	1.2	1.4	38.2	39.7
Poland	POL	5.7	11.6	12.4	0.7	2.7	67.0	69.6
Portugal	PRT	3.8	11.4	15.3	20.3	4.5	44.7	49.3
Qatar	QAT	12.4	33.5	18.5	1.6	5.2	28.9	34.1
Romania	ROU	6.8	11.8	22.1	3.4	1.6	54.4	56.0
Russian Federation	RUS	1.3	6.9	29.6	54.1	0.5	7.7	8.1
Rwanda	RWA	8.2	3.7	16.9	0.1	1.3	69.7	71.1

Saudi Arabia	SAU	0.3	7.6	17.0	71.3	1.9	2.0	3.8
Senegal	SEN	1.6	9.2	36.5	31.6	0.5	20.6	21.1
Serbia	SRB	7.1	11.5	23.7	6.5	2.7	48.5	51.2
Sierra Leone	SLE	2.1	13.6	46.6	34.6	1.8	1.4	3.1
Slovakia	SVK	10.3	14.8	21.0	4.8	2.2	46.9	49.1
Slovenia	SVN	10.7	15.6	22.0	19.1	2.9	29.9	32.8
Solomon Is	SLB	70.9	13.0	14.7	0.0	0.0	1.4	1.4
Somalia	SOM	0.5	6.2	34.3	57.1	0.4	1.5	1.9
South Africa	ZAF	2.9	12.1	35.3	38.1	1.3	10.3	11.5
South Korea	KOR	6.0	18.0	17.7	7.2	8.1	43.0	51.1
South Sudan	SSD	0.0	1.7	17.1	80.4	0.5	0.3	0.7
Spain	ESP	6.9	12.3	24.2	6.4	2.4	47.8	50.2
Sri Lanka	LKA	16.0	11.8	30.0	9.2	1.4	31.6	33.0
Sudan	SDN	0.7	5.6	24.0	61.0	0.4	8.3	8.7
Suriname	SUR	0.3	5.0	14.3	77.9	1.4	1.0	2.4
Eswatini	SWZ	6.6	17.4	44.0	6.4	0.9	24.7	25.6
Sweden	SWE	3.3	17.4	54.5	11.1	0.8	12.9	13.7
Switzerland	CHE	14.8	15.2	24.6	5.7	4.3	35.4	39.7
Syria	SYR	1.8	9.0	25.7	30.3	1.1	32.2	33.3
Taiwan	TWN	18.5	15.2	29.3	0.8	12.5	23.6	36.1
Tajikistan	TJK	2.6	11.7	67.0	8.5	1.1	9.2	10.2
Tanzania	TZA	4.3	18.5	38.2	18.2	0.5	20.3	20.8
Thailand	THA	8.0	12.6	16.9	4.4	2.5	55.6	58.1
Togo	TGO	4.9	19.7	43.3	4.6	0.8	26.6	27.4
Tunisia	TUN	2.7	8.1	31.0	39.3	1.4	17.5	18.9
Turkey	TUR	10.0	15.1	36.7	2.7	1.4	34.2	35.6
Turkmenista n	TKM	1.0	10.2	29.4	52.8	0.5	6.2	6.7
Uganda	UGA	7.6	14.8	31.3	9.7	0.6	35.9	36.5
Ukraine	UKR	4.7	6.9	12.3	0.6	1.3	74.3	75.6
United Arab Emirates	ARE	1.7	18.2	26.6	33.9	6.9	12.8	19.6
United Kingdom	GBR	7.6	13.2	10.6	5.6	6.0	57.0	63.0
United States	USA	3.6	14.3	29.1	27.7	2.6	22.9	25.4
Uruguay	URY	3.3	8.8	54.0	14.6	0.6	18.7	19.3
Uzbekistan	UZB	3.0	12.4	21.7	44.5	3.0	15.4	18.4
Vanuatu	VUT	65.3	23.4	10.7	0.0	0.0	0.7	0.7
Venezuela	VEN	2.8	12.4	25.5	54.5	2.2	2.7	4.9
Vietnam	VNM	6.6	17.5	33.6	6.8	2.8	32.8	35.5
Western Sahara	ESH	0.0	0.5	14.9	84.6	0.1	0.1	0.2
Yemen	YEM	1.4	7.0	26.3	62.3	0.6	2.5	3.1
Zambia	ZMB	1.2	10.1	39.8	43.9	0.5	4.5	5.0
Zimbabwe	ZWE	6.1	20.2	47.5	8.8	0.3	17.2	17.4

Table S5 | List of sensitivity testing models tested to determine impact of model parameters on current flow. C value indicates the rescaling parameter in a negative exponential function used to transform the human modification resistance data. Higher c values indicate a more exponential function with lower resistance to low and moderate human modification values and lower c value indicates a more linear transformation, where lower human modifications are relatively higher resistance compared to an exponential function.

	Resistance	Source	Radius
Sensitivity 1			
<i>Goal: Determine impact of source layer on output</i>			
[Default model]	HM (untransformed)	1-HM	125
	HM (c=2)	1-HM	125
	HM (c=2)	uniform 1	125
	HM (c=2)	Proportional natural lands	125
	HM (c=2)	Other natural lands layer?	
Sensitivity 2			
<i>Goal: Determine impact of resistance layer on output</i>			
[Default model]	HM (untransformed)	1-HM	125
	HM (c=2; grazing included)	Proportional natural lands	125
	HM (c=2; slope included)	Proportional natural lands	125
	HM (c=2; water as 1000)	Proportional natural lands	125
	HM (c=2)	Proportional natural lands	125
	HM (c=.25)	Proportional natural lands	125
	HM (c=4)	Proportional natural lands	125
	HM (c=8)	Proportional natural lands	125
Sensitivity 3			
<i>Goal: Determining the impact of other model parameters</i>			
	HM (c=2)	Proportional natural lands	125
	HM (c=2)	Proportional natural lands	50
	HM (c=2)	Proportional natural lands	425

Table S6 | Pearson correlation coefficients for all model sensitivity runs. We tested 1) differences in resistance transformation (c= 0.25, c=2, c=4, c=8 in a negative exponential function), 2) resistance data with grazing included and excluded, 3) including water as maximum resistance vs a uniform random resistance value (default), 4) different radius sizes (50 km, 125 km, and 450 km) and 5) using different source data (a uniform source (1) and commonly used source (1-HM)). Pearson correlations are on log-transformed data.

	c0.25, 125k m	c2, 125k m	c2, 50k m	c2, 450km	c4, 125km	c8, 125k m	c2, 125km, 1-HM	c2, 125km, 1	c2, 125km, Grazing included	c2, 125km, Water high resistance
c0.25, 125 km		0.99	0.65	0.54	0.98	0.93	0.54	0.91	0.99	0.99
c2, 125 km	0.99		0.65	0.54	0.99	0.96	0.51	0.90	0.99	0.99
c2, 50 km	0.65	0.65		0.46	0.64	0.59	0.50	0.49	0.65	0.65
c2 450 km	0.54	0.54	0.46		0.51	0.46	0.47	0.43	0.52	0.53
c4, 25 km	0.98	0.99	0.64	0.51		0.98	0.45	0.89	0.99	0.98
c8, 125 km	0.93	0.96	0.59	0.46	0.98		0.32	0.84	0.96	0.94
c2, 125 km, 1-HM	0.54	0.51	0.50	0.47	0.45	0.32		0.42	0.48	0.51
c2, 125 km, 1	0.91	0.90	0.49	0.43	0.89	0.84	0.42		0.90	0.90
c2, 125 km, Grazing included	0.99	0.99	0.65	0.52	0.99	0.96	0.48	0.90		0.99
c2, 125 km, Water high resistance	0.99	0.99	0.65	0.53	0.98	0.94	0.51	0.90	0.99	

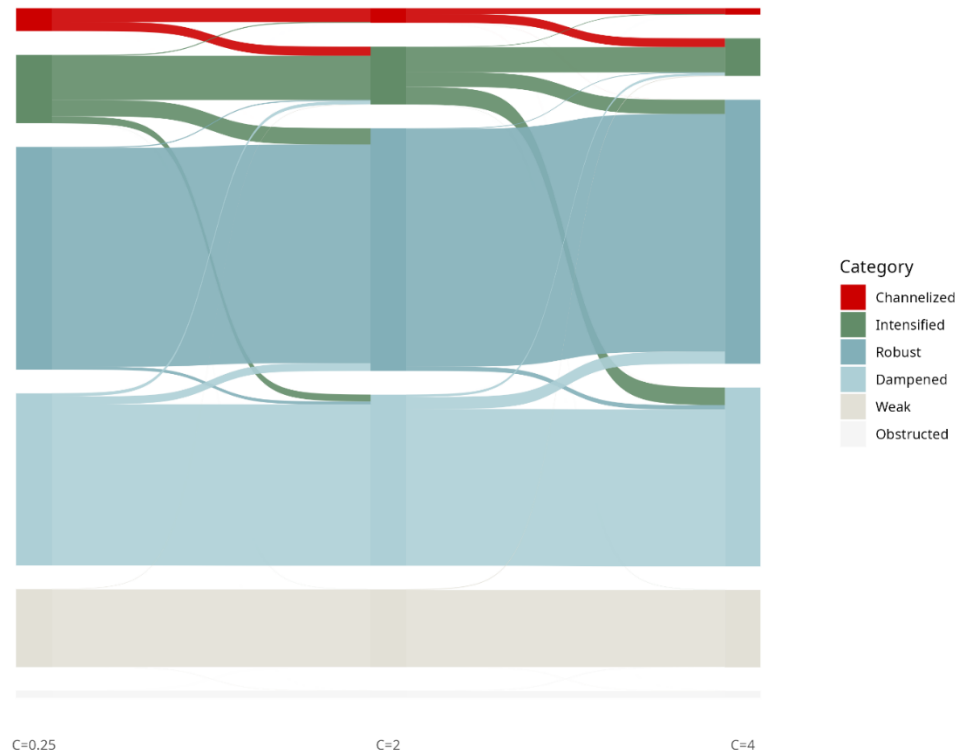


Fig. S2 | Changes in pixel assignments across flow categories with changes in rescaling parameter of the exponential transformation in resistance data. The impeded, weak, and dampened connectivity categories are relatively resistant to changes in resistance layer transformation. The channelized and intensified categories decrease with increasing rescaling parameter (c) values. The robust category increases in pixel count with increasing c values. With higher c values, higher values of the untransformed resistance data will have lower resistance values, once transformed, leading to a relative increase in flow across these areas. This is reflected in the increase in the robust flow category and a decrease in the channelized category.