Supplementary Materia

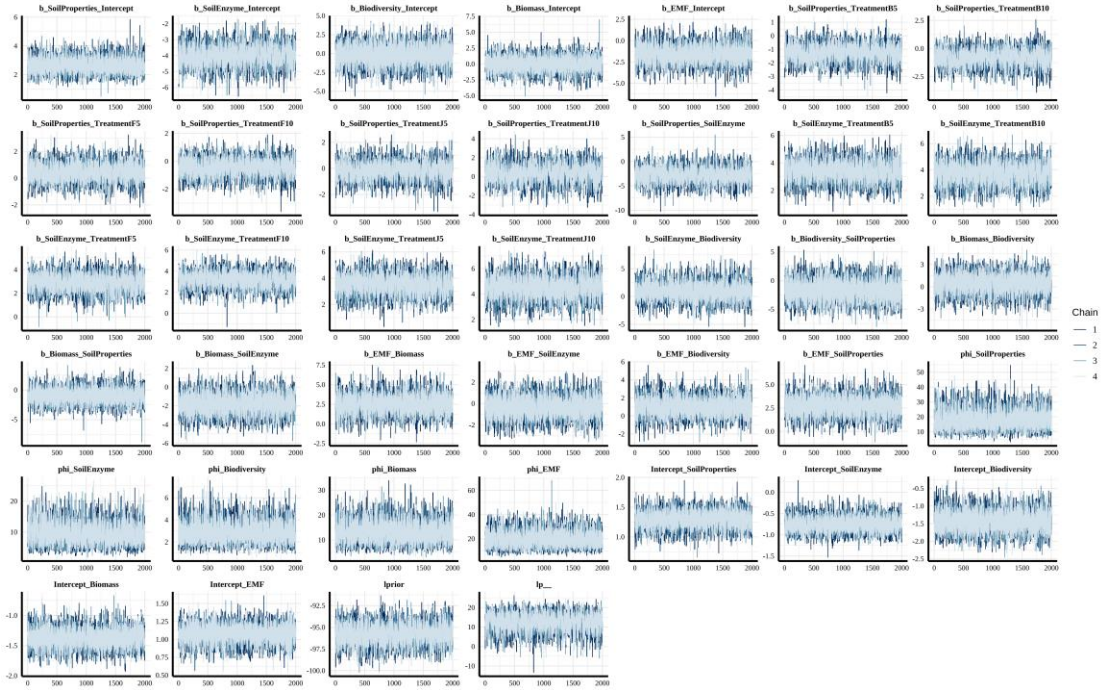
Table S1 Differences in grassland soil physical and chemical properties, soil enzymes, and plant diversity across different degradation gradients

Indexs		Degree of degradation	Mean±SE
Soil pH	pH	Mild	7.43 ± 0.110 a
Soil nutrients		Moderate	7.87 ± 0.013 b
		Severe	8.10 ± 0.034 c
	soil organic matter（SOM）/g.kg^{-1}	Mild	48.17 ± 1.02 a
		Moderate	41.38 ± 0.24 b
		Severe	35.28 ± 2.08 c
	available potassium（AK）/mg.kg^{-1}	Mild	82.81 ± 6.49 a
		Moderate	73.86 ± 2.86 a
		Severe	45.26 ± 4.18 b
	available phosphorus（AP）/mg.kg^{-1}	Mild	6.69 ± 0.28 a
		Moderate	6.05 ± 0.31 a
		Severe	3.55 ± 0.18 b
	ammonium nitrogen（NH_4^+-N）/mg.kg^{-1}	Mild	1.19 ± 0.05 a
		Moderate	1.28 ± 0.14 a
		Severe	0.94 ± 0.09 b
	nitrate nitrogen（NO_3^--N）/mg.kg^{-1}	Mild	3.87 ± 0.51 a
		Moderate	3.63 ± 0.80 b
		Severe	2.38 ± 0.78 c
Soil enzyme activity	urease（URE）/mg.g^{-1}	Mild	1.08 ± 0.12 b
		Moderate	0.91 ±0.08 c
		Severe	1.35±0.12 a
	catalase（CAT）mg.g^{-1}	Mild	2.02 ± 0.58 c
		Moderate	3.55 ±0.37 b
		Severe	3.83±0.14 a
	alkaline phosphatase（ALP）mg.g^{-1}	Mild	1.40 ± 0.04 a
		Moderate	1.16 ±0.06 b
		Severe	0.95±0.08 b
	dehydrogenase（DHA）mg.g^{-1}	Mild	4.04 ± 0.65a
		Moderate	6.16 ±0.78b
		Severe	2.25±0.25c
	cellulase（CEL）mg.g^{-1}	Mild	0.34 ± 0.03 a
		Moderate	0.23 ±0.02 b
		Severe	0.18±0.01 b
Vegetation diversity indices	Abundance	Mild	316.00±41.22a
		Moderate	204.00±31.07b
		Severe	89.67±43.01c

	Shannon-Wiener Index	Mild	1.36±0.17a
		Moderate	1.57±0.13b
		Severe	1.23±0.19a
	Pielou evenness Index	Mild	0.57±0.06a
		Moderate	0.71±0.03b
		Severe	0.67±0.04b
	Phylogenetic-Diversity	Mild	1053.34±99.74a
		Moderate	850.98±166.33b
		Severe	605.14±156.15c

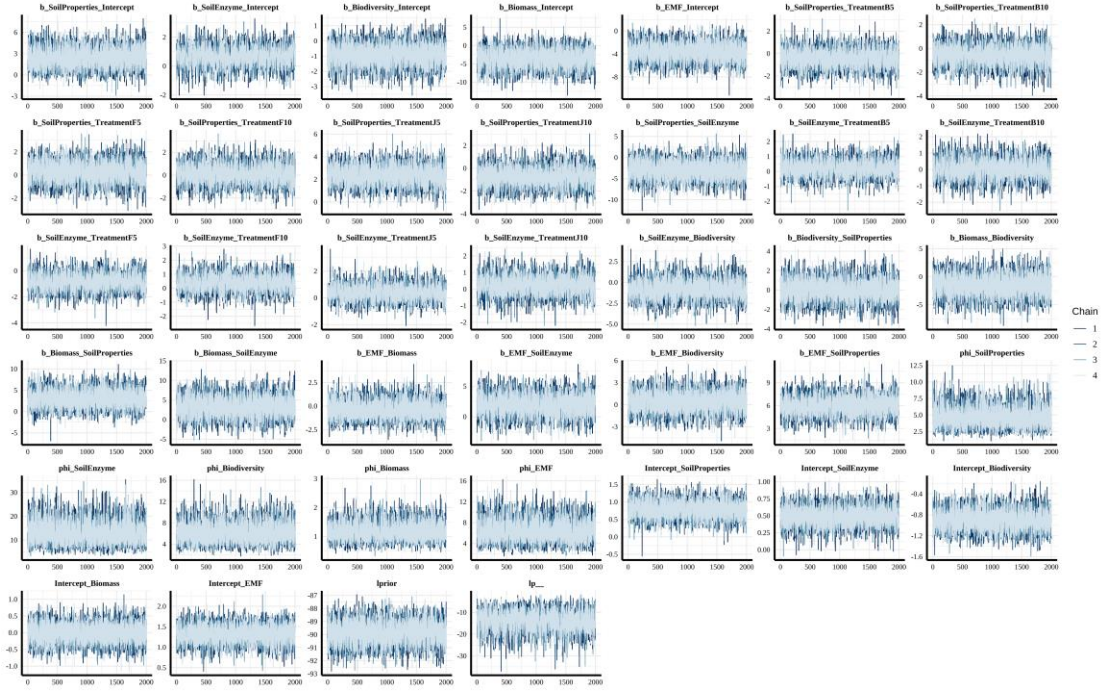
Mild degradation

MCMC Trace Plot of Parameters



Moderate degradation

MCMC Trace Plot of Parameters



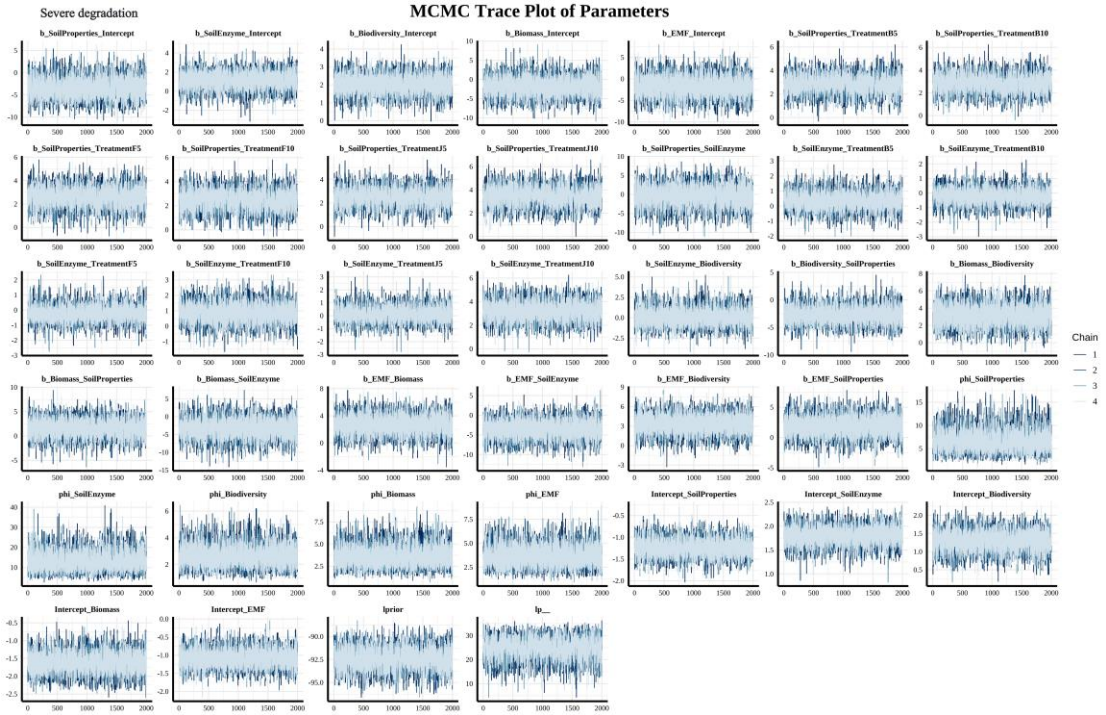
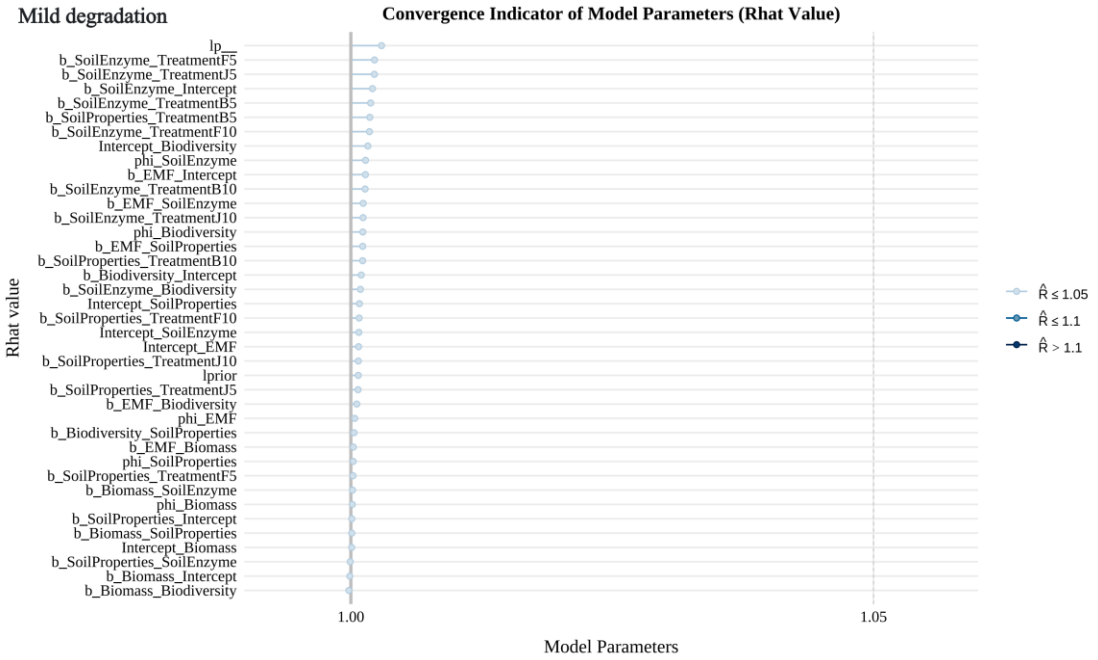
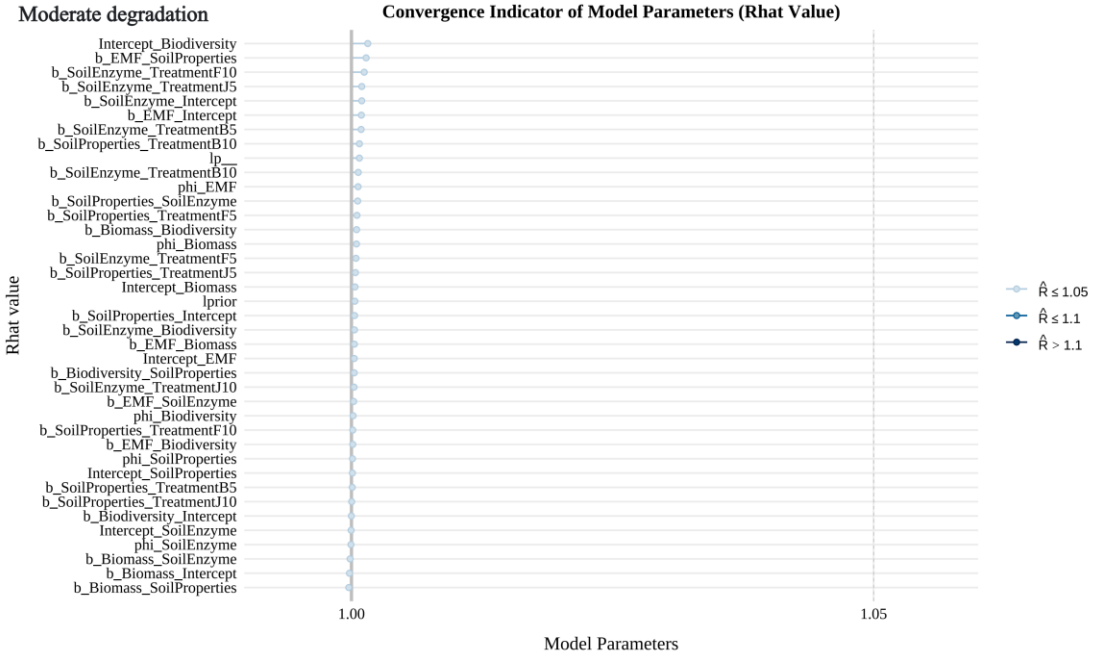


Figure S1 Bayesian structural equation model convergence MCMC test trace plot

Mild degradation



Moderate degradation



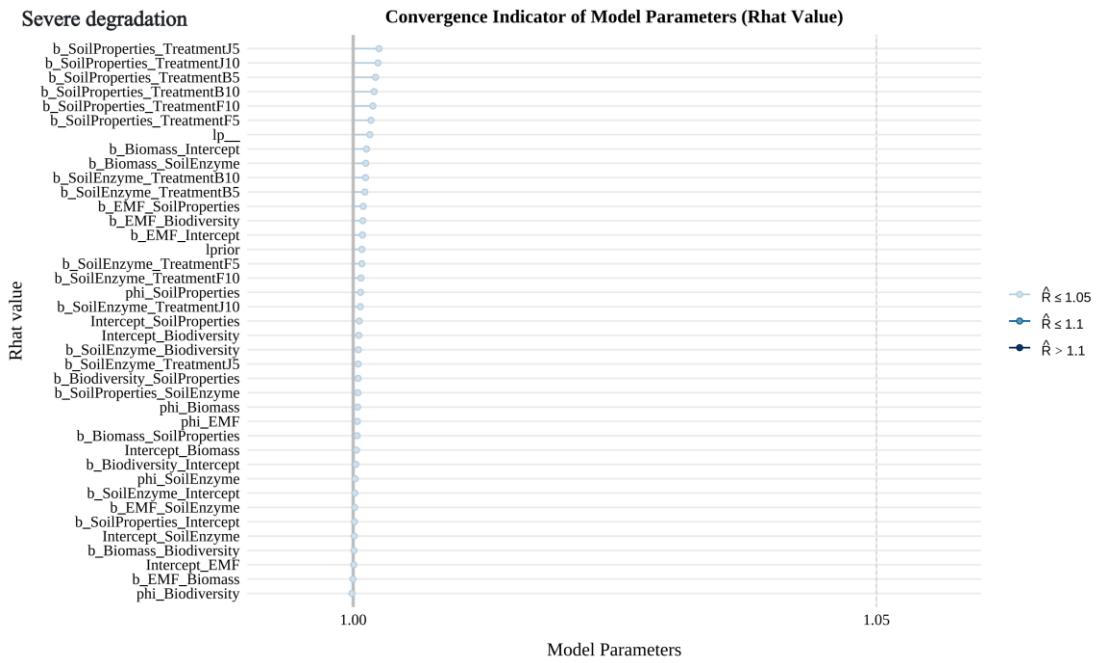
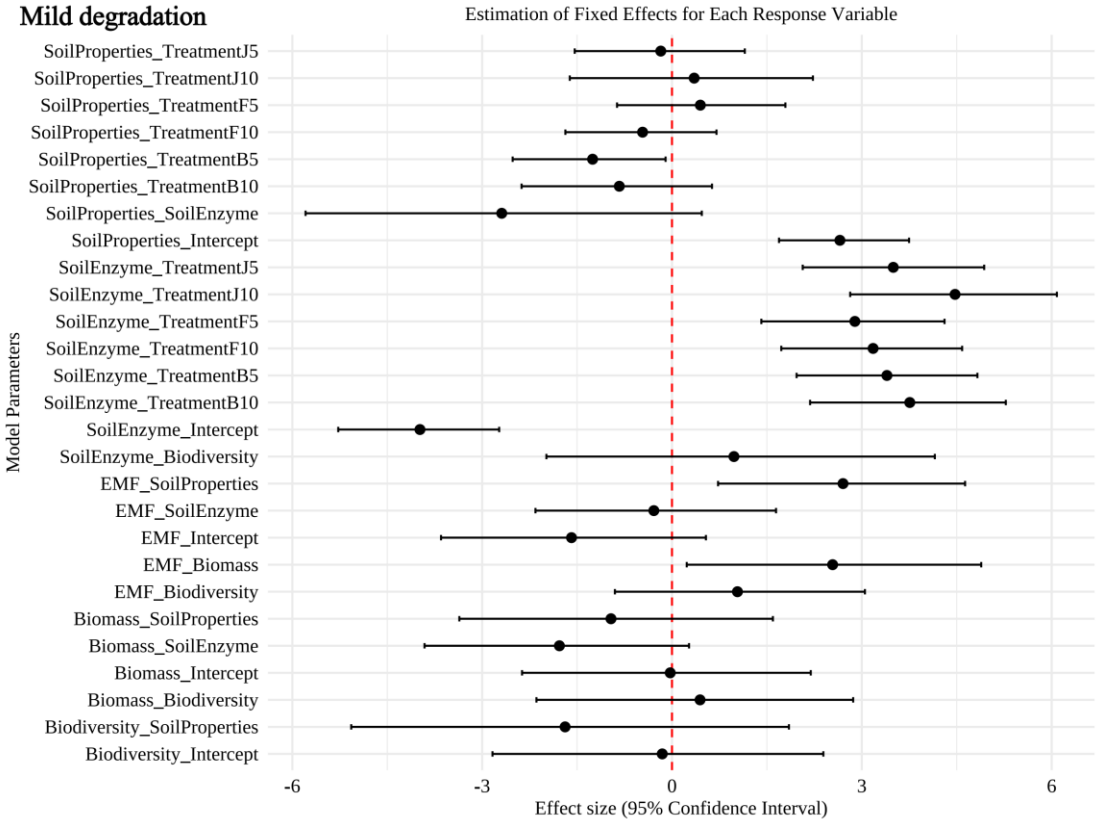
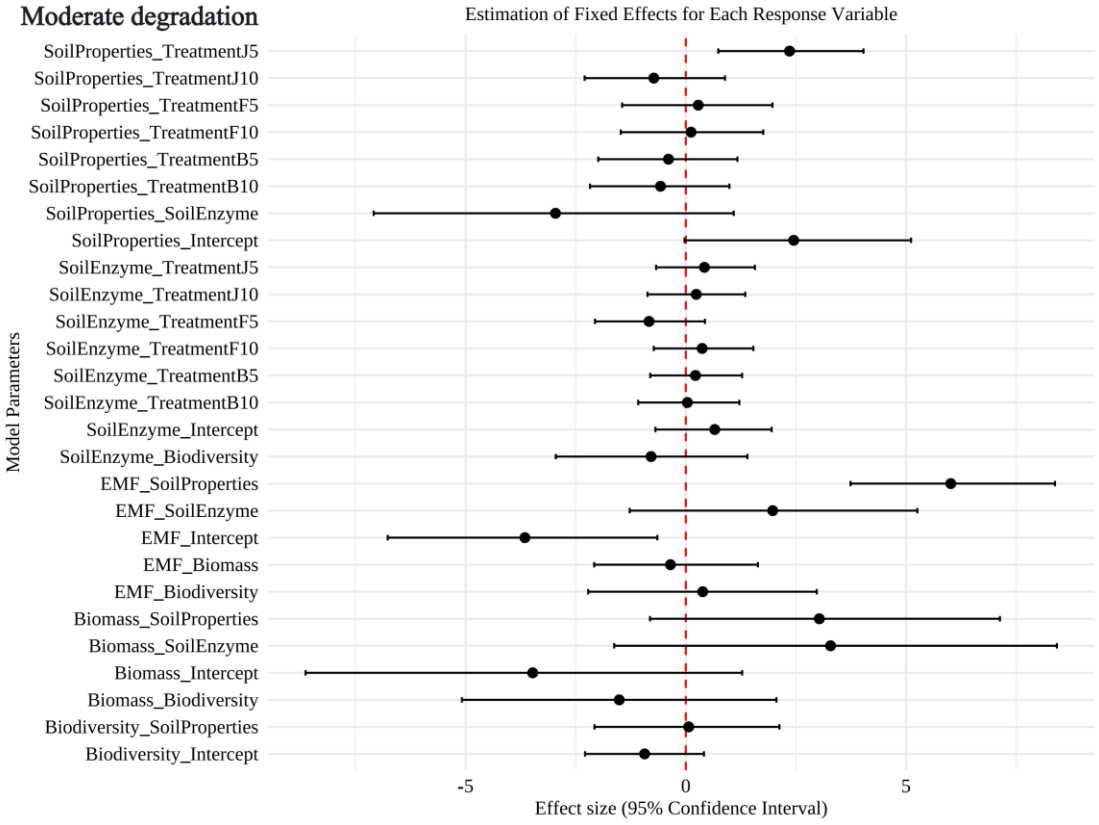


Figure S2 Bayesian structural equation model Rhat value plot

Mild degradation



Moderate degradation



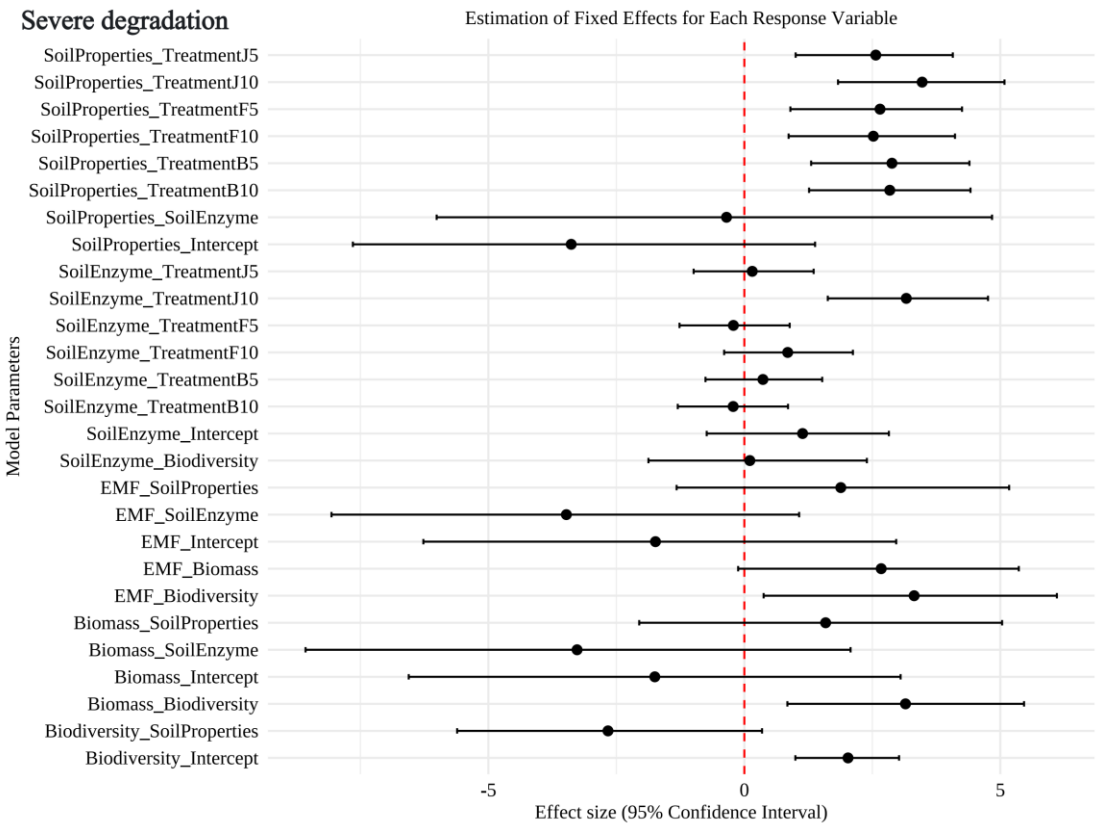
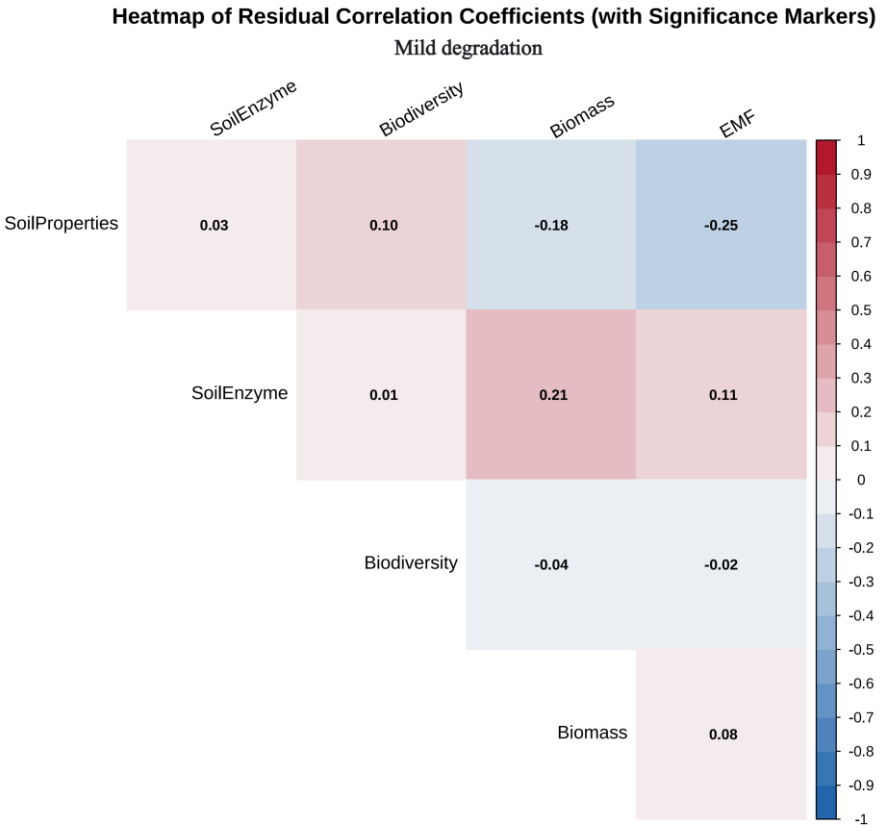
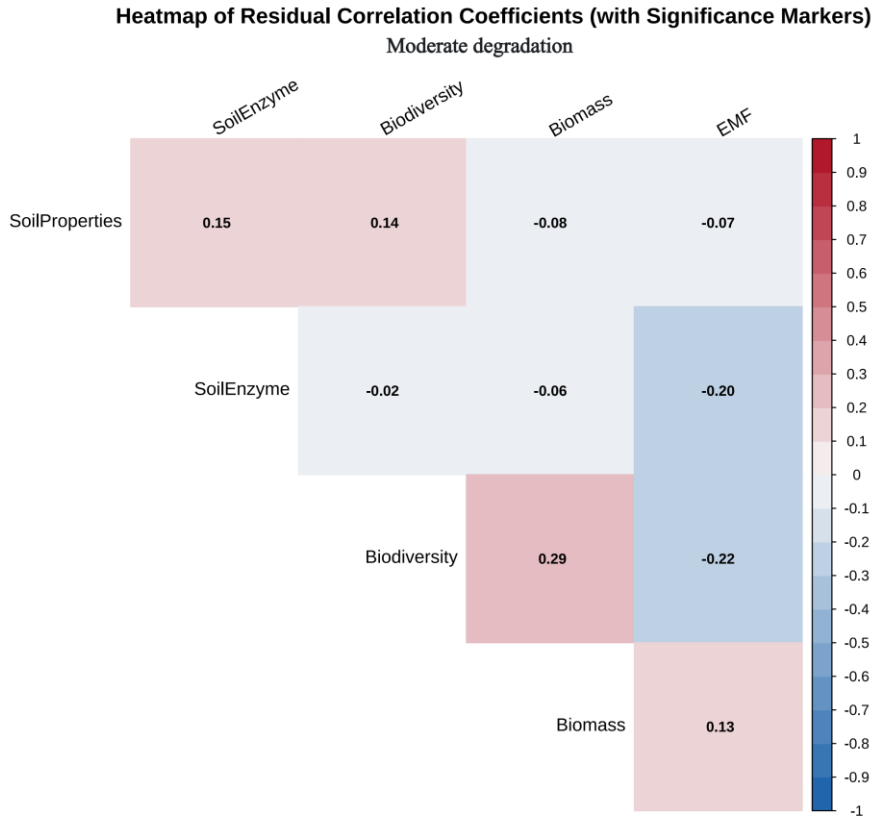


Figure S3 Bayesian structural equation model response variable effect values


Heatmap of Residual Correlation Coefficients (with Significance Markers)
Mild degradation
SoilEnzyme
Biodiversity
Biomass
EMF
SoilProperties
0.03
0.10
-0.18
-0.25
SoilEnzyme
0.01
0.21
0.11
Biodiversity
-0.04
-0.02
Biomass
0.08
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1


Heatmap of Residual Correlation Coefficients (with Significance Markers)
Moderate degradation
SoilEnzyme
Biodiversity
Biomass
EMF
SoilProperties
0.15
0.14
-0.08
-0.07
SoilEnzyme
-0.02
-0.06
-0.20
Biodiversity
0.29
-0.22
Biomass
0.13
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1

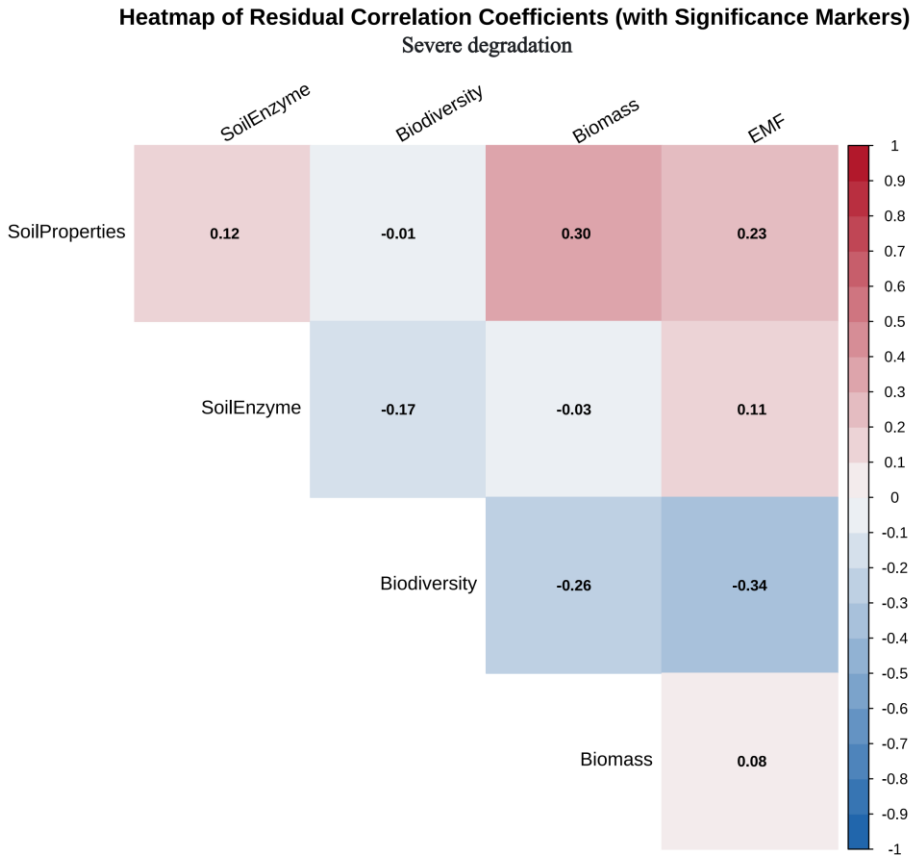


Figure S4 Bayesian structural equation model residual correlation plot