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*Supplement of*

## **An integrated probabilistic assessment to analyse stochasticity of soil erosion in different restoration vegetation types**

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Table S-1 The whole processes of logistic stepwise regression of odds ratio of all random runoff events on the rainfall, plant and soil ordinal variable in all restoration vegetation types

Grade Levels	<sup>a</sup> R <sup>2</sup>	PREC (Low)	INT (Low)	ASM (Low)	SHC (Low)	CRO (Low)	TLL (Low)
Odds ratio of all random runoff events							
<b>STEP 1: PREC entering the LRM</b>							
Extreme		× <sup>NS</sup>					
High		× <sup>NS</sup>					
Middle		× <sup>NS</sup>					
<b>STEP 2: INT entering the LRM</b>							
Extreme	0.79	× <sup>NS</sup>	<sup>b</sup> 90.91***				
High		× <sup>NS</sup>	32.26***				
Middle		× <sup>NS</sup>	2.09*				
<b>STEP 3: ASM entering the LRM</b>							
Extreme	0.84	× <sup>NS</sup>	× <sup>NS</sup>	2.19*			
High		× <sup>NS</sup>	× <sup>NS</sup>	2.01*			
Middle		× <sup>NS</sup>	× <sup>NS</sup>	1.59*			
<b>STEP 4: SHC entering the LRM</b>							
Extreme	0.83	× <sup>NS</sup>	× <sup>NS</sup>	2.30*	Null		
High		× <sup>NS</sup>	× <sup>NS</sup>	2.15*	0.85*		
Middle		× <sup>NS</sup>	× <sup>NS</sup>	1.76*	Null		
<b>STEP 5: CRO entering the LRM</b>							
Extreme	0.88	× <sup>NS</sup>	× <sup>NS</sup>	2.88*	Null	Null	
High		× <sup>NS</sup>	× <sup>NS</sup>	2.40*	0.08*	7.53×10 <sup>-3</sup> ***	
Middle		× <sup>NS</sup>	× <sup>NS</sup>	2.20*	Null	7.17×10 <sup>-2</sup> **	
<b>STEP 6: TLL entering the LRM</b>							
Extreme	0.88	× <sup>NS</sup>	× <sup>NS</sup>	2.88*	Null	Null	Null
High		× <sup>NS</sup>	× <sup>NS</sup>	2.40*	0.08*	7.53×10 <sup>-3</sup> ***	× <sup>NS</sup>
Middle		× <sup>NS</sup>	× <sup>NS</sup>	2.20*	Null	7.17×10 <sup>-2</sup> **	Null

a: Nagelkerke determination coefficient to explain the variance of logistical expression; b: making the low-grade of INT ordinal variable as reference, the odds ratio of all random runoff events in extreme-grade of INT is 90.91 times significantly larger than that of low-grade of INT, under the controlled PREC condition with  $P \leq 0.001$ ; Wald test statistic is applied to test the significant of odds ratio (\*\*\*)  $P \leq 0.001$ , \*\*  $P \leq 0.01$ , \*  $P \leq 0.1$ , NS: not significant, ×<sup>NS</sup>: the nonsignificant value cannot be estimated)

Table S-2 The whole processes of logistic stepwise regression of odds ratio of all random sediment events on the rainfall, plant and soil ordinal variable in all restoration vegetation types

Levels	R <sup>2</sup>	PREC (Low)	INT (Low)	ASM (Low)	SHC (Low)	CRO (Low)	TLL (Low)
Odds ratio of all random sediment events							
STEP 1: PREC entering the LRM							
Extreme	0.47	142.85***					
High		16.95**					
Middle		6.09**					
STEP 2: INT entering the LRM							
Extreme	0.65	333.34***	166.67***				
High		18.52***	125.00***				
Middle		4.17**	34.48***				
STEP 3: ASM entering the LRM							
Extreme	0.70	250**	333.34***	15.40*			
High		10.64*	142.84**	13.79**			
Middle		3.40*	11.50*	6.36*			
STEP 4: SHC entering the LRM							
Extreme	0.71	250**	333.34***	13.20*	Null		
High		10.87*	142.84**	13.75*	0.78*		
Middle		3.34*	12.05*	6.34*	Null		
STEP 5: CRO entering the LRM							
Extreme	0.83	120.00**	10.42**	172.34*	Null	Null	
High		17.85*	× <sup>NS</sup>	102.96*	0.08*	6.27×10 <sup>-3**</sup>	
Middle		× <sup>NS</sup>	× <sup>NS</sup>	45.97*	Null	2.55×10 <sup>-2**</sup>	
STEP 6: TLL entering the LRM							
Extreme	0.83	120.00**	10.42**	172.34*	Null	Null	Null
High		17.85*	× <sup>NS</sup>	102.96*	0.08*	6.27×10 <sup>-3**</sup>	× <sup>NS</sup>
Middle		× <sup>NS</sup>	× <sup>NS</sup>	45.97*	Null	2.55×10 <sup>-2**</sup>	Null

Table S-3 The whole processes of logistic stepwise regression of odds ratio of all random runoff and sediment events on interactive effect of soil ordinal variables in all restoration vegetation types

Grade levels	<sup>a</sup> R <sup>2</sup>	PREC (Low)	INT (Low)	SHC(Low)×ASM(different levels )			
				low	middle	high	extreme
Odds ratio of all random runoff events							
Extreme	0.84	× <sup>NS</sup>	× <sup>NS</sup>	Ref.	2.23 <sup>NS</sup>	3.19 <sup>NS</sup>	<sup>b</sup> 7.02*
High		× <sup>NS</sup>	× <sup>NS</sup>				
Middle		× <sup>NS</sup>	× <sup>NS</sup>				
Odds ratio of all random sediment events							
Extreme	0.69	62.5**	357.14***	Ref.	× <sup>NS</sup>	1.22 <sup>NS</sup>	1.82 <sup>NS</sup>
High		3.97*	142.85*				
Middle		1.11 <sup>NS</sup>	21.27*				

a: Nagelkerke determination coefficient to explain the variance of logistical expression; b: making the interactive effect of low-grade of SHC and low-grade of ASM as reference, the odds ratio of all random runoff events affected by the interactive effect of low-grade of SHC and extreme-grade of ASM is 7.02 times larger than that interactive effect of low-grade SHC and low-grade of ASM under controlled PREC and INT ordinal variables, with  $P \leq 0.001$ ; Wald test statistic is applied to test the significant of odds ratio (\*\*\*  $P \leq 0.001$ , \*\*  $P \leq 0.01$ , \*  $P \leq 0.1$ , NS: not significant, ×<sup>NS</sup>: the nonsignificant value cannot be estimated)

Table S-4 The whole processes of logistic stepwise regression of odds ratio of all random runoff and sediment events on interactive effect of plant ordinal variables in all restoration vegetation types

Grade levels	R <sup>2</sup>	PREC (Low)	INT (Low)	CRO(Low)×TLL(different levels )			
				low	middle	high	extreme
Odds ratio of all random runoff events							
Extreme	0.85	× <sup>NS</sup>	175.43***	Ref.	Null	<sup>a</sup> 0.12***	Null
High		× <sup>NS</sup>	55.56***				
Middle		× <sup>NS</sup>	2.69 <sup>NS</sup>				
Odds ratio of all random sediment events							
Extreme	0.67	370.37***	169.49***	Ref.	Null	0.33**	Null
High		21.74***	135.26**				
Middle		4.50**	38.47***				

a: making the interactive effect of low-grade of CRO and low-grade of TLL as reference, the odds ratio of all random runoff events affected by the interactive effect of low-grade of CRO and high-grade of TLL is only 0.12 times significantly larger than that interactive effect of low-grade CRO and low-grade of TLL under controlled PREC and INT ordinal variables, with  $P \leq 0.001$  Wald test statistic is applied to test the significant of odds ratio (\*\*\*  $P \leq 0.001$ , \*\*  $P \leq 0.01$ , \*  $P \leq 0.1$ , NS: not significant, ×<sup>NS</sup>: the nonsignificant value cannot be estimated)

Table S-5 The whole processes of logistic stepwise regression of odds ratio of all random runoff and sediment events on interactive effect of soil (ASM) and plant (CRO) ordinal variables in all restoration vegetation types

Grade levels	R <sup>2</sup>	PREC (Low)	INT (Low)	CRO(Low) × ASM(different levels )			
				low	middle	high	extreme
Odds ratio of all random runoff events							
Extreme	0.88	× <sup>NS</sup>	× <sup>NS</sup>	Ref.	<sup>a</sup> 64.34*	70.77*	486.43**
High		× <sup>NS</sup>	× <sup>NS</sup>				
Middle		× <sup>NS</sup>	× <sup>NS</sup>				
Odds ratio of all random sediment events							
Extreme	Null	× <sup>NS</sup>	× <sup>NS</sup>	Ref.	× <sup>NS</sup>	× <sup>NS</sup>	× <sup>NS</sup>
High		× <sup>NS</sup>	× <sup>NS</sup>				
Middle		× <sup>NS</sup>	× <sup>NS</sup>				

a: making the interactive effect of low-grade of CRO and low-grade of ASM as reference, the odds ratio of all random runoff events affected by the interactive effect of low-grade of CRO and middle-grade of ASM is 64.34 times significantly larger than that interactive effect of low-grade CRO and low-grade of ASM under controlled PREC and INT ordinal variables, with  $P \leq 0.1$  Wald test statistic is applied to test the significant of odds ratio (\*\* $P \leq 0.001$ , \* $P \leq 0.01$ , \* $P \leq 0.1$ , NS: not significant, ×<sup>NS</sup>: the nonsignificant value cannot be estimated)

Table S-6 The whole processes of logistic stepwise regression of odds ratio of all random runoff and sediment events on interactive effect of soil (ASM) and plant (CRO) ordinal variables in all restoration vegetation types

Grade levels	R <sup>2</sup>	PREC (Low)	INT (Low)	CRO(Middle) × ASM(different levels )			
				low	middle	high	extreme
Odds ratio of all random runoff events							
Extreme	0.88	× <sup>NS</sup>	× <sup>NS</sup>		Ref.	2.32 <sup>NS</sup>	<sup>a</sup> 22.49*
High		× <sup>NS</sup>	× <sup>NS</sup>				
Middle		× <sup>NS</sup>	× <sup>NS</sup>				
Odds ratio of all random sediment events							
Extreme	Null	× <sup>NS</sup>	× <sup>NS</sup>		Ref.	× <sup>NS</sup>	× <sup>NS</sup>
High		× <sup>NS</sup>	× <sup>NS</sup>				
Middle		× <sup>NS</sup>	× <sup>NS</sup>				

a: making the interactive effect of middle-grade of CRO and middle-grade of ASM as reference, the odds ratio of all random runoff events affected by the interactive effect of middle-grade of CRO and high-grade of ASM is 22.49 times significantly larger than that interactive effect of middle-grade CRO and middle-grade of ASM under controlled PREC and INT ordinal variables, with  $P \leq 0.1$  Wald test statistic is applied to test the significant of odds ratio (\*\* $P \leq 0.001$ , \* $P \leq 0.01$ , \* $P \leq 0.1$ , NS: not significant, ×<sup>NS</sup>: the nonsignificant value cannot be estimated)