Supplementary Materials

Article

Multicriteria analysis in Apiculture: a sustainable tool for rural development in communities and conservation areas of Northwest Peru

Supplementary 1. Pairwise comparison matrix to evaluate the importance of sub-criteria and sub-models for the identification of suitability areas for beekeeping.

a) Paired comparison matrix to assess the relative importance of the biophysical sub-criteria.

Expert 1	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					
[1] Land cover / Land use	1.00	3.00	3.00	3.00	3.00	2.00	0.35	0.23	0.53	0.30	0.32	0.29	0.34	2.184	6.50	**λmax**	6.3067
[2] Slope	0.33	1.00	0.33	0.50	0.50	0.50	0.12	0.08	0.06	0.05	0.05	0.07	0.07	0.443	6.22	**IC**	0.0613
[3] Distance to water systems	0.33	3.00	1.00	3.00	2.00	2.00	0.12	0.23	0.18	0.30	0.21	0.29	0.22	1.410	6.40	**IA**	1.252
[4] Elevation	0.33	2.00	0.33	1.00	2.00	0.50	0.12	0.15	0.06	0.10	0.21	0.07	0.12	0.738	6.22	**RC**	0.0490
[5] Temperature	0.33	2.00	0.50	0.50	1.00	1.00	0.12	0.15	0.09	0.05	0.11	0.14	0.11	0.678	6.18		
[6] Precipitation	0.50	2.00	0.50	2.00	1.00	1.00	0.18	0.15	0.09	0.20	0.11	0.14	0.14	0.912	6.31		
∑	2.83	13.00	5.67	10.00	9.50	7.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert 2	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					
[1] Land cover / Land use	1.00	5.00	4.00	5.00	5.00	5.00	0.49	0.25	0.52	0.41	0.57	0.52	0.46	3.031	6.62	**λmax**	6.4489
[2] Slope	0.20	1.00	0.25	0.25	0.33	0.33	0.10	0.05	0.03	0.02	0.04	0.03	0.05	0.283	6.23	**IC**	0.0898
[3] Distance to water systems	0.25	4.00	1.00	2.00	1.00	1.00	0.12	0.20	0.13	0.16	0.11	0.10	0.14	0.892	6.44	**IA**	1.252
[4] Elevation	0.20	4.00	0.50	1.00	1.00	0.33	0.10	0.20	0.06	0.08	0.11	0.03	0.10	0.614	6.23	**RC**	0.0717
[5] Temperature	0.20	3.00	1.00	1.00	1.00	2.00	0.10	0.15	0.13	0.08	0.11	0.21	0.13	0.855	6.59		
[6] Precipitation	0.20	3.00	1.00	3.00	0.50	1.00	0.10	0.15	0.13	0.24	0.06	0.10	0.13	0.857	6.58		
∑	2.05	20.00	7.75	12.25	8.83	9.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert 3	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					
[1] Land cover / Land use	1.00	3.00	5.00	3.00	3.00	3.00	0.39	0.21	0.67	0.41	0.24	0.31	0.37	2.672	7.19	**λmax**	6.5566
[2] Slope	0.33	1.00	0.33	0.33	0.50	0.50	0.13	0.07	0.04	0.05	0.04	0.05	0.06	0.410	6.41	**IC**	0.1113
[3] Distance to water systems	0.20	3.00	1.00	2.00	3.00	3.00	0.08	0.21	0.13	0.27	0.24	0.31	0.21	1.393	6.71	**IA**	1.252
[4] Elevation	0.33	3.00	0.50	1.00	2.00	2.00	0.13	0.21	0.07	0.14	0.16	0.20	0.15	0.981	6.45	**RC**	0.0889
[5] Temperature	0.33	2.00	0.33	0.50	1.00	0.33	0.13	0.14	0.04	0.07	0.08	0.03	0.08	0.521	6.24		
[6] Precipitation	0.33	2.00	0.33	0.50	3.00	1.00	0.13	0.14	0.04	0.07	0.24	0.10	0.12	0.769	6.33		
∑	2.53	14.00	7.50	7.33	12.50	9.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert 4	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					
[1] Land cover / Land use	1.00	5.00	3.00	5.00	3.00	3.00	0.42	0.29	0.55	0.42	0.29	0.36	0.39	2.550	6.58	**λmax**	6.3570
[2] Slope	0.20	1.00	0.33	0.33	0.50	0.33	0.08	0.06	0.06	0.03	0.05	0.04	0.05	0.332	6.26	**IC**	0.0714
[3] Distance to water systems	0.33	3.00	1.00	3.00	2.00	3.00	0.14	0.18	0.18	0.25	0.19	0.36	0.22	1.442	6.65	**IA**	1.252
[4] Elevation	0.20	3.00	0.33	1.00	2.00	0.50	0.08	0.18	0.06	0.08	0.19	0.06	0.11	0.671	6.14	**RC**	0.0570
[5] Temperature	0.33	2.00	0.50	0.50	1.00	0.50	0.14	0.12	0.09	0.04	0.10	0.06	0.09	0.560	6.17		
[6] Precipitation	0.33	3.00	0.33	2.00	2.00	1.00	0.14	0.18	0.06	0.17	0.19	0.12	0.14	0.903	6.34		
∑	2.40	17.00	5.50	11.83	10.50	8.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert 5	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					
[1] Land cover / Land use	1.00	3.00	3.00	3.00	5.00	3.00	0.39	0.21	0.53	0.41	0.32	0.31	0.36	2.419	6.65	**λmax**	6.5322
[2] Slope	0.33	1.00	0.33	0.50	0.50	0.33	0.13	0.07	0.06	0.07	0.03	0.03	0.07	0.416	6.28	**IC**	0.1064
[3] Distance to water systems	0.33	3.00	1.00	2.00	3.00	2.00	0.13	0.21	0.18	0.27	0.19	0.21	0.20	1.333	6.68	**IA**	1.252
[4] Elevation	0.33	2.00	0.50	1.00	2.00	3.00	0.13	0.14	0.09	0.14	0.13	0.31	0.16	1.078	6.87	**RC**	0.0850
[5] Temperature	0.20	2.00	0.33	0.50	1.00	0.25	0.08	0.14	0.06	0.07	0.06	0.03	0.07	0.458	6.26		
[6] Precipitation	0.33	3.00	0.50	0.33	4.00	1.00	0.13	0.21	0.09	0.05	0.26	0.10	0.14	0.905	6.45		
∑	2.53	14.00	5.67	7.33	15.50	9.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert 6	Paired Comparasion Matrix						Normalized Comparasion Matrix						Prioritization Vector (PV)	Weighted Sum Vector (WSV)	WSV/PV	n	6
	[1]	[2]	[3]	[4]	[5]	[6]	[1]	[2]	[3]	[4]	[5]	[6]					

[1] Land cover / Land use	1.00	4.00	3.00	3.00	3.00	2.00	0.36	0.29	0.51	0.26	0.27	0.29	0.33	2.198	6.64	**λmax**	6.5341
[2] Slope	0.25	1.00	0.50	0.50	0.50	0.33	0.09	0.07	0.09	0.04	0.05	0.05	0.06	0.415	6.47	**IC**	0.1068
[3] Distance to water systems	0.33	2.00	1.00	2.00	2.00	3.00	0.12	0.14	0.17	0.17	0.18	0.43	0.20	1.448	7.09	**IA**	1.252
[4] Elevation	0.33	2.00	0.50	1.00	0.50	0.33	0.12	0.14	0.09	0.09	0.05	0.05	0.09	0.551	6.24	**RC**	0.0853
[5] Temperature	0.33	2.00	0.50	2.00	1.00	0.25	0.12	0.14	0.09	0.17	0.09	0.04	0.11	0.677	6.24		
[6] Precipitation	0.50	3.00	0.33	3.00	4.00	1.00	0.18	0.21	0.06	0.26	0.36	0.14	0.20	1.329	6.52		
∑	2.75	14.00	5.83	11.50	11.00	6.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00				

Expert average	**Paired Comparasion Matrix**						**Normalized Comparasion Matrix**						**Prioritization Vector (PV)**	**Weighted Sum Vector (WSV)**	**WSV/PV**	**n**	6
	[1]	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**					
[1] Land cover / Land use													0.37			**λmax**	6.4559
[2] Slope													0.06			**IC**	0.0912
[3] Distance to water systems													0.20			**IA**	1.252
[4] Elevation													0.12			**RC**	0.0728
[5] Temperature													0.10				
[6] Precipitation													0.15				
∑													1.00				

b) Paired comparison matrix to assess the relative importance of the socioeconomic sub-criteria.

Expert 1	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads	1.00	0.33	0.25	0.25	0.25
[2] Distance to urban areas	3.00	1.00	0.75	0.75	0.75
∑	4.00	1.33	1.00	1.00	1.00

Expert 2	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads	1.00	0.20	0.17	0.17	0.17
[2] Distance to urban areas	5.00	1.00	0.83	0.83	0.83
∑	6.00	1.20	1.00	1.00	1.00

Expert 3	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads	1.00	2.00	0.67	0.67	0.67
[2] Distance to urban areas	0.50	1.00	0.33	0.33	0.33
∑	1.50	3.00	1.00	1.00	1.00

Expert 4	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads	1.00	1.00	0.50	0.50	0.50
[2] Distance to urban areas	1.00	1.00	0.50	0.50	0.50
∑	2.00	2.00	1.00	1.00	1.00

Expert 5	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads	1.00	3.00	0.75	0.75	0.75
[2] Distance to urban areas	0.33	1.00	0.25	0.25	0.25
∑	1.33	4.00	1.00	1.00	1.00

Expert 6	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	

[1] Distance to roads	1.00	0.50	0.33	0.33	0.33
[2] Distance to urban areas	2.00	1.00	0.67	0.67	0.67
∑	3.00	1.50	1.00	1.00	1.00

Expert average	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Distance to roads					0.44
[2] Distance to urban areas					0.56
∑					1.00

c) Pairwise comparison matrix to evaluate the importance of sub-models prior to final modeling

Expert 1	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	2.00	0.67	0.67	0.67
[2] Socioeconomic	0.50	1.00	0.33	0.33	0.33
∑	1.50	3.00	1.00	1.00	1.00

Expert 2	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	1.00	0.50	0.50	0.50
[2] Socioeconomic	1.00	1.00	0.50	0.50	0.50
∑	2.00	2.00	1.00	1.00	1.00

Expert 3	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	2.00	0.67	0.67	0.67
[2] Socioeconomic	0.50	1.00	0.33	0.33	0.33
∑	1.50	3.00	1.00	1.00	1.00

Expert 4	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	3.00	0.75	0.75	0.75

[2] Socioeconomic	0.33	1.00	0.25	0.25	0.25
∑	1.33	4.00	1.00	1.00	1.00

Expert 5	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	2.00	0.67	0.67	0.67
[2] Socioeconomic	0.50	1.00	0.33	0.33	0.33
∑	1.50	3.00	1.00	1.00	1.00

Expert 6	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical	1.00	2.00	0.67	0.67	0.67
[2] Socioeconomic	0.50	1.00	0.33	0.33	0.33
∑	1.50	3.00	1.00	1.00	1.00

Expert average	**Paired Comparasion Matrix**		**Normalized Comparasion Matrix**		**Prioritization Vector (PV)**
	[1]	**[2]**	**[1]**	**[2]**	
[1] Biophysical					0.65
[2] Socioeconomic					0.35
∑					1.00