

陕西牛背梁国家级自然保护区生态评价

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【摘 要】【目的】为保护区提供科学的生态评价途径及保护与利用的理论依据, 以便更有效地保护生物多样性。【方法】以牛背梁国家级自然保护区的本底调查数据为基础, 运用专家评分与层次分析法(AHP)相结合的方法, 从生物多样性保护、景观生态状况改善、教育科研价值、生态旅游价值 4 个方面, 选取多样性、代表性、稀有性、面积适宜性、自然性、稳定性、人类威胁等 7 项指标, 对其进行生态评价。【结果】牛背梁国家级自然保护区综合评价指数为 0.869。【结论】牛背梁国家级自然保护区整体生态质量很好, 保护价值大。

【关键词】自然保护区; 牛背梁; 生态评价

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Ecological assessment of Niubeiliang National Nature Reserve in Shannxi Province

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Abstract:【Objective】Reference is given in order to provide a method and foundation of ecological assessment for preserving and utilizing the resources of Niubeiliang National Nature Reserve, and to improve the conservation of bio-diversity. 【Method】Based on the survey data of the background of Niubeiliang National Nature Reserve, seven assessment indices, including diversity, rareness, representativeness, spatial natural suitable areas, naturalness, stability, and human-impact, were chosen and the ecological evaluation of them was made by means of the AHP method from four respects of ecological function, including conservation of diversity, improvement of landscape ecological states, value of education and scientific research, value of eco-tourism. 【Result】The result of evaluation showed that the evaluating index was 0.869. 【Conclusion】Niubeiliang National Nature Reserve presents a satisfactory ecological quality and great conservation value.

Key words: nature reserve; Niubeiliang; ecological assessment

自然保护区是依法予以特殊保护和管理的区域, 也是生物多样性保护的最有效途径^[1]。我国自然保护区建设事业经过 52 年的发展历程得到了迅猛发展, 据《2006 年中国环境状况公报》(<http://www.zhb.org.cn>), 截止 2006 年底, 我国共有各种类型、不同级别的自然保护区 2 395 个, 陆域自然保

护区面积 14 553.50 万 hm^2 , 占国土面积的比例为 15.16%。随着自然保护区事业的发展, 对自然保护区的规划、建设和管理提出了更高的要求^[2]。如何更有效地保护生物多样性, 为保护提供有效的管理依据, 迫切需要对自然保护区的生态进行科学评价。目前, 有关生态评价的方法较多^[3-4], 对不同自

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然保护区生态评价研究主要采用层次分析法(AHP)^[5-13],也有运用物元模型或信息熵的方法^[14-16],但在自然保护区生态评价中仍存在评价指标选择的主观性和评价的片面性等问题。基于此,本研究以牛背梁国家级自然保护区为研究对象,在调查与分析的基础上,运用专家评分与层次分析法(AHP)相结合的方法,合理地选择评价指标,对自然保护区的生态功能进行综合评价,以期为自然保护区提供科学的生态评价途径及保护与利用的理论依据。

1 牛背梁国家级自然保护区概况

牛背梁国家级自然保护区是以保护羚牛及其栖息地为主的森林野生动物类型自然保护区,是“中国生物多样性保护行动计划”最优先的生物多样性保护地区之一。保护区横跨秦岭南北(108°45′~109°03′E,33°47′~33°55′N),位于长安、柞水、宁陕3县(区)交界处,总面积16 520 hm²。保护区内地形复杂,高差悬殊(海拔1 300~2 802 m),牛背梁(2 802 m)是保护区内和秦岭东段的最高峰。北坡平台缓坡相对较多,南坡多峡谷峭壁。以秦岭为分水岭,北部属黄河水系,南部属长江水系。保护区属暖温带半湿润气候区,具有气候垂直差异明显的山地气候特点。年均气温8~10℃,极端最高气温31.1℃,极端最低气温-21.6℃,年降水量850~950 mm,无霜期130 d。保护区内植被繁茂,有林地面积15 940 hm²,森林覆盖率达97%以上,植被属暖温带针阔叶混交型,有明显的垂直分布规律。保护区内动植物资

源丰富,种类繁多,有种子植物950种,隶属105科433属,有红豆杉、太白红杉等国家保护植物15种,羚牛、豹、林麝等国家保护动物46种^[17]。

2 自然保护区生态评价方法

层次分析法(AHP)是一种定性方法与定量分析方法相结合的多目标决策分析方法,在生态评价中广为应用^[5-12]。结合保护区的实际,本研究采用专家评分与层次分析法相结合的方法,对该保护区的生态环境进行评价。

2.1 建立评价指标体系

本研究依据我国自然保护区评价指标与评价标准^[2],结合牛背梁国家级自然保护区的生态环境特点,以自然保护区的生态功能作为目标层(A),以自然保护区的生物多样性保护(B1)、景观生态状况改善(B2)、教育科研价值(B3)、生态旅游价值(B4)等4项生态功能作为准则层(B),选取多样性(C1)、代表性(C2)、稀有性(C3)、面积适宜性(C4)、自然性(C5)、稳定性(C6)、人类威胁(C7)等7项评价指标作为指标层(C),建立牛背梁国家级自然保护区评价指标体系。

2.2 评价指标的等级划分、赋值标准与得分

将每个评价指标划分为3~4个等级,分别赋以0.25~1分值^[2]。依据赋值标准,结合保护区的本底调查数据和资源现状,由10位生态、环境和旅游等学科的专家分别就每个评价因子进行打分,取其平均值作为每个评价指标的最终得分,结果见表1。

表 1 牛背梁国家级自然保护区生态评价指标及其等级划分、赋值标准和评价得分

Table 1 Ecological assessment index of the Niubeiliang National Nature Reserve, and its grade, standard and score			
评价指标 Assessment index	评分标准 Grade	赋值 Conferred score	评价得分 Assessment score
多样性 C1 Diversity	物种相对丰度极高,区内物种数占其所在生物地理区或行政省内物种总数的比例>40%,或区内高等植物≥2 000种或高等动物≥300种 The relative abundance of species in the nature reserve is sky-high, the proportion of quantity of species in the nature reserve in the whole population in the biota or administrative province is more than 40 percent, or the amount of species of higher plants in the nature reserve is more than 2 000, or the amount of species of higher animal in the nature reserve is more than 300	1.00	
	物种相对丰度较高,区内物种数占其所在生物地理区或行政省内物种总数的比例达25%~40%,或区内高等植物1 000~1 999种或高等动物200~299种 The relative abundance of species in the nature reserve is comparatively high, the proportion of quantity of species in the nature reserve in the whole population in the biota or administrative province is from 25 percent to 40 percent, or the amount of species of higher plants in the nature reserve is from 1 000 to 1 999, or the amount of species of higher animal in the nature reserve is from 200 to 299	0.75	1.00
	物种相对丰度一般,区内物种数占其所在生物地理区或行政省内物种总数的比例达10%~24.9%,或区内高等植物500~999种或高等动物100~199种 The relative abundance of species in the nature reserve is average, the proportion of quantity of species in the nature reserve in the whole population in the biota or administrative province is from 10 percent to 24.9 percent, or the amount of species of higher plants in the nature reserve is from 500 to 999, or the amount of species of higher animal in the nature reserve is from 100 to 199	0.50	

续表 1 Continued table 1

评价指标 Assessment index	评分标准 Grade	赋值 Conferred score	评价得分 Assessment score	
多样性 C1 Diversity	物种相对丰度较低,区内物种数占其所在生物地理区或行政省内物种总数的比例<10%,或区内高等植物<500种,或高等动物<100种 The relative abundance of species in the nature reserve is comparatively low, the propotion of quantity of species in the nature reserve in the whole population in the biota or administrative province is less than 10 percent,or the amount of species of higher plants in the nature reserve is less than 500,or the amount of species of higher animal in the nature reserve is less than 100	0.25		
代表性 C2 Represent ativeness	自然生态状况在全球范围或同纬度区具有突出的代表意义 The natural ecological state has a projecting representative meaning in global limit or identical latitude	1.00	1.00	
	自然生态状况在全国范围或生物地理区内具有突出的代表意义 The natural ecological state has projecting representative meaning in nation-wide limit or biota	0.75		
	自然生态状况在地区范围或生物地理省内具有代表意义 The natural ecological state has representative meaning in its area or geographical province of living beings	0.50		
	代表性一般 The natural ecological state has a average representative meaning	0.25		
物种地区分布 Biota distribu- tion of species	地理分布极窄,仅有极少产地的地方性物种 The species whose geographical distribution is exceedingly narrow,and local species are exceedingly few,only spotted in some areas	1.0		
	地理分布较窄,或虽广布但局部少见及生物地理分布区边缘之物种 The species whose geographical distribution is comparatively narrow or found sparsely populated in a larger area or on the verge of biota	0.66		
	广布种 Widely distributing species	0.33		
	全球性的珍稀濒危物种 The plants or animals are of global rare and endangered species	1.00		
	物种濒危程度 Endangered degree of species	国家Ⅰ、Ⅱ级重点保护植物或Ⅰ级重点保护动物 The species belong to key national preserved plants under 1st class conservation or 2st class conservation,or belong to key national preserved animals under 1st class conservation	0.75	0.83
		国家Ⅲ级重点保护植物或Ⅱ级重点保护动物 The species belong to key national preserved plants under 3st class conservation,or belong to key national preserved animals under 2st class conservation	0.50	
		地方重点保护物种 The species are under key conservation on the local level	0.25	
	生境稀有性 Habitat rareness	世界范围内惟一或极重要之生境 The nature reserve is a unique or extremely important habitat worldwide	1.00	
		国家或生物地理区范围内惟一或极重要之生境 The nature reserve is a unique or extremely important habitat in its biota nationwide	0.75	
		地区范围内稀有或重要生境 The nature reserve is a rare or extremely important habitat in its region	0.50	
常见类型 The habitat of the nature reserve is a common form		0.25		
面积适宜性 C4 Spatial natural suitable areas	有效面积大小适宜,足以维持生态系统的结构和功能,有效保护全部保护对象 The size of available area of the nature reserve is moderate enough to maintain the structure and functions of the ecosystem,and to effectively preserve the all preserving objectlves	1.00	0.75	
	有效面积大小较适宜,基本上能维持生态系统的结构与功能,有效保护主要保护对象 The size of available area of the nature reserve is comparatively moderate,and basically can maintain the structure and functions of the ecosystem,and to effectively preserve the main preserving objectlves	0.75		
	有效面积大小稍不适宜,尚可维持生态系统的结构与功能,勉强能有效保护主要保护对象 The size of available area of the nature reserve is less moderate, yet can maintain the structure and functions of the ecosystem,and to inadequately preserve the main preserving objectlves	0.50		
	有效面积的大小不适宜,不足以有效保护主要保护对象 The size of available area of the nature reserve is not moderate,and not enough to effectively preserve the all preserving objectlves	0.25		

续表 1 Continued table 1

评价指标 Assessment index		评分标准 Grade	赋值 Conferred score	评价得分 Assessment score
自然性 C5 Naturalness		未受人类侵扰或极少受侵扰,保持原始状态,自然生境完好,核心区未受人类影响的完全自然型保护区 The nature reserve is not or less subject to human impact,it maintains its original state and perfect natural habitat,it is a completely natural reserve free from huam impact	1.00	0.75
		已受到轻微侵扰和破坏,但生态系统无明显的结构变化,自然生境基本完好,核心区未受或较少受到影响的受扰自然型保护区 The nature reserve has been slightly invaded or harassed,but shows no istinctivestructural changes in its eco-system,its habitat is basically sound,it is a harassed natural reserve with its core zone no or less subject to human impact	0.75	
		已遭受较严重的破坏,系统结构发生变化,但尚无大量的引入物种,自然生境退化,核心区受到中等强度影响的退化自然型保护区 The nature reserve has been severely harassed and shows distinctive structural changes in its eco-system,but there is no large quantity of introduced species and its habitat has been degenerated,it is a degenerated natural reserve with its core zone moderately harassed	0.50	
		自然生境遭到破坏,有大量的人为修饰迹象,外源物种被大量引入,核心区受到很大影响,自然状态基本已为人工状态所替代的人工修复型保护区 The nature reserve has been completely harassed and shows many artificial adornments, many external original species has been introduced, its natural state has fundamentally been substituted by artificial state,it is a artifically adorned natural reserve with its core zone fundamentally harassed	0.25	
稳定性 C6 Stability	物种生活力 Species viability	主要或关键性物种适应性差,需特化生境或生活力弱,繁殖力很低 The adaptiveness of main or key species is poor, and they require a specialized habitat, or their viability and reproductive capability are very low	1.00	0.83
		主要或关键性物种需较特化生境或生活力、繁殖力较低 The main or key species require comparatively specialized habitat, or their viability and reproductive capability are comparatively low	0.66	
		主要或关键性物种不需特化生境或生活力、繁殖力强或较强 The main or key species do not require specialized habitat, or their viability and reproductive capability are powerfull or comparatively powerful	0.33	
	生物种群稳定性 Stability of biological population	个体数量少,密度低,最小生存种群很难维持 The individual amount is small, and thickness is low,and the minimal race is hard to maintain	1.00	
		个体数量较多,但密度低,或个体数量少,但密度高,最小生存种群不易维持 The individual amount is comparatively big,but the thickness is low,or the individual amount is little,but the thickness is high, and minimal race is not easy to maintain	0.66	
		个体数量多,密度高,最小生存种群可以维持 The individual amount is big, the thickness is high,and minimal race can maintain	0.33	
人类威胁 C7 Human- impact	直接威胁 Directhuman- impact	自然保护区,特别是核心区很少有人类侵扰,或者人们在实验区或非核心区 内对水体、土地、矿藏、生物或景观等资源开发、利用适度,对资源的有效保护 不构成威胁 The nature reserve,especially its core zone,is free from the invasion and harassment of mankind,the huaman development and utilization of the resouces such as waterbody,minerals,creatures and landscapes in experi- mental zone or out of core zone is moderarte and exerts no threat to the effec- tive conservation	1.00	0.71
		目前或近期人们开发、利用自然保护区,特别是核心区内的水体、矿藏、生物 或景观等资源的强度很小,或远期遭受人为活动不利影响的可能性较大,资源 的有效保护受到一定威胁 The intensity of human development and utilizaion of the resources such as waterbody, minerals, creatures and landscapes, especially in its core zone in recent or prsent time is week, there is a possible negative impact from human activity, and there is a possible threat to the effective conservation of resouces	0.75	
		目前或近期人们开发、利用自然保护区,特别是核心区内的水体、矿藏、生物 或景观等资源的强度中等,资源的有效保护受到较大威胁 The intensity of human development and utilizaion of the resources such as waterbody,minerals,creatures and landscapes,especially in its core zone in re- cent or prsent time is moderate,there is a comparatively great threat to the ef- fective conservation of resouces	0.50	
		目前或近期人们有过分开发、利用自然保护区内,特别是核心区内的水体、土 地、矿藏、生物或景观等资源的趋势,资源的有效保护受到极大威胁 There is a tendency of overdeveloping or overutilizing the resources in the na- ture reserve,especially in its core zone in recent or prsent time and there is a extremely great threat to the effective conservation of resouces	0.25	

续表 1 Continued table 1

评价指标 Assessment index		评分标准 Grade	赋值 Conferred score	评价得分 Assessment score
人类威胁 C7 Human- impact	间接威胁 Indirecthuman- impact	自然保护区与另一自然保护区毗邻,或有通道相连,或为未开发生境所环绕 The nature reserve is bordered on another nature reserve or linked to it through a passageway, or encircled by virgin habitats	1.00	
		自然保护区周边地区尚有未开发的生境 There is a virgin habitat in the neighbouring regions of the nature reserve yet	0.66	
		自然保护区已为开发区域所环绕 The nature reserve is encircled by development zone	0.33	

2.3 评价指标权重的确定

2.3.1 构造判断矩阵 自然保护区的生态功能一般表现在生物多样性保护、景观生态状况改善、教育科研价值和生态旅游价值 4 个方面^[6],各评价指标对自然保护区生态功能的影响程度不同。根据专家意见确定 4 项生态功能的相对重要性,再通过对 4 项生态功能逐项分析,对 7 个单项指标中的任意 2 个进行比较,根据专家意见确定其相对重要性,并赋以相应的分值,得到 1~9 标度^[18]的判断矩阵,见表 2~6。

表 2 牛背梁国家级自然保护区 4 项生态功能指标对目标层重要度的判断矩阵

Table 2 Judgement matrix of the weight of every item of ecological function in object hierarchy of the Niubeiliang National Nature Reserve

A	B1	B2	B3	B4
B1	1	3	5	7
B2	1/3	1	3	5
B3	1/5	1/3	1	3
B4	1/7	1/5	1/3	1

表 3 牛背梁国家级自然保护区评价指标对生物多样性保护重要度的判断矩阵

Table 3 Judgement matrix of the weight of assessment index in conservation of diversity of the Niubeiliang National Nature Reserve

B1	C1	C2	C3	C4	C5	C6	C7
C1	1	3	3	5	5	7	9
C2	1/3	1	1	3	3	5	5
C3	1/3	1	1	3	3	5	5
C4	1/5	1/3	1/3	1	1	3	5
C5	1/5	1/3	1/3	1	1	3	5
C6	1/7	1/5	1/5	1/3	1/3	1	3
C7	1/9	1/7	1/7	1/5	1/5	1/3	1

表 4 牛背梁国家级自然保护区评价指标对景观生态状况改善重要度的判断矩阵

Table 4 Judgement matrix of the weight of assessment index in improvement of landscape ecological states of the Niubeiliang National Nature Reserve

B2	C1	C2	C3	C4	C5	C6	C7
C1	1	1	1	1/3	1/5	1/7	1/9
C2	1	1	1	1/3	1/5	1/7	1/9
C3	1	1	1	1/3	1/5	1/7	1/9
C4	3	3	3	1	1/3	1/5	1/7
C5	5	5	5	3	1	1/3	1/5
C6	7	7	7	5	3	1	1/3
C7	9	9	9	7	5	3	1

表 5 牛背梁国家级自然保护区评价指标对教育科研价值重要度的判断矩阵

Table 5 Judgement matrix of the weight of assessment index in value of education and scientific research of the Niubeiliang National Nature Reserve

B3	C1	C2	C3	C4	C5	C6	C7
C1	1	1/9	1/7	1/3	1/3	1/7	1/5
C2	9	1	3	7	7	3	5
C3	7	1/3	1	5	5	1	3
C4	3	1/7	1/5	1	1	1/5	1/3
C5	3	1/7	1/5	1	1	1/5	1/3
C6	7	1/3	1	5	5	1	3
C7	5	1/5	1/3	3	3	1/3	1

表 6 牛背梁国家级自然保护区评价指标对生态旅游价值重要度的判断矩阵
Table 6 Judgement matrix of the weight of assessment index in value of co-tourism
of the Niubeiliang National Nature Reserve

B4	C1	C2	C3	C4	C5	C6	C7
C1	1	1/9	1/7	1/5	1/5	1/3	1/3
C2	9	1	3	5	5	7	7
C3	7	1/3	1	3	3	5	5
C4	5	1/5	1/3	1	1	3	3
C5	5	1/5	1/3	1	1	3	3
C6	3	1/7	1/5	1/3	1/3	1	1
C7	3	1/7	1/5	1/3	1/3	1	1

2.3.2 指标权重的确定 评价指标的权重可以通过评价指标的生态功能重要度来确定^[5]。依据表 2~6 的数据,按照下式^[18]计算每个指标对上一层的权重值:

$$W_i = \frac{1}{n} \sum_{j=1}^n \frac{a_{ij}}{\sum_{k=1}^n a_{kj}}, i=1,2,\cdots,n。$$
 (1)

式中:W 为判断矩阵的特征向量,n 为判断矩阵阶

数, a_{ij} 和 a_{kj} 为矩阵的元素。
经计算,生物多样性保护、景观生态状况改善、教育科研价值和生态旅游价值 4 项生态功能的相对重要性,即权重值分别为 $W_{B1}=0.558, W_{B2}=0.263, W_{B3}=0.122, W_{B4}=0.057$; 单项指标对各项生态功能的权重分别与该生态功能权重之积相加的和,即为该评价指标的权重,结果见表 7。

表 7 牛背梁国家级自然保护区评价指标的权重
Table 7 Weight of assessment index of the Niubeiliang National Nature Reserve

评价指标 Assessment index	多样性 Diversity	代表性 Representativeness	稀有性 Rareness	面积适宜性 Spatial natural suitable area	自然性 Naturalness	稳定性 Stability	人类威胁 Human-impact
生物多样性保护 Conservation of diversity	0.389	0.188	0.188	0.086	0.086	0.039	0.024
景观生态状况改善 Improvement of land- scape ecological states	0.034	0.034	0.034	0.076	0.143	0.248	0.431
教育科研价值 Value of education and scientific research	0.025	0.196	0.390	0.047	0.047	0.196	0.099
生态旅游价值 Value of eco-tourism	0.025	0.229	0.418	0.113	0.113	0.051	0.051

2.4 一致性检验

判断矩阵的一致性检验:首先,计算判断矩阵的最大特征值 $\lambda_{\max}$;其次,计算一致性指标 C. I., $C. I. = (\lambda_{\max} - n)/(n - 1)$;第三通过查平均一致性指标表确定平均一致性指标 R. I.;最后,计算随机一致性比值 C. R., $C. R. = C. I. / R. I.$ ^[4]。当 $C. R. < 0.1$

时,认为判断矩阵的一致性是可以接受的,否则应该对判断矩阵进行适当修正^[19]。经查 R. I. 系数表^[18]可知,当判断矩阵为 4,7 阶时,R. I. 分别为 0.90, 1.32,可得检验结果,见表 8。由表 8 可以看出,各层次判断矩阵有满意的一致性。

表 8 牛背梁国家级自然保护区评价指标判断矩阵一致性检验结果
Table 8 Examined results of the Assessment index of the Niubeiliang National Nature Reserve

检验项目 Examined item	$\lambda_{\max}$	C. I. Consistency index	R. I. Random index	C. R. Consistency ratio	检验结果 Examined result
目标层 Object hierarchy	4.209	0.070	0.90	0.078	$C. R. < 0.1$
生物多样性保护 Conservation of diversity	7.288	0.048	1.32	0.036	$C. R. < 0.1$
景观生态状况改善 Improvement of landscape ecological states	7.280	0.046	1.32	0.035	$C. R. < 0.1$
教育科研价值 Value of education and scientific research	7.268	0.045	1.32	0.034	$C. R. < 0.1$
生态旅游价值 Value of eco-tourism	7.285	0.047	1.32	0.036	$C. R. < 0.1$

3 牛背梁国家级自然保护区的生态评价结果

评价结果依据公式(2)^[18]计算:

$$S = \sum_{i=1}^n (I_i W_i) \quad (2)$$

式中: S 为综合评价指数, n 为判断矩阵阶数, I_i 为单项指标实际得分, W_i 为评价指标 i 的权重。

依据各评价指标的得分(表1)及权重(表7),按照公式(2)计算出牛背梁国家级自然保护区的各单项评价指数分别为, $S_{C1}=0.230\ 0$, $S_{C2}=0.185\ 0$, $S_{C3}=0.125\ 3$, $S_{C4}=0.060\ 0$, $S_{C5}=0.073\ 5$, $S_{C6}=0.094\ 6$, $S_{C7}=0.100\ 9$,综合评价指数为 0.869 。参照薛达元等^[20]对综合评价指数作出的等级划分: $0.86 \leq S \leq 1.00$,很好; $0.71 \leq S \leq 0.85$,较好; $0.51 \leq S \leq 0.70$,一般; $0.36 \leq S \leq 0.50$,较差; $S \leq 0.35$,很差,可知牛背梁自然保护区作为我国野生生物类保护区,目前整体生态质量很好,保护价值大。

4 讨 论

自然保护区生态评价的指标较多,各自然保护区应根据保护区类型的不同选择具体的评价指标体系。自然保护区生态评价一般从生态功能的4个方面进行综合评价,有学者则对4项功能的权重未进行判断,取其平均值^[6,13],而另一些学者对4项功能的权重进行了判断^[1,5]。从理论上讲,对4项功能的权重进行判断可能更合理,但实际上,本研究的2种计算结果差异不大。到目前为止,我国生态评价指标从建立到应用约有14年,但并未对其进行进一步完善与发展,所以这方面还有待更多的学者予以关注。

5 结论及建议

5.1 结 论

牛背梁自然保护区的生态评价结果为很好,说明该保护区目前生态资源丰富,保护价值大,保护效果好。从评价指标的得分看,多样性、代表性指标的得分很高,达到 1.00 ;稀有性、稳定性等指标的得分较高;但自然性、面积适宜性、人类威胁等指标的得分不是十分满意。

5.2 建 议

(1)采取措施尽量减少与降低来自周遍的威胁。目前,保护区来自周边的威胁还比较严重,如西康高速公路和西康铁路、沙柞公路、210国道、西安市环

山旅游公路等道路位于保护区的东、南、西、北四面,特别是西康高速公路和西康铁路从山腰穿过,周边地方林场建立森林公园,地方引资建立盘古山庄等旅游开发项目,其建设过程及使用无疑会对保护区的保护工作带来影响,保护区应加强巡查与监测力度,及时发现问题,尽量避免或减少对生态环境和保护动物的影响。

(2)处理好保护与开发的协调关系。保护区的资源有较高的旅游、科研、教育等价值,正在开发建设秦蜀古道旅游项目,如何协调旅游开发与生态保护的关系,是保护区保护生态过程中的一个关键问题。保护区的旅游开发必须坚持资源保护为主、旅游开发为辅的方针,要在保护好自然资源和生态环境的前提下,根据总体规划适度开发。旅游开发区域必须严格限制在实验区范围内,旅游接待能力和实际接待量不得大于保护区的生态旅游容量。

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