

# Threatened biodiversity as an environmental problem in Chile

Biodiversidad amenazada de extinción como problema ambiental en Chile

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## RESUMEN

La extinción de la biodiversidad se reconoce como un problema ambiental en Chile. Este reconocimiento proviene tanto de grupos ambientalistas como de biólogos de vida silvestre. Sin embargo, sus evaluaciones sobre el estado de la biota difieren, exhibiendo visiones opuestas sobre su estado de conservación a nivel de las regiones administrativas de Chile. Aquellas regiones donde el estado de la biota es considerado como un problema menor por los ambientalistas son aquellas regiones donde los biólogos detectan la mayor cantidad de especies en peligro de extinción y viceversa. Esta discrepancia demuestra que pueden existir diferentes percepciones del entorno tanto entre grupos sociales diferentes como al interior de grupos afines.

**Palabras clave:** conservación biológica, extinción, medio ambiente, percepción

## ABSTRACT

The extinction of biodiversity is recognized as an environmental problem in Chile. This recognition comes from both environmentalists and wildlife biologists. However, their evaluations about the conservation status of the biota are strikingly different, depicting opposite views regarding it within administrative regions of Chile. Those regions where the threats to the native biota are considered of lower importance by environmentalists are precisely the regions where wildlife biologists detect the higher numbers of threatened species and viceversa. This discrepancy demonstrates that different perceptions of the natural surroundings may occur not only between different social groups but also within alike groups.

**Key words:** conservation biology, environment, species extinction, perception

## INTRODUCTION

The loss of the world's biological diversity is a phenomenon that requires social understanding of its causes and effects in order to implement adequate conservation strategies (Kellert 1985). Support for conservation plans depends upon recognition of the threats faced by wild species as well as the recognition of species extinction as an environmental problem that, like pollution, ozone depletion and other environmental alterations, may affect human welfare (Norton 1987).

The perception of the status of biodiversity differs between different social groups, as each one perceives the environment through their own symbolic filters (Luhmann 1989). Therefore, environmentalists may have a different assessment of

the problems faced by wild species compared to governmental agencies, politicians, or any other social group (e.g., Peterson 1991). These differences may hamper the implementation and social acceptance of conservation policies. Differences however, should be minimal if non-existent within groups (Luhmann 1989). Therefore, it could be expected that wildlife biologists and environmentalists should exhibit similar perceptions of the conservation status of biodiversity. Consistency within groups is also required to establish coherent conservation policies.

Although Chileans have a poor perception of their natural landscape (Hoffmann & Hoffmann 1980), threatened biodiversity is recognized among the environmental problems of Chile (Hajek *et al* 1990). Wildlife biologists have listed 35% (243

out of 684 species) of the terrestrial vertebrate species under some IUCN category, including 50 species classified as Endangered and 92 species classified as Vulnerable (Glade 1988). That is, a significant proportion of the terrestrial vertebrates of Chile are of conservation concern. Regarding the Chilean flora, there are 5,082 vascular plants (Marticorena 1990) whose conservation status is largely unknown. For trees and shrubs however, 70 species are considered of conservation concern, including 20 Endangered and 24 Vulnerable (Benoit 1989). Overexploitation and habitat disruption are regarded as prime factors decimating the Chilean biota (e.g., Miller et al. 1983, Simonetti et. al 1992).

The status of terrestrial plants and vertebrates has been determined by botanists, zoologists and wildlife biologists (wildlifera hereafter; Glade 1988, Benoit

1989) and the conservation status of species as an environmental problem has been recognized by a broad group of professionals all dealing and concerned with environmental issues (environmentalists hereafter; Hajek et al. 1990: 15). Given the similar concerns of these groups, they should be expected to perceive the status of the Chilean biodiversity in a similar fashion. That is, in any given region of Chile, the assessment of the potential threats to the local biodiversity or any concern about its decline should be ranked according to the magnitude of the local's threatened biota. In other words, regardless of the absolute value assigned to the endangered biota regarding other regional environmental problems, such a value should be higher in regions where there are more threatened species.

In this note, I explore whether the importance attributed to the threatened

TABLE I

Threatened biota as an environmental problem in Chile. For each administrative region, the importance value assigned to the extinction, decline or decimation of plants and animals is given (from Hajek et al. 1990), together with the number of threatened plant (pl), mammal (ma), bird (bi), reptile (re), amphibian (am) and freshwater fish (fi) species (from Glade 1988, Benoit 1989).

Biota amenazada como problema ambiental en Chile. Para cada región administrativa se indica el valor de importancia asignado a la extirpación de plantas y animales (tomado de Hajek et al. 1990), junto con el número de especies plantas (pl), mamíferos (ma), aves (bi), reptiles (re), anfibios (am) y peces de aguas continentales (fi) amenazados por región (tomado de Glade 1988, Benoit 1989).

Region	Importance value		Number of threatened species					
	Plants	Animals	pl	ma	bi	re	am	fi
I	3.2	3.9	9	24	30	7	2	11
II	3.8	4.0	14	18	27	15	4	6
III	4.4	4.3	13	15	33	3	1	7
IV	4.8	4.4	21	17	33	11	4	10
V	4.2	3.4	23	20	48	14	4	16
MR	1.9	2.2	25	15	25	11	8	0
VI	3.1	0.0	14	17	37	10	6	17
VII	3.9	3.8	34	19	36	8	8	19
VIII	4.2	0.0	24	19	36	6	10	23
IX	4.3	4.0	18	18	36	3	10	22
X	4.6	3.5	12	20	37	2	11	22
XI	5.0	4.1	2	22	24	1	5	8
XII	4.0	4.3	15	26	24	4	1	6

biota by environmentalists is related to the actual status of the biota at a regional level assessed by wildlifers. That is, I will test if both Chilean environmentalists and wildlifers perceive the conservation status of our biodiversity in a similar fashion.

#### METHODS

Chile is divided into 13 administrative regions, arranged in a north-south axis. The status of terrestrial vertebrates and trees and shrubs of Chile has been determined for each of these regions (Glade 1988, Benoit 1989). In order to rank regions according to the number of threatened species, I tallied the number of species of conservation concern for mammals, birds, reptiles, amphibians and freshwater fishes, as classified in the Red List of Terrestrial Chilean Vertebrates (Glade 1988). Administrative regions were then ranked according to the number of species of conservation concern. The same procedure was followed for vascular plants, according to the status given in Benoit (1989).

Environmental problems of Chile have also been determined on a regional basis (Hajek et al. 1991). Among them, the extinction and overexploitation or decline of wild species are ranked along pollution, desertification, and other problems that a group of environmental experts perceive as important. For each administrative region, I considered the highest importance value assigned to categories such as «extinction of fauna, irrational exploitation, illegal or uncontrolled hunting and scarce fauna» to be representative of the importance of wildlife as an environmental problem. Similarly for trees and shrubs, the categories "extinction by overexploitation, indiscriminate exploitation, deforestation" were treated as representative of the importance of its decline in biodiversity. In the original analysis by Hajek et al. (1990), environmental problems were ranked from 0.0 (irrelevant problem) to 5.0 (maximum importance). In two administrative regions, no mention was made of declining wildlife. I assigned a 0.0 value to

each. Regions were then ranked according to the importance value given to this environmental problem. The number of threatened species was then correlated to the importance value assigned to the decline of vertebrate and plant species within each administrative region.

The assessment of the status of the terrestrial vertebrates, as reported by Glade (1988) was performed by 64 wildlife specialists (see Glade 1988: 64-67 for the list of contributors). Of these, 17 experts also contributed to the analysis of the environmental problems in Chile, which was based on the contribution of 420 consultants (Hajek et al. 1990: 19-21). In other words, only 4.1% of the specialists who determined the type, number and importance of environmental problems in Chile did also determine the status of the biota. Similarly, 51 botanists determined the status of the terrestrial flora (Benoit 1989: 95-100), of which 6 (12%) participated in the elaboration and ranking of environmental problems of Chile. Therefore, rankings can be treated as virtually independent of each other.

#### RESULTS

Compared to all other environmental problems, the extinction of animal species, their overexploitation and illegal hunting as decimating factors ranked from a highest score of 4.4 (out of 5.0) in the IV Region to a low 0.0 in the VI and VIII regions (Table 1; see Hajek et al. 1990). The number of threatened vertebrates by administrative region ranked from 59 to 102 species (Table 1). The importance value assigned by environmentalists to the threatened wildlife was either unrelated (for mammals, reptiles and fishes) or negatively related (birds and amphibians) to the actual number of threatened species by region (Table 2).

Forest destruction and plant over-exploitation received importance values as high as 5.0 in the XI region to a low 1.9 in the Metropolitan Region (Table 1; see Hajek et al. 1990). The number of threatened tree and shrub species ranged from two in the

XI region to 34 in the VII region (Table 1). The importance value assigned by environmentalists to plant threats at each administrative region was unrelated to the number of threatened species each region holds (Table 2). On average, importance values assigned to threatened animal species ranked them as the 26<sup>th</sup> environmental problem in Chile, while threatened plants were ranked as the 15<sup>th</sup> one (cf. Hajek et al. 1990). That is, plants are regarded higher than vertebrates, although the difference between mean ranking is marginal (Mann-Whitney U test,  $P = 0.07$ ).

TABLE 2

Threatened biota as an environmental problem. Figures are the Spearman's rank correlation coefficient for the relationship between the importance value assigned to the threats to biodiversity and the number of threatened species on a regional basis.

Biota amenazada como problema ambiental en Chile. Se presentan los valores del coeficiente de correlación de Spearman para la relación entre el valor de importancia asignado a la biota amenazada y el número de especies amenazadas por región.

Taxon	$r_n$	$p^a$
Plants	- 0.31	0.14
Mammals	0.08	0.39
Birds	- 0.54	0.03
Reptiles	- 0.24	0.20
Amphibians	- 0.59	0.02
Fishes	- 0.45	0.06

<sup>a</sup> = one-tailed test

#### DISCUSSION

Threatened biodiversity is recognized as an environmental problem in Chile (Hajek et al. 1990), albeit one of relatively low importance. If environmentalists and wildlifers assess the conservation status of the biota in a similar fashion, the importance value assigned to threatened biodiversity by the first group should correlate positively with the number of threatened species

determined by wildlifers. Contrary to this expectation, perceptions of threats to regional flora and fauna were either unrelated or negatively related to the actual degree of endangerment of the regional biota. That is, environmentalists and wildlifers had different perceptions regarding the conservation status of Chilean biodiversity.

Choices have to be made when planning and implementing conservation strategies (Soulé 1986, Norton 1987). The discrepancy exhibited by Chilean environmentalists and wildlifers may reduce support to conservation activities, as agreement in valuation and consequently in priority assessment, seems unlikely.

The attitude of environmentalists is striking, because the Chilean biota is so unique. Poorer in species when compared to tropical regions, the high level of endemism of the Chilean biota renders its flora and fauna a unique environmental feature (Simonetti et al. 1992). Uniqueness should trigger higher levels of appreciation to these species and their conservation status. This seems not to be the case for Chilean environmentalists. In fact, areas of high levels of endemism, such as the central regions of mediterranean climate (Simonetti et al. 1992) are ranked very low by environmentalists, despite their holding of large numbers of endangered species.

A rewarding conservation strategy has been habitat (or ecosystem) conservation (Norton 1987). Landscapes, and the habitats they contain, have been drastically altered in Chile, due to extensive native forest replacement by pine plantations, wood cutting, among other activities. However, the ranking given by environmentalists to the endangerment of the flora, a most conspicuous landscape component, is also unrelated to its current threats. Therefore, a habitat-based conservation approach may also have weak support.

Interestingly, the conservation of biological diversity in Chile has relied on both the coarse and fine-filter approach. That is, has been centered on the conservation of community-types and individual species, respectively (Simonetti & Armesto 1991).

The scientific knowledge required to support such approaches is basically lacking (Simonetti & Armesto 1991). The absence of correlation between the endangerment of the biota and its regional ranking reveals that support and appreciation from environmentalists may also be lacking. Consequently, the elaboration of public policies may be hampered. Further, Chilean citizens have a poor perception of the natural vegetation (Hoffmann & Hoffmann 1980, Filp et al. 1983, Fuentes et al. 1984). This fact, coupled with the distorted view of environmentalists regarding the status of the threatened biota suggests that a strong campaign is urgently required to increase public awareness and understanding of the significance and status of biodiversity in order to ensure the conservation of the Chilean biota.

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