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Roadside habitats: a missing link in the conservation agenda

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Summary

Roadside habitats in Brazil have been and remain major suppliers of biological diversity and plant genetic resources to society. If the ultimate demise of these habitats is to be avoided, their inclusion in conservation policy planning is mandatory.

Introduction

The literature outlining possible on-site conservation actions for tropical biomes is remarkably silent on the subject of marginal habitats. The concern for habitats for wildlife and wild plants along roadsides is more developed elsewhere, particularly in America and western Europe (Joselyn, 1969; Way, 1977; Holzapfel and Schmidt, 1990; Ahern and Boughton, 1994; Eversham and Telfer, 1994; Lamont *et al*., 1994; Sykora *et al*., 1994). However, the corresponding level of awareness in tropical America leaves much to be desired.

In Brazil, one such marginal habitat, represented by roadside and railroad verges, appears to have been overlooked. Much of the biological diversity of flowering plants in the Brazilian tropics is currently finding refuge in this type of habitat. The paramount importance of these apparently unnoticed sanctuaries to the plant stocks must be emphasized.

The *Faixas de Dominio* in Brazil

The *faixas de dominio* (FDD) in Brazil are the strips of land bordering each highway in between the road and the fence of any rural property. By law people cannot inhabit or modify this land. The FDD belongs to the union in the case of the federal highways and to the state in the case of the state highways. Over the last 20 years the Centro Nacional de Pesquisa de Recursos Genéticos e Biotecnologia's (CENARGEN) staff have been amassing economic germplasm and herbarium plants from all over tropical Brazil and the importance of the road verge diversity has been clearly recognized. The discovery of scores of new plant species from roadsides over recent decades has shown that plants can survive successfully under conditions far distant from the ideal, often through their use of adaptive mechanisms. Until 1960, the importance of the FDD as a reservoir of biological diversity was not duly assessed, for large tracts of relatively undisturbed vegetation existed in the Amazon, in the northeast (the Caatinga) and in the midwest (the Cerrado). In contrast, the vegetation of the industrialized south and southeast of Brazil was fast disappearing.

An abrupt change took place in the early 1960s. Credit subsidy became available for agricultural commodities and estates of all sizes soon converted their original vegetation into cash crop plantations and beef cattle pastures. At the same time, the opening of new roads speeded up the exodus of the landless to new opportunities in the tropics. In the late 1960s high-value export crops such as soyabeans, wheat, coffee and oranges occupied the place of most of the virgin vegetation in Brazil's south and southeast regions. In the north, the northeast and the midwest the forests were depleted to serve the needs of the logging industry and the requirements of steel mills or were converted outright into pastures. The flat Cerrado soon became a landscape of pastures of African grasses and cash crop plantations.

The threat to the FDD as a repository of plants became real in the early 1970s when farmers started to cultivate these narrow strips of land to increase their crops. In the early 1980s the FDD represented the known sites of occurrence of many tropical species. The situation worsened in the late 1980s, when scores of landless poor people (*sem terra*) started to exploit the FDD (Fig. 1). The FDD belonged neither to the farmer nor to the landless but law enforcement was nil. Widespread cultivation of the FDD followed.

The trends of deforestation in Brazil

Much of Brazil's remaining original vegetation outside of the Amazon disappeared between 1970 and

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Fig. 1. Maize growing on the roadside verge. The hut of the landless occupants borders the fence of the forested estate. The photograph was taken at the municipality of Porto Franco, along the BR-010 highway, Amazonian State of Maranhão, 28 January 1995.

1990. Some parts of the Amazon faced the same situation. In Rondonia, for example, the population increased 5-fold, from 160 000 to 800 000 inhabitants between 1983 and 1988; as a result, between 1975 and 1987 from 12% to 15% of the forests of the state disappeared. Scientists and politicians alike now talk of avoiding the rondonization of the Amazon.

Large parts of Brazilian territory now consist of scattered stocks of plants clinging to roadsides. The Cerrado has been hardest hit. This huge area of savanna woodlands was virtually untouched until 1946. At present, it is estimated that approximately 40% of the Cerrado has become farmland (WWF/Pró-Cer, 1995). The situation in the Caatinga is also serious; between 1984 and 1990, the native vegetation decreased from 64% to 47% (IBGE/IBAMA/SUDENE, 1991). The figures of deforestation for the humid tropics are conflicting, but a recent estimate indicates a loss of 15% of the forests of the Brazilian Amazon (Walker and Holmes, 1996).

The forgotten areas

The controversy about the effects of habitat fragmentation, the ideal size of reserves and the species losses sounds at times too academic *vis-à-vis* the question of habitat destruction (Murphy, 1989; Noss, 1989; Myers, 1993). However, the situation in Brazil mirrors what is happening in most of Latin America.

The issue of roadside verges is scarcely mentioned in official fora (Dyer and Holland, 1988; McNeely, 1994a,b; Myers, 1994). The preservation of marginal lands is occasionally recommended (Terborgh, 1992) but the proposal falls short of the scope pursued here. A recent analysis (Johnson and Jonsson, 1995; McNeely, 1995) of the state of biological diversity, commissioned by the United Nations Environment Programme, revealed only three titles dealing with roadside vegetation, whereas 35 titles were found dealing with the conservation of the biodiversity in urban areas. A comment (McNeely, 1995, p. 776) on Way's (1977) findings is worrisome: 'the very specialized habitat of roadside vegetation reveals some surprising contributions to the conservation of native species'. This view that conservation be associated with pristine, unpolluted habitats is misleading in the present state of affairs. Collectors know that verges are a rich source of live materials. The observation that 43.5% of the higher flora of Britain may be found along roadsides (Way,

1977) should create wonder and amazement, as should the resilience shown by the plants and the areas should secure protective legislation.

Roadside habitats work as phytogeographical transects binding distinct types of vegetation from one biome to another. They may serve as corridors and refuges for small mammals, ground-nesting birds, reptiles and scores of insects.

The outlook

The cultivation of verges in the tropics is the ultimate threat to an effective oasis of biological diversity for higher plants. Africa had 65% of its wildlife habitats converted into farming land by 1986 (McNeely, 1992). The neotropics seems to be in a better situation and neotropical roadsides could significantly contribute to the preservation and replenishment of the stocks of plants. The Brazilian Cerrado may serve as an example. In a floristic inventory of 26 areas, 50% of the woody species were concentrated at a single site (Ratter and Dargie, 1992). Another study in the Cerrado showed that only 22 tree species out of 139 were common to six sites in which an inventory had been made (Felfili and da Silva, 1993). This suggests that tree species are distributed in a heterogeneous mosaic that may correlate with edaphic preferences. Should conservation units be of uncongenial size or few, it is likely that parts of the biological diversity will be left out of the protective network. Roadsides may house unique expressions of the evolutionary process. This is particularly expected for short-range distributions, strict local endemisms and in cases of edaphic speciation.

The importance of roadside habitats grows exponentially as the arable land is cleared for farming. The present wave of extinctions would be larger but for these verges acting as buffers. Such habitats generally can cope with management by burning and mowing, but they cannot survive cultivation. Should the roadsides be converted for agricultural use, the tropics, almost overnight, will become a more barren land.

Concluding remarks

The clock of biological concern is ticking. The classification of the roadside habitat as a category of protected area is past its time. This action would naturally merge with the movement that strives for the recognition of disturbed habitats as a worthy repository for wildlife (Johns, 1983, 1985; Carlson, 1985; Wilkie and Finn, 1990).

Recent calls recommend that countries should be at the ready with protected-area system plans to qualify for funding (McNeely, 1994b). The June 1996 Food and Agriculture Organization-sponsored Leipzig conference on plant genetic resources unfolded its Global Plan of Action for plant genetic resources for food and agriculture, stressing the importance of on-site conservation for gene pools of wild crop relatives. The draft of March 1996, states (p. 19) that 'many protected areas are under threat of degradation and destruction; they cannot provide comprehensive geographical and biological coverage of the diversity of many species. It is necessary to complement the conservation in protected areas with measures aimed at conserving genetic diversity which lies outside such areas; to promote conservation on other lands not explicitly listed as protected areas'. The plight of roadside verges fits perfectly well within the scope of that announcement.

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