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a1 Road Ecology in Brazil: evolution and goals for the next decade

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Roads are the main way for transportation of supplies and people in Brazil. Brazilian road network is growing rapidly, with the largest expansion occurring between 1960 and 1980 and reaching an extension of 1.6 million km nowadays. During this period there was not a concern with environmental impacts, and road construction was performed without any previous study. Environmental licenses only began to be required in Brazil after the publication of specific laws in 1986. The first academic study on road impacts on wildlife was published only in 1988, concerning bird roadkills. The majority of Brazilian studies in this area still now focus on roadkilled species lists, many of them without an appropriate experimental design, and are predominantly published in conference proceedings. However, in the last six years this pattern is changing, with an increase of publications in scientific journals, development of a software for spatial data analysis of road mortality (Sirie-ma), the organisation of specialized conferences (Road Ecology Brazil) and experience exchange and cooperation between researchers. Nowadays, construction, widening and paving of roads are carried out after performing environmental impact assessments, to inform managers about the viability and need for mitigation and environmental compensation. During this process, mitigation measures have been implemented, such as wildlife passages, based on studies carried out in temperate zones of the northern hemisphere. However, to implement these measures with success in tropical regions we need local studies, considering that species richness affected is significantly greater and ecological

and social aspects may be very different. Although the installation of mitigation measures is already a reality in Brazil, the evaluation of their effectiveness is incipient and usually adopts inadequate sampling and analytical approaches. For the development of road ecology in Brazil, actions must be based on scientific research, aiming to ameliorate road planning and mitigation. The Brazilian Centre of Road Ecology Studies was created in 2011 to help the development of Brazilian road ecology, being responsible for promoting a link between academics, decision makers in environmental agencies and road planners and builders. The Centre main goals are to identify and stimulate research concerning knowledge gaps; to propose protocols for assessment, mitigation and monitoring of impacts; and to implement a database to be adopted by research centres and environmental agencies. This link is crucial in the present Brazilian scenario of government investment in the road network expansion. A national program for infrastructure predicts the building of new roads, and paving and widening of old roads summing at least 42 thousand kilometres. Also, since two new Brazilian laws were published in 2011, 55,000 km of roads already constructed must be regularized in the next 20 years, aiming to reduce environmental impacts, especially those related to roadkills and isolation of populations. While the expansion of the road network in Brazil represents a risk of increasing negative effects upon biodiversity, the recent development of Brazilian road ecology may be the opportunity to plan and implement an ecologically sustainable national transportation system.