

## COMMENTARY

**Football and Biodiversity Conservation: FIFA and Brazil Can Still Hit a Green Goal**Felipe P. Melo<sup>1</sup>, José A. Siqueira<sup>2</sup>, Bráulio A. Santos<sup>3</sup>, Orione Álvares-da-Silva<sup>4</sup>, Gerardo Ceballos<sup>5</sup>, and Enrico Bernard<sup>6,7</sup><sup>1</sup> Departamento de Botânica, Centro de Ciências Biológicas, Universidade Federal de Pernambuco, Recife, PE, 50670901, Brazil<sup>2</sup> Colegiado de Ciências Biológicas, Universidade Federal do Vale do São Francisco, Petrolina, PE, 56306410, Brazil<sup>3</sup> Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba, João Pessoa, PB, 58051900, Brazil<sup>4</sup> Floresta Nacional da Restinga de Cabedelo, ICMBio/MMA, Cabedelo, PB, 58310000, Brazil<sup>5</sup> Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City, DF, 04510, Mexico<sup>6</sup> Departamento de Zoologia, Centro de Ciências Biológicas, Universidade Federal de Pernambuco, Recife, PE, 50670420, Brazil

Abstract in Portuguese is available in the online version of this article.

*Key words:* armadillo; *Caatinga*; environmental policy; legacy; soccer; sports events.

FOOTBALL IS THE MOST POPULAR SPORT IN THE WORLD, WITH AN ESTIMATED 270 MILLION people actively involved in the game [Fédération Internationale de Football Association (FIFA) 2014]. With 209 national associations, the football's principal governing body—the FIFA—has more members than the United Nations, and the estimated audience of the final match of the FIFA World Cup (hereafter FWC) in South Africa in 2010 surpassed one billion people.

Starting in 1966, FIFA adopted official mascots for each FWC. Mascots are ambassadors that represent a commitment of their creators with a cause. For the 2014 FWC in Brazil, FIFA has chosen communicating the importance of the environment and ecology as its key objective; to do so, it has chosen as the mascot of the endemic Brazilian Three-banded armadillo (*Tolypeutes tricinctus* Linnaeus 1758, Dasypodidae), which it named *Fuleco*<sup>TM</sup> by combining the Portuguese words *futebol* and *ecologia* (football and ecology, respectively). According to FIFA, *Fuleco*<sup>TM</sup> 'can play a key role in driving environmental awareness' and the chosen name 'seamlessly represents the way in which the FIFA World Cup can combine the two (football and ecology) to encourage people to behave in an environmentally-friendly way'. Unlike other armadillo species, the Brazilian Three-banded armadillo is not adapted to digging and life underground, and when threatened, it protects itself by rolling into a ball (Fig. 1)—an ideal species to serve as the official mascot for a football tournament.

Football is big business and FIFA's financial reserves were nearly US\$ 1378 million at the end of 2012 (FIFA 2013). Evidence that hosting a FWC provides economic benefits remains controversial (Cornelissen *et al.* 2011, Eick 2011). However, the

Brazilian economy is expected to produce an additional US\$ 58.9 billion as a result of the 2014 FWC, with potential direct and indirect benefits reaching 24 sectors of the economy and an addition of as much as 0.4 percent annually to Brazil's gross domestic product until 2019 (Ernst & Young Terco 2011). Beyond the tangible and intangible economic benefits, a common argument is that cities or countries hosting major sporting events such as the FWC or the Olympics are a given 'once in a lifetime opportunity' to benefit socially and culturally (Manzenreiter 2008, Haferburg 2011), although again the evidence for such benefits is mixed (du Plessis & Maennig 2011). Here, we argue that although the selection of the endangered Brazilian Three-banded armadillo as the official mascot of the 2014 FWC is meant to represent a commitment to Brazil's environment, the opportunity has been squandered. We also argue, however, that it is not too late to take this opportunity back.

### CONSERVATION OF THE BRAZILIAN THREE-BANDED ARMADILLO AND ITS MAIN HABITAT

Two species of *Tolypeutes* occur in Brazil, the endangered and endemic *T. tricinctus* and the lesser-known *T. matacus*. Although *Tolypeutes tricinctus* is considered vulnerable to extinction because of its patchy distribution, rapidly decreasing population size, heavy hunting, and habitat loss (Superina & Abba 2013), there is no conservation plan in place for this species. Its range includes most of the *Caatinga*, a type of tropical dry forest in northeastern Brazil. Tropical dry forests are among the most threatened biomes of the world and the *Caatinga* is no exception—it once covered nearly 845,000 square km, or about 11 percent of the Brazilian territory, but has now been reduced to 53 percent of its original area (MMA 2014). The remaining areas are intensively used as sources of both industrial and domestic fuelwood and for livestock ranching. In addition, more than 20 million people

Received 21 March 2014; revision accepted 28 March 2014.

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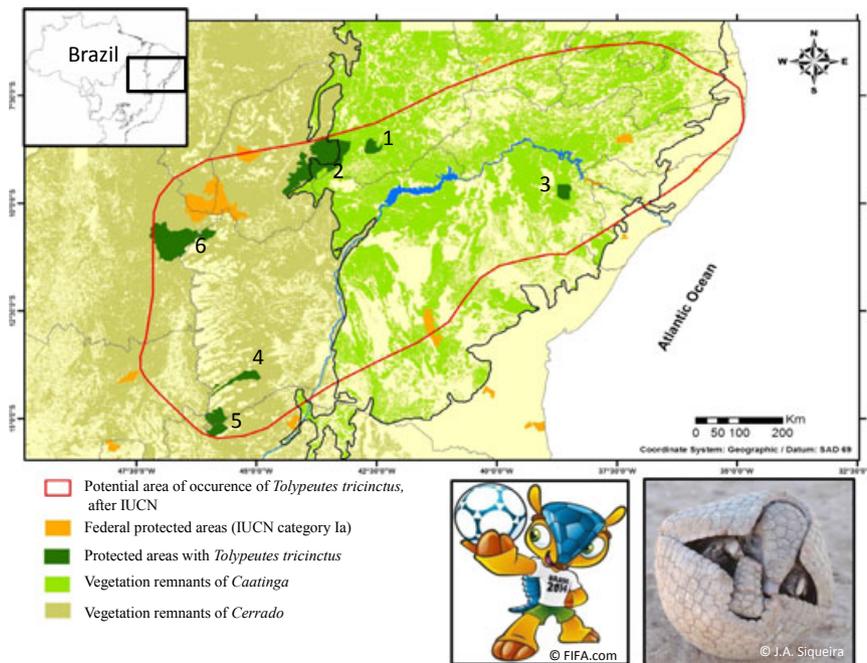


FIGURE 1. Potential area of occurrence of the endemic and endangered Brazilian Three-banded armadillo (*Tolpupes tricinctus*; red polygon, 731,981 km<sup>2</sup>), with *caatinga* (green) and *cerrado* (dark brown) remnants. Brazilian federal protected areas (IUCN type Ia; soft brown polygons, numbered as in Table S1, with exception of Jalapão State Park, not shown here) covers about 4.6 percent of its potential distribution, but the species is known in only six of those areas (dark brown; ca 20,860 km<sup>2</sup>). In the lower right corner, *Fuleco*™, the official mascot of the 2014 FIFA World Cup, and the Brazilian Three-banded armadillo in its characteristic ball-shape position. Color version available in online Supporting Information.

live in the *Caatinga*—most of whom are among Brazil's poorest—which leads to substantial subsistence hunting of *T. tricinctus*.

Despite its recognition as one of the most biodiversity-rich regions in the tropics (Dirzo et al. 2011), the *Caatinga* is also among the least-known and least-protected Brazilian ecosystems. Only one percent of its original area is under legal protection, and most of the protected areas are underfunded and understaffed—it is common to have a single park ranger responsible for areas of over 100,000 ha.

## A MAJOR OPPORTUNITY FOR A TRUE CONSERVATION LEGACY

FIFA's environmental aim for the 2014 FWC is described in the 'Football for the Planet' program: (1) monitoring of and compensation for greenhouse gases emissions resulting from the main activities related to the event; (2) certified 'green stadiums'; and (3) waste management and recycling. After the initial frenzy surrounding *Fuleco*™'s selection as mascot, the rich Brazilian biodiversity, this species was chosen to represent seems to have been completely forgotten by the FIFA's official environmental program. Indeed, not a single action for protecting this endangered species or its habitat has been proposed by the organizers of the 2014 FWC. With that in mind, we propose three concrete conservation actions that FIFA and the Brazilian government could implement to live up to the promised legacy of the 2014 World Cup:

1. Fulfill the commitment of supporting the 'Parques da Copa' project (World Cup Parks): The Brazilian government announced in late 2011 a US\$ 275 million investment in infrastructure for 26 federal and 21 state and municipal protected areas that had the potential to attract visitors during and after the 2014 FWC (Portal Brasil 2011). Two years later, the number of protected areas that would benefit was reduced to 16 and, less than two percent of these investments were actually granted. Honoring the initial commitment would tremendously benefit Brazil's protected area system, which is the largest in the world (ca 220 million hectares, or 12.4% of the global total, WDPA 2012). However, Brazil has a biased distribution of its protected areas—most of them, and especially the largest ones, are located outside of *T. tricinctus*' distributional range in Amazonia. In the *Caatinga*, among the protected areas that would benefit most are the seven where the Three-banded armadillo is known to occur (Fig. 1; Table S1), which together sum up more than 2.2 million ha. Of these, only the *Serra da Capivara* National Park (ca 91,000 ha), which is managed in cooperation with a non-governmental organization, can be considered a truly functional protected area and was included in the initiative. The others are 'paper parks' that are seriously underfunded, understaffed and lacking true habitat protection.
2. Designate new protected areas: Expanding the PA system in the *Caatinga* is a long-standing request from Brazilian conser-

vationists given that it is the least-protected ecosystem in Brazil. There are few large and well-conserved *Caatinga* remnants that can sustain viable populations of the Three-banded armadillo; creating new protected areas devoted to the conservation of the 2014 FWC mascot will both increase the amount of *Caatinga* protected and be a benchmark for future FWC organizers. As football fans and conservationists, we challenge FIFA and Brazil to set an ambitious mark: at least 1000 ha of *Caatinga* declared as protected area for each goal scored during the 2014 FWC. Based on the results of recent World Cups, this could result in the conservation of up to 171,000 ha of *Caatinga*. Sites worthy of protection are hardly lacking—more than 80 *Caatinga* sites were identified as priorities for conservation in an initiative led by the Minister of Environment in 2000 (MMA 2006).

3. Accelerate the completion and publication of species conservation plans: Brazil has joined the Aichi Biodiversity Targets, establishing a commitment to prevent by 2020 the extinction of species known to be threatened and improve the status of species in decline. *Tolypeutes tricinctus* was listed as ‘vulnerable’ by the IUCN in 1996 and in 2002 by the Brazilian Government. Almost two decades have passed and there is still no conservation action plan in place for this species. Creating and implementing such a plan, as well as plans for other Brazilian species threatened with extinction, must become a priority.

## PATH TO THE FUTURE

While these proposals are ambitious, there are existing mechanisms in place to implement them. FIFA recently launched the 2014 FIFA World Cup Legacy Trust, which is designed to both promote football and use it as a means of community development. Although the total amount will only be known after the competition, FIFA approved a preliminary amount of US\$20 million. Although Legacy Trusts typically focus on social issues (e.g., FIFA 2010), FIFA and the Brazilian government could seize this opportunity to use the trust for environmental conservation as well—especially in light of the link between environmental conservation and socio-economic development. By acting boldly and swiftly, FIFA and the Brazilian government could remove the Brazilian Three-banded armadillo from the IUCN Red List and protect thousands of hectares of its habitat. That could be the best goal scored this Cup.

## ACKNOWLEDGMENTS

We thank Ricardo Ramos for producing the map. UFPE, Univasf, UFPB, Capes, CNPq, and ICMBio provided support for the research of the Brazilian authors, and CONACyT supported

G. Ceballos in Mexico. We also thank the *Associação Caatinga*, the non-governmental organization that submitted *T. tricinctus*’ mascot nomination to FIFA.

## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

TABLE S1. *Protected areas in Brazil with known records of the Brazilian three-banded armadillo (Tolypeutes tricinctus).*

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