

Evidence for colonisation of anthropogenic habitats by the Réunion day gecko *Phelsuma borbonica* (Mertens, 1966) (Réunion Island, France): conservation implications

Stéphane Augros^{1,*}, Lisa Faipoux², Manon Bodin², Arnaud Le Goff¹, Mickaël Sanchez³ and Johanna Clémencet²

Abstract. Réunion Island landscapes are today characterised by a complex mosaic of ecosystems in varying degrees of alteration. Changes in natural areas result in hybrid ecosystems, retaining some original characteristics (e.g. native species) as well as novel elements (e.g. introduced species). Previous studies demonstrate that substantially modified areas could represent valuable habitats for some species of *Phelsuma*. Here, we examine a population of the Réunion day gecko, *Phelsuma borbonica*, in habitats characterised by different degrees of human influence to improve the understanding of the distribution of this species outside its native area. Distribution, edge effect, artificial structure attractiveness and degree of habitats alteration were quantified with four distinct protocols. We found that availability of egg laying sites, and edge effect should be considered as potential drivers to explain the species observed distribution within highly disturbed areas dominated by introduced plant species and scattered with artificial structures. Consequently, anthropogenic habitats must be seen in certain cases as areas of importance for the endangered *P. borbonica*. Because hybrid ecosystems will almost certainly cover a larger fraction of Réunion Island in the near future, we call for different ways of managing native geckos in these areas.

Keywords: *Phelsuma*, conservation, Réunion Island, anthropogenic habitats, artificial structures, edge effect

Introduction

Originating from Madagascar (Rocha et al., 2009), day geckos of the genus *Phelsuma* are typical island colonisers assumed to be highly mobile and adaptable to new habitats (Gibbons, 1985; Fisher, 2011; Noble et al., 2011). Nevertheless, as ectotherms, lizards are particularly exposed to habitat alteration due to a strong dependency on environmental parameters (Sinervo et al., 2010; Jenkins et al., 2014). With restricted geographical ranges, native species of *Phelsuma* spp. living in tropical islands around Madagascar are now

facing major threats: natural habitats modification or destruction (Sanchez and Probst, 2011; Bungard et al., 2014), biological invasions (Cole et al., 2005; Buckland et al., 2014a), and climate change (Kearney et al., 2009; Rödder et al., 2010). Inside the Malagasy biogeographic region, Réunion Island is a small French territory (2,500 km²) that belongs to the 35 globally recognised biodiversity hotspots (Myers et al., 2000; Mittermeier et al., 2011). Nowadays, as 70% of the island's original habitats are considered disturbed or destroyed (Strasberg et al., 2005), landscapes of the island are characterised by a complex mosaic of ecosystems in varying degrees of alteration (Lagabrielle et al., 2010). Changes in natural areas result in hybrid ecosystems, retaining some original characteristics as well as novel elements (Hobbs et al., 2009). The Réunion day gecko *Phelsuma borbonica* Mertens, 1966 is one of the two native lizards to Réunion Island (Meier, 1995). While its natural habitat was presumed to originally cover most of the island's forested habitats, its actual area of occupancy, estimated below 500 km² (UICN France and MNHN, 2010a), remains inaccurate since fragmented

¹ Eco-Med Océan Indien, 97400 Saint-Denis, La Réunion, France

² Université de La Réunion, UMR Peuplements Végétaux et Bio-Agresseurs en Milieu Tropical, 15 avenue René Cassin, F-97715 Saint-Denis, La Réunion, France

³ Association Nature Océan Indien, 46, Rue des Mascariens, F-97429 Petite Île, La Réunion, France

* Corresponding author e-mail: s.augros@ecommed.fr

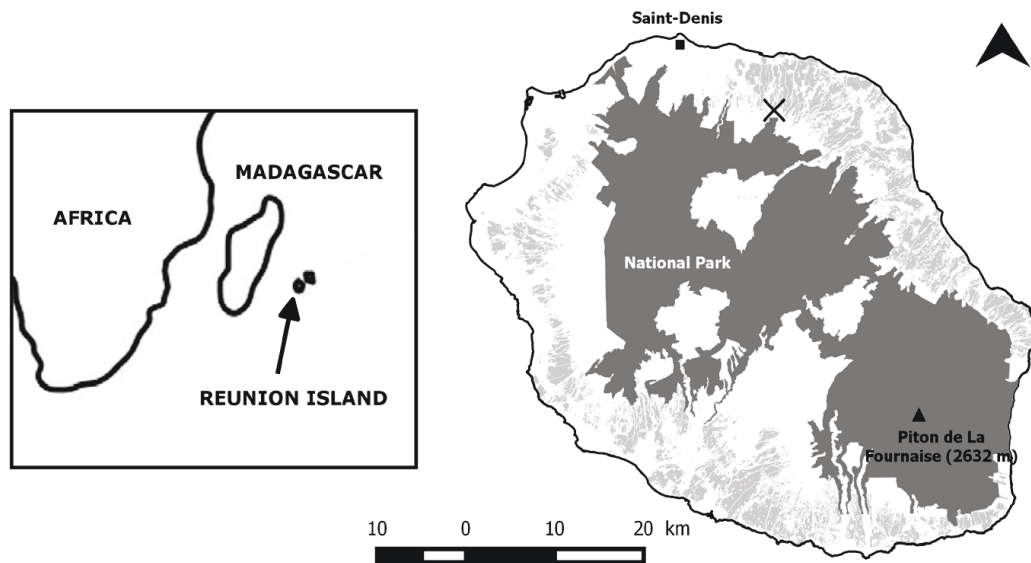


Figure 1. Location of the study site. Dark grey: National Park; light grey: sugar cane fields.

populations are still being discovered (S.A. & M.S., unpubl. data). Given that egg laying site availability can be a strong limiting factor for arboreal geckos (Ineich, 2010), it is of relevance that several observations reported that *P. borbonica* commonly used artificial structures as shelters and/or oviposition sites when present in the ecosystem (Probst and Déso, 2001; Sanchez, 2012a-b). Moreover, while edge effects are reported to play a key role in fragmented and degraded habitats for reptiles (see Lehtinen *et al.*, 2003), a clear preference for open habitats (i.e. forest edges) allowing thermoregulation has also been suggested for *P. borbonica* (Sanchez, 2012a).

Here, we aim to study potential drivers that may explain how disturbed areas may fit with the Réunion day gecko ecological requirements. Specifically, our aims are: 1) to assess the gecko's presence and distribution in a particular anthropogenic site; 2) to investigate the abundances in forest edges between two singular parts of an area exposed to different degrees of human influences; 3) to determine if artificial structures may attract *P. borbonica*, as potential thermoregulation and/or egg laying sites; 4) to assess the varying degrees of alteration in our site's degraded habitats confirmed to host the Réunion day gecko.

Materials and Methods

Study site.—The study site lies in the North part of Réunion Island (21°00'S; 55°30'E, 380–700 m a.s.l., 160 ha) and stands as a buffer area between pristine

midland rainforests - inside the limits of the National Park - and sugar cane fields surrounding the East coast of the island (Fig. 1). Mean temperature range is 12–22°C (respectively over dry and rainy season) and annual rainfall is ranging from 2,000 mm to 3,000 mm (Jumaux *et al.*, 2011). Originally covered by lowland humid rainforests (Cadet, 1980), the area is today composed of a mosaic of disturbed native forest (4% of the site area), second-growth forest (39%), open fields (pastures: 11%; sugar cane fields: 23%), bamboo patches (4%) and planted forests (19%). Second-growth forests are mainly composed of two introduced Myrtaceae species (*Syzygium jambos* (L.) Alston, *Psidium cattleianum* Sabine) both considered to belong to the 10 most problematic invasive species in Réunion Island (Schmitt and Rivière, 2002; Kueffer and Lavergne, 2004). Located between two major riverine corridors (Lagabrielle *et al.*, 2009), the site's hybrid ecosystems still provide suitable environmental conditions for the maintenance of populations of some rare native plant species (Augros and Martos, 2016). Historically, the area has been partly turned to a game park (GP) for 63 ha in 1996 with the introduction of a herd of Javan rusa deers (*Cervus timorensis* Blainville, 1822). As a consequence, the study site is divided into two areas arising historically from different human influences: i) the GP, mostly consisting in livestock grazing and the maintenance of grasslands, trails, and the presence of 32 hunting blinds (HBs) spread over the area and ii) the remaining part of the study site involving intensive agricultural practices for the growing of sugar

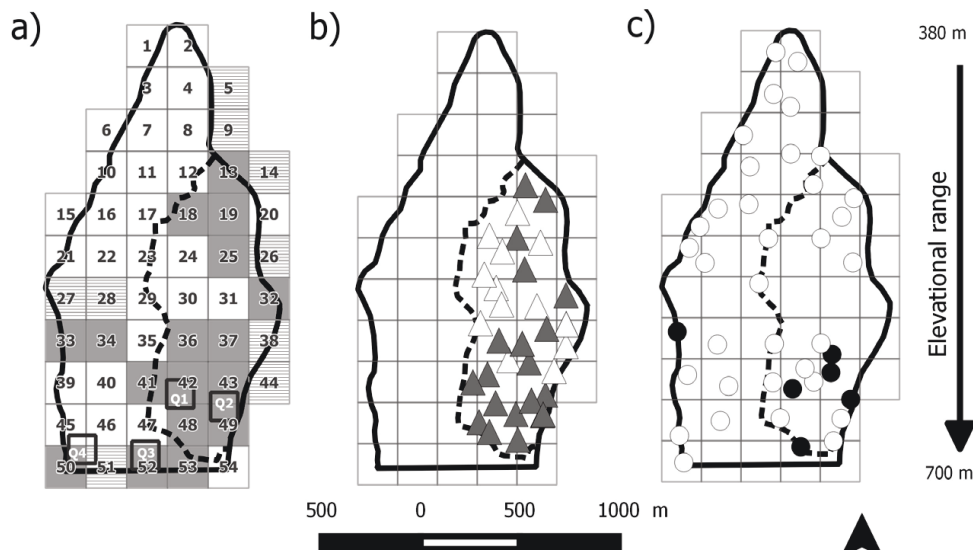


Figure 2. Distribution of *P. borbonica* over the study area (solid and dashed lines representing the limits of the study site and the GP respectively) highlighted by three different methods: a) Grid squares surveys method: dark greys = presence of geckos; white = geckos undetected; strips = unvisited squares; Q1-Q4 squares = vegetation quadrats. b) HBs survey method: grey triangles = presence of eggs and/or geckos; white triangles = absence of eggs and/or geckos. c) Transect lines method: black dots = presence of geckos; white dots = geckos undetected.

cane punctuated with forested riverines.

Protocols.—Four different steps were followed to understand how the study site might fit with the forest day gecko ecological preferences. i) The first step consisted in assessing the presence and distribution of geckos all over the study site (inside and outside the GP) through active searching by focusing on edges, artificial structures (i.e. cabins, electric poles, metallic tubes, boxes) and attractive vegetation (i.e. Arecaceae, Pandanaceae, Musaceae and *Bambusa vulgaris* Schrad.) during 7 days by two surveyors for a total of 36 hours. For this purpose, the study site was divided into 54 4,000 square meters squares providing markers to ensure an even coverage of the area (Fig. 2a). Nine squares were not visited because of the lack of appropriate habitats and/or difficulty of access. ii) Second, to differentiate the attractiveness of the two different parts of the area (i.e. inside and outside the GP), 40 transect lines (Eberhardt, 1978) were placed randomly along forest edges inside (n=20) and outside (n=20) the GP (Fig. 2c, Fig. 3a). Transects of 100 m in length were inspected once from ground to canopy by two surveyors (L.F, M.B) for 20 minutes, a time frame chosen from preliminary surveys, for a total of 13.3 hours. iii) Third, as egg laying sites availability is considered as a potential limiting factor for arboreal geckos (Ineich, 2010; Bungard et al., 2014), we specifically searched on

the 32 HBs located inside the GP for eggs and geckos. Around each HB, a 100m² area, including surrounding trees, was inspected by two surveyors (L.F, M.B), for 20 minutes, for a total of 10.6 hours (Fig. 2b). HBs consisted in wooden made platforms erected amongst living trees (Fig. 3c). The level of connectivity of HBs to the forest was categorised in three types: edge (n = 17), forest (n = 4), isolated in open areas (n = 11). iv) Fourth, to characterise the range of degradation of forested areas confirmed to host *P. borbonica*, a pair of 10 X 10 m vegetation quadrats (Gleeson, 1920) was surveyed inside the GP most degraded habitats while another pair was inventoried outside the GP limits, in the most preserved part of the forest (Fig. 2a). Along with the plant species richness, records included all species of trees, shrubs, herbs, vines and epiphytes. To estimate native and exotic plants coverage regardless of strata, relative percentages of the floristic composition were weighted by the abundance coefficient provided by the Braun-Blanquet scale (Braun-Blanquet, 1964).

Data collection.—Fieldwork was undertaken over the summer season from December 2013 to May 2014. Field sessions were conducted during the optimum period survey from 8 a.m. to 3 p.m. We conducted the survey only on days with similar weather conditions (no wind, no rain) to avoid any bias that could result from different activity patterns of the reptiles. For each gecko

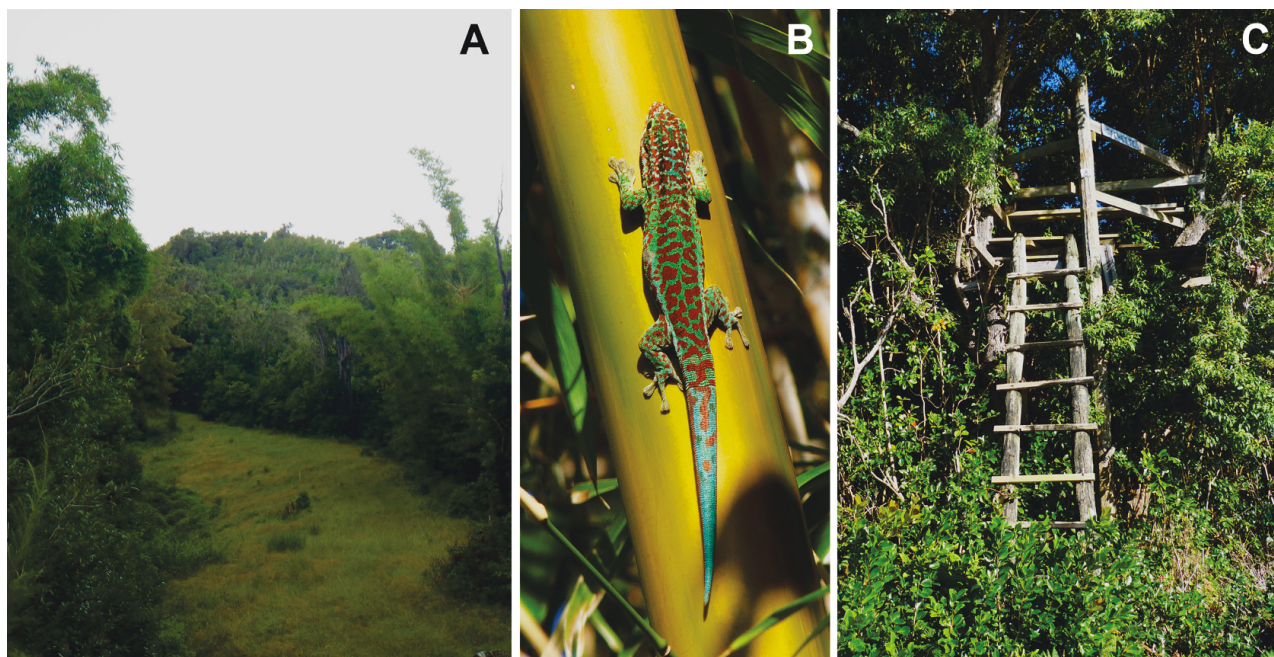


Figure 3. Illustrations from the study area: a) Transition between forest and pastures inside the game park (GP), b) *P. borbonica* on a bamboo tree, c) Hunting blind (HB) in forest edges inside the GP.

sighting, we systematically collected data on three environmental variables: elevation, host type (native/exotic tree, artificial structure, ground), and perch height. The total length of abrupt transitions between forested and open areas (i.e. forest edges), inside and outside the GP, was estimated in the whole study site via a GIS software (QGIS v. 2.10) and aerial photographs (© BD Ortho 2011).

Analyses.—Data were not normally distributed, so we used different non-parametric tests suited for categorical and/or numerical data (Fisher's exact test, Kruskal-Wallis test, Pearson's Chi-squared test). Chi-square goodness of fit tests were conducted to determine whether numbers of individuals or eggs found on HBs were consistent or not with a hypothesised distribution. Statistical analyses were computed with R version 3.2.2.

Results

A total of 115 geckos and 289 eggs were recorded with the four different protocols. Amongst the 45 grid squares surveyed, 17 revealed the presence of geckos (31.5%) and most of them (12) were located partly or totally inside the GP (Fig. 2a). 56% of all detections were collected randomly during the first step of active searching (64 individuals), 13% during transect lines inspection (15 individuals) and 31% by specifically

focusing on hunting blinds (36 individuals, 239 eggs). Out of the 115 gecko observations, 51 were recorded on artificial structures, 20 on native trees, 42 on exotic perches and 2 on rocks above the ground (Fig. 4). Detections of geckos were only made in disturbed forests, second growth forests and bamboo patches (Fig. 3b).

Out of the 32 HBs inspected, 19 were positive for the presence of *P. borbonica* (59%). Geckos were detected on 17 HBs, the number of detections varied from 1 to 6 individuals by HBs. Eggs ($n = 179$) were only found on 9 HBs, their number ranged from 1 to 50; no geckos were recorded on two of the HBs. Detections ranged from 437 m to 697 m whilst 17 HBs were located on edges, 4 inside forested habitats and 11 isolated in open habitats (Fig. 2b). Although presence of geckos was not correlated with the connectivity to the forest of the HBs (Fisher's exact test, $p = 0.1037$, two sided), numbers of individuals and eggs did not follow the predicted values as 84% of all individuals (Chi-squared goodness of fit = 14.0132, $df = 2$, p -value < 0.001) and 87% of all eggs (Chi-squared goodness of fit = 113.4425, $df = 2$, p -value < 0.001) were recorded on HBs located on the edges. Number of eggs were not positively correlated with the number of individuals detected (Pearson's Chi-squared test, X -squared = 67.133, $df = 54$, p -value = 0.1081).

Transect line surveys that were conducted in forest

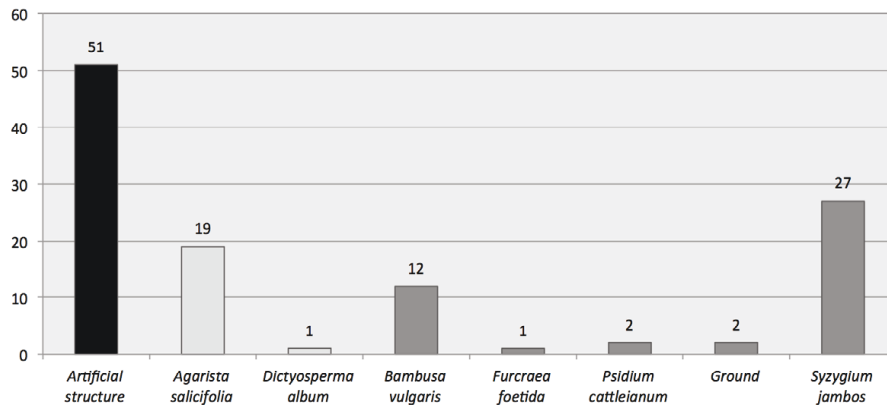


Figure 4. Number of geckos observed per perch type: light grey = native trees; dark grey = exotic trees; black = anthropogenic structures.

edges revealed a significant difference between the inside (13 individuals observed) and the outside (1 individual) of the GP (Chi-squared goodness of fit = 10.286, $df=1$, P -value < 0.005) (Fig. 2c). Extent of forest edges were estimated at 20.2 km within the whole area while 62% of the total were included inside the GP (that itself represents 39% of the total surface area).

According to our four vegetation samplings using the quadrat method, diversity in potential perches for *P. borbonica* (i.e. tree and shrub species), strongly differed between the inside and the outside of the GP limits (Tab. 1). Up to 21 species were recorded in the most preserved part of the area, outside the GP, while only to 2 to 4 species were noted inside the two GP quadrats. Total species richness (i.e., including herbaceous, vines and epiphytic plants) followed the same pattern (see Appendix I). In terms of surface coverage, indigenous plants were estimated to cover only 30% in 3 out of the 4 quadrats. One quadrat inside the GP was almost entirely covered by introduced species (Q2, Tab. 1).

Amongst all gecko sightings collected from the four protocols, we did not observe significant differences in perch heights between host types (Kruskal-Wallis chi-squared = 3.0387, $df = 2$, p -value = 0.2188), despite

a broader range of height for indigenous host trees, scaling from 2 to 8 m against 2 to 5 m for exotic hosts. Elevation and presence of geckos were positively correlated (Kruskal-Wallis chi-squared = 14.5047, $df = 1$, p -value < 0.001).

Discussion

Our study brings evidence of the presence of a *P. borbonica* population in very disturbed areas. Results suggest that the availability of laying and thermoregulation sites (i.e. forest edges, artificial structures) may both occur as important drivers to explain the actual distribution of the species inside the study site. While Ineich (2010) proposed that artificial egg laying sites may increase species density amongst tropical Gekkonidae (including *Phelsuma* spp.), our results bring evidence to support this hypothesis while 19 out of 32 HBs had traces of recent or ancient occupation within the GP limits. Moreover, *P. borbonica* was mostly and more easily observed in forest edges, as is the case throughout Réunion Island (Sanchez, 2012a-b; Vingadachetty et al., 2015). Within a mosaic of open pastures and second-growth forests, edges were disproportionately represented inside the GP with a total

Table 1. Results from the vegetation quadrat samplings (Plant list: see Appendix I). Q: quadrat; GP: Game Park.

Quadrats	Species richness	Number of Introduced plants	Number of Indigenous plants	Indigenous/introduced plant ratios	Number of trees and shrubs species	Indigenous plant coverage	Introduced plant coverage
Q1 (GP)	3	2	1	33.33%	2	29.30%	70.70%
Q2 (GP)	5	3	2	40.00%	4	2.44%	97.56%
Q3	28	7	21	75.00%	21	31.53%	68.47%
Q4	28	5	23	82.14%	19	33.23%	66.77%

linear of 12.5 km of abrupt forest/pastures transitions within a very small area (63 ha), providing a large panel of thermoregulation sites throughout the day. Along with elevation, the edge effect seems likely to play a key role in the presence of *P. borbonica* inside the GP. Even though edges were also well-represented outside the GP, the intensive agricultural landscape and the lack of anthropogenic structures may explain why significantly fewer observations of geckos were recorded. Indeed we have often witnessed the absence of transition zone between sugar cane fields and forest edges on the field, involving embankments into the forest, trees injured or destroyed and the use of pesticides sprayed towards the edges. After habitat loss and degradation, the impact of agrochemicals is considered as the third threat for reptiles decline (Gibbons *et al.*, 2000); recent studies have shown evidence that, among reptiles, lizards display the highest sensitivity toward pesticides (Mingo *et al.*, 2016).

Finally, our study demonstrates that *P. borbonica* can adapt to disturbed areas on the margin of its native habitat. Habitat requirements differ among reptile species in the Indian Ocean area (Glaw and Vences, 2007), as does the sensitivity to habitat alteration (Theisinger and Ratianarivo, 2015). Despite the fact that habitats with high diversity of plants are proved to shelter an increased abundance and diversity of arthropod preys (Florens *et al.*, 2010; Buckland *et al.*, 2014b), the present study contradicts the assumption that *P. borbonica* strongly rely on habitats with complex structure and highest plant diversity (as shown for *P. guimbeaui* in Mauritius, see Buckland *et al.*, 2014b). The extreme poverty in plant diversity observed within the GP's second growth forests (Tab. 1) may partly be explained by the presence of the Javan rusa deer, already known to feed on a wide variety of native plants in Australia (see Keith and Pellow, 2005). Outside the GP, planted forests (*Casuarina* sp., *Eucalyptus* sp.) and open areas (sugar cane fields, pastures) did not yield any gecko sightings, which could be explained by the lack of cover close to perches, suitable laying sites or nectar for food. The relevance of artificial and attractive man-shaped habitats -such as the second growth forest studied herein- on the populations of this endemic gecko would need further investigations, given that substantially modified areas were already revealed as valuable habitats for some other species of *Phelsuma* (Thorpe and Crawford, 1979; Sanchez and Probst, 2011; Randrianantoandro *et al.*, 2012; Theisinger and Ratianarivo, 2015; Augros *et al.*, 2017a-b). Under certain circumstances, studies on lizard communities including *Phelsuma* even report

higher abundance and diversity in modified areas compared to natural sites (Ackley *et al.*, 2009; D'Cruze *et al.*, 2009; D'Cruze and Kumar, 2011), suggesting that conservation efforts should not be restricted to pristine habitats. Consequently, anthropogenic habitats would need more in-depth studies to understand how these hybrid systems contribute in food resources and microhabitats to fit with the requirements of *P. borbonica*, including parameters like microhabitat thermal characteristics, diurnal activity of arthropods and composition and floral nectar production of the introduced trees. The Réunion day gecko is already known to feed on the nectar of *Syzygium jambos* (Vingadachetty, 2015), the most common invasive tree inside the GP (see Appendix) and throughout the Eastern and Southern parts of the island's second growth forests (Kueffer and Lavergne, 2004). In order to provide comparison in abundance or microhabitat use between native and anthropogenic areas, distance sampling or capture-mark-recapture by photo-recognition protocols would be highly recommended (see Wanger *et al.*, 2009; Imlay *et al.*, 2012). Moreover, as the species is mainly recorded from edges, further surveys are necessary to estimate and compare density in both edges and forested habitats. This would require elevation point surveys to spot geckos over the canopy, as suggested by Imlay *et al.* (2012).

In conclusion, this study provides conservation perspectives for the Réunion day gecko. In our case, *P. borbonica* colonisation of anthropogenic habitats may be interpreted as a niche broadening from natural populations located above the study site or by unintentional artificial displacement of individuals. Long-term surveys are needed to confirm the maintenance of populations in these anthropogenic areas. As hybrid ecosystems can be defined as the results of native habitats being transformed into new species combinations and/or novel abiotic conditions, it implies new ways of management and conservation (Hobbs *et al.*, 2009). This concept means that the conservation and the active management of critically endangered species as *P. borbonica* should not be restricted to natural areas. Because hybrid ecosystems will certainly cover a larger fraction of Réunion Island in the near future, niche broadening towards attractive anthropogenic habitats for geckos (i.e. disturbed forest with artificial structures, edges and food resources) may come as a plausible short and mid-term view for the endemic *P. borbonica* populations dynamic. In that matter, conservation tools are urgently needed to value all types of ecosystems, including hybrid systems that can deliver unprecedented

benefits for the conservation of the island's endemic reptiles. In the specific case of *P. borbonica*, second growth forests, disturbed habitats and touristic areas close to natural populations are located mostly on the Eastern and Southern parts of the island, ranging from 200 m to 1000 m asl. Providing artificial shelters in these areas (i.e. artificial structures, human-made holes in trees) could be prioritised in order to maintain gecko populations. Works conducted by Sanchez (2012b) already involved Artificial Egg Laying Site (AELS) to mitigate biodiversity losses in a construction project with promising results. Furthermore, existing openings (i.e. firebreaks, dirt roads or nature trails) should be considered as conservation corridors for the species, and could be prioritised for the installation and monitoring of AELS in protected areas. Eventually, our observations strongly suggest considering different and complementary ways of managing biodiversity in anthropogenic areas, especially in Réunion Island supporting high endemic rates.

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Appendix I. Plant list from the quadrat samplings (Type: e= epiphytic, T= tree, h= herbaceous, s= shrub, v= vine; IUCN Status: LC= Least Concerned, NT: Near Threatened, VU= Vulnerable, CR= Critically Endangered). Names, family and status referred to Picot and Lucas (2016). IUCN red list categories referred to UICN France and MNHN (2010b). Abundance scale referred to Braun-Blanquet (1964).

Plant species	Family	IUCN Red List 2010	Status	Type	Abundance scale within quadrats (Q)			
					Q1	Q2	Q3	Q4
<i>Acalypha integrifolia</i> Willd.	Euphorbiaceae	LC	Indigenous	T			+	+
<i>Aeranthus arachnitis</i> (Thouars) Lindl.	Orchidaceae	LC	Indigenous	e			+	
<i>Antidesma madagascariense</i> Lam.	Phyllanthaceae	LC	Indigenous	T			+	
<i>Antrophyum giganteum</i> Bory	Pteridaceae	NT	Indigenous	e				+
<i>Apodytes dimidiata</i> E. Mey. ex Arn.	Icacinaceae	VU	Indigenous	T			+	
<i>Ardisia crenata</i> Sims	Primulaceae	-	Introduced	h	1	2	4	2
<i>Asplenium daucifolium</i> Lam.	Aspleniaceae	LC	Indigenous	h			+	
<i>Badula barthesia</i> (Lam.) A. DC.	Primulaceae	LC	Indigenous	s			+	
<i>Badula nitida</i> (Coode) Coode	Primulaceae	NT	Indigenous	T				+
<i>Blechnum attenuatum</i> (Sw.) Mett.	Blechnaceae	LC	Indigenous	h			+	1
<i>Calanthe sylvatica</i> (Thouars) Lindl.	Orchidaceae	NT	Indigenous	h				+
<i>Calophyllum tacamahaca</i> Willd.	Clusiaceae	LC	Indigenous	T			1	+
<i>Chassalia corallioides</i> (Cordem.) Verdc.	Rubiaceae	LC	Indigenous	s		+	1	1
<i>Cinnamomum camphora</i> (L.) J. Presl	Lauraceae	-	Introduced	T			+	+
<i>Cnestis glabra</i> Lam.	Connaraceae	LC	Indigenous	T			+	+
<i>Coffea mauritiana</i> Lam.	Rubiaceae	LC	Indigenous	T				+
<i>Crepidomanes bipunctatum</i> (Poir.) Copel.	Hymenophyllaceae	LC	Indigenous	e				+
<i>Cyathea borbonica</i> Desv.	Cyatheaceae	LC	Indigenous	T				+
<i>Doratoxylon apetalum</i> (Poir.) Radlk.	Sapindaceae	LC	Indigenous	T			+	
<i>Ficus densifolia</i> Miq.	Moraceae	LC	Indigenous	T			2	
<i>Gaertnera vaginata</i> Lam.	Rubiaceae	LC	Indigenous	T	3		+	
<i>Grangeria borbonica</i> Lam.	Chrysobalanaceae	LC	Indigenous	T			+	
<i>Graphorkis concolor</i> (Thouars) Kuntze	Orchidaceae	CR	Indigenous	e			+	
<i>Homalium paniculatum</i> (Lam.) Benth.	Salicaceae	LC	Indigenous	T			2	+
<i>Labourdonnaisia calophylloides</i> Bojer	Sapotaceae	LC	Indigenous	T				2
<i>Litsea glutinosa</i> (Lour.) C. Rob.	Lauraceae	-	Introduced	T			1	+
<i>Mimusops balata</i> (Aubl.) C.F. Gaertn.	Sapotaceae	LC	Indigenous	T				1
<i>Molinaea alternifolia</i> Willd.	Sapindaceae	LC	Indigenous	T			1	+
<i>Mussaenda arcuata</i> Poir.	Rubiaceae	LC	Indigenous	T				+
<i>Nuxia verticillata</i> Lam.	Stilbaceae	LC	Indigenous	T		1	1	1
<i>Ocotea obtusata</i> (Nees) Kosterm.	Lauraceae	LC	Indigenous	T				+
<i>Pandanus purpurascens</i> Thouars	Pandanaceae	LC	Indigenous	T			+	
<i>Piper borbonense</i> (Miq.) C. DC.	Piperaceae	LC	Indigenous	v				+
<i>Procris pedunculata</i> (J.R. Forst. et G. Forst.) Wedd.	Urticaceae	LC	Indigenous	h			+	+
<i>Psidium cattleianum</i> Sabine	Myrtaceae	-	Introduced	s	5	3	3	1
<i>Psiloxylon mauritianum</i> (Bouton ex Hook. f.) Baill.	Myrtaceae	LC	Indigenous	T				2
<i>Rubus alceifolius</i> Poir.	Rosaceae	-	Introduced	s			+	
<i>Selaginella obtusa</i> (P. Beauv.) Spring	Selaginellaceae	LC	Indigenous	h				1
<i>Syzygium cymosum</i> (Lam.) DC.	Myrtaceae	LC	Indigenous	T			+	
<i>Syzygium jambos</i> (L.) Alston	Myrtaceae	-	Introduced	T		5	+	5
<i>Trichomanes cuspidatum</i> Willd.	Hymenophyllaceae	LC	Indigenous	e				+