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The effects of environmental education on children's and parents' knowledge and attitudes towards lemurs in rural Madagascar

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Abstract

Environmental education is widely used to increase awareness of conservation issues. The theory is that increasing knowledge will improve attitudes towards the environment. Often, environmental education is aimed at children with the assumption that this can also impact adults through intergenerational transfer of knowledge and attitudes. However, there are few detailed studies evaluating the effectiveness of environmental education on changing knowledge and attitudes, and whether any changes do transfer between generations. We evaluate the effect of a school-based education programme run by Malagasy researchers aimed at promoting lemur conservation in Eastern Madagascar. We assess changes in the knowledge and attitudes of participating children and their parents (surveying 126 children and 88 parents across four matched villages, 1 year after two of the villages received environmental education). There was very low awareness of the law protecting lemurs. Attitudes towards lemurs varied between species; with the aye-aye (considered scary) and the eastern lesser bamboo lemur (considered a pest) being less preferred. Children in villages who received environmental education had higher knowledge about lemurs and more positive attitudes than children in the villages not exposed to the environmental education. Knowledge about lemurs among parents where children had received environmental education was also higher (although not attitudes). Environmental education programmes can have a lasting effect, certainly on knowledge, but engagement of the research and NGO community is needed to build the capacity of teachers in rural areas to enthuse their pupils about ecology and conservation issues.

Introduction

Environmental education is commonly promoted as an important component of biodiversity conservation interventions (Salafsky *et al*., 2002; Monroe, 2003; Brewer, 2006). This is based on the argument that environmental education will increase knowledge, potentially leading to changes in attitudes and people's interaction with their environment (Kaiser, Oerke & Bogner, 2007; van der Ploeg *et al*., 2011). Environmental education can be defined as a process to raise awareness and sensitivity to the environment, to increase knowledge and experience of environmental problems (UNESCO, 2002), and to acquire positive attitude of the natural world and skills to identify and mitigate environmental threats (Jacobson, McDuff & Monroe, 2006). The paucity of quality evaluations of conservation education programmes limits ongoing development and improvement, and is greatly needed (Jacobson, 2010). A number of recent studies assess the impact of environmental education on participant's immediate knowledge and attitudes (Penn, 2008; Damerell, Howe & Milner-Gulland, 2013). However, there are few studies that investigate the longer term retention of knowledge and whether changes in attitudes are maintained.

Adults are responsible for the majority of decisions that impact the environment; however, environmental education is most commonly targeted at children. A common justification for this is that pro-environmental attitudes are formed in childhood (Asunta, 2003), but pragmatism (schools offer a 'captive audience' and the opportunity cost

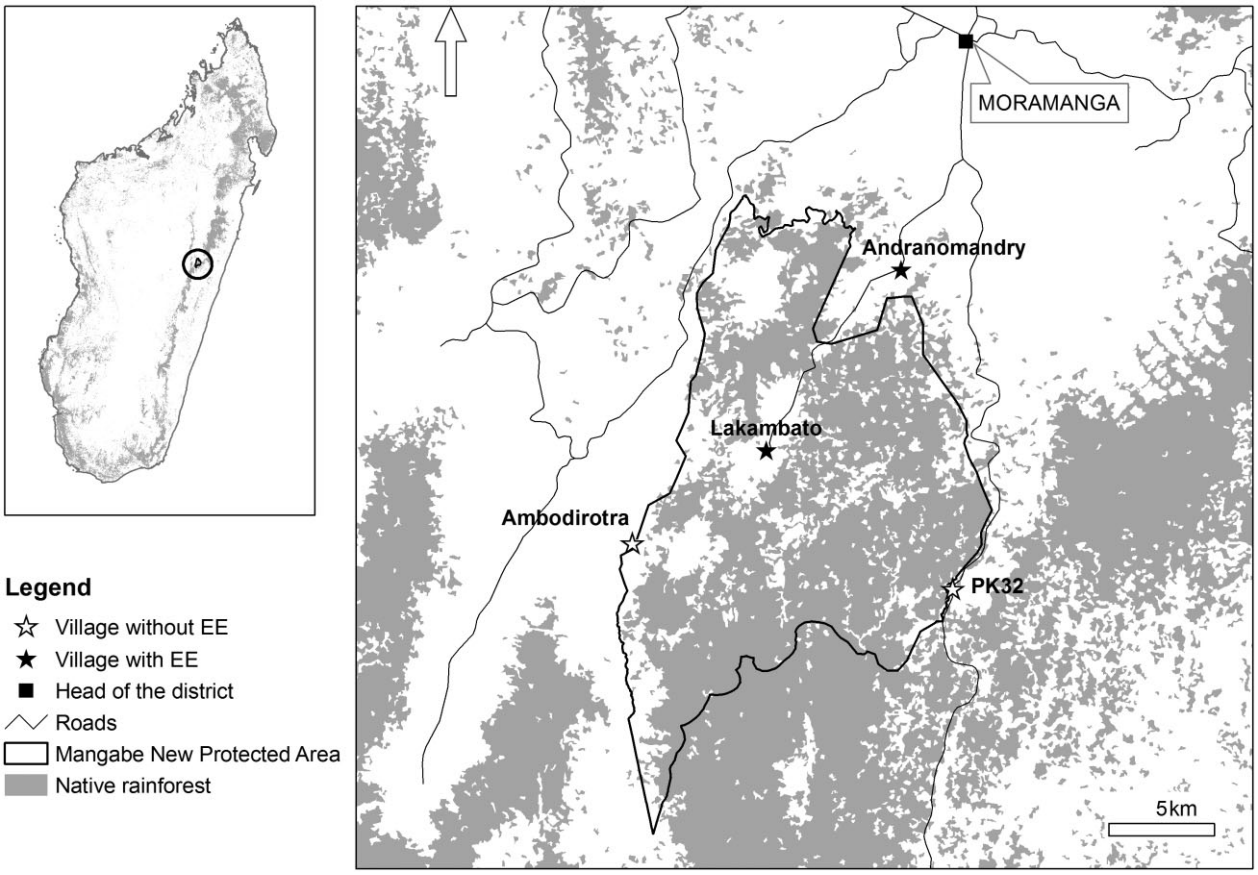

Figure 1 Location of study sites. Communities represented by filled stars received environmental education and unfilled stars did not. EE, environmental education.

of children's time is lower) is also likely to play a role. Some have suggested that there is the potential for transfer of information from children to their parents (Duvall & Zint, 2007; Damerell *et al.*, 2013), that is that environmental education with children can impact adults.

Madagascar is world-famous for its exceptional biodiversity and endemic lemurs, but also unfortunately for the very high levels of threat facing its natural heritage. The main threats facing lemurs are habitat loss (Schwitzer *et al.*, 2014), and increasingly hunting as traditional taboos break down in the face of increased human migration (Jenkins *et al.*, 2011). Lemurs have been protected under Malagasy law since 1960; however, their protected status is not widely known in rural areas of Madagascar (Keane *et al.*, 2011). Ratsimbazafy (2003) raised concern that the majority of Malagasy children have very limited knowledge about lemurs in general (their ecology, taxonomy or protected status). In 2002, the Malagasy government issued a decree that environmental education should be integrated in the national curriculum at all levels, but many teachers lack the capacity to effectively include environmental education in their teaching (Dollins *et al.*, 2010).

We evaluate the efficacy of a single-day, lemur-focused environmental education activity run by a Malagasy non-governmental organization (NGO) in collaboration with local teachers in schools in the periphery of a new protected area in the Mangabe area, Eastern Madagascar (Fig. 1). One year after environmental education took place, we investigate whether there are measurable differences in knowledge about, and attitudes towards, lemurs in children exposed to the environmental education and those not exposed. We also examine differences in the knowledge and attitudes of parents in the villages exposed to, and not exposed to, the environmental education, despite the parents not being directly exposed to environmental education activities.

Methods

Case study and sampling strategy

The Mangabe protected area in the eastern rainforest of Madagascar was established in 2008. Surveys show nine species of lemurs are found in this area and significant evidence of lemur hunting (Keane *et al.*, 2011). The Malagasy NGO Madagasikara Voakajy instigated an environmental education programme and decided to carry out concurrent research to investigate its efficacy. Four villages similar in

size, distance from the Mangabe forest, similar low-level of exposure to any previous environmental education, and all with a primary school were selected. Two were randomly selected to receive the environmental education, which consisted of a day of lemur-themed activities and talks run by Malagasy researchers from the NGO Madagasikara Voakajy. One year after the environmental education day, we collected data in all four villages. Schools provided a list of their pupils from which we could obtain a random sample. For the villages with environmental education, only pupils who had been present at the environmental education training were included. We questioned children while they were at school. Parents were interviewed at home or in their fields but without children in order to obtain independent knowledge and attitude measures.

Permission and research ethics

This research was approved by the Bangor University ethics committee. We obtained permission from the Ministry of Environment and Forest and the Circonscription Scolaire of Moramanga (local representative of the Ministry of Education). Each school was visited in order to explain the research and to request permission from the head teacher and the president of the association of parents (Fikambanan'ny Ray Amandrenin'ny Mpianatra). We then sent a letter to each school explaining the details of the research, and that participation was voluntary and again emphasizing that children and their parents could withdraw from the study at any time. When carrying out the questionnaire with children, we emphasized that the test was anonymous and the teachers would not see the marks. All interviews were done by the lead author (S. N. R.).

Conflict of interest statement: A co-author in this paper, Julie Razafimanahaka, is now the director of the NGO Madagasikara Voakajy, which directed the education programme we evaluate in this paper (although she held a more junior position when this research was carried out). The main author, Sariakanirina Rakotomamonjy, was a student at Ecole Superieure des Science Agronomies (University of Antananarivo) on a placement with Madagasikara Voakajy.

Questionnaire design

The same questionnaire was used with parents and children, but while children did it as a self-complete questionnaire this was not possible with the parents due to low literacy, and so we used face-to-face interviews. We collected the following socio-demographic data (summarized in Table 1): age (both children and adults), whether they had seen a lemur (children only), education level (adults only) and origin (whether they were native to the village or not; adults only).

Five multiple choice questions were used to measure knowledge. We assessed respondent's ability to name species from photographs, whether they knew activity patterns of the species (e.g. nocturnal/diurnal/crepuscular), ecology and biology of the species (Supporting Information Table S1). These questions focused on seven species of lemurs found in the area (Keane *et al.*, 2012), all of which have unique and non-ambiguous local names: *Daubentonia madagascariensis* (aye-aye; *aye-aye*), *Hapalemur griseus* (eastern lesser bamboo lemur; *kotreka*), *Eulemur fulvus* (common brown lemur; *varika*), *Indri indri* (Indri; *babakoto*), *Microcebus rufus* (brown mouse lemur; *antsidy*), *Propithecus diadema* (diademed sifaka; *simpona*) and *Avahi laniger* (eastern woolly lemur; *fotsife*).

We used five statements to measure attitudes and asked respondents to consider the same set of attitudes statements for each of the seven species (Supporting Information Table S2). Attitude statements were measured with a 3-point Likert scale. We measured attitude as positive (coded +1) if the respondent was happy to see lemurs, viewed lemurs as part of national heritage and would be sad if lemurs become extinct (scoring −1 if they disagreed with these statements). Attitude was negative (coded −1) if the respondent considered lemurs as a pest or frightening (scoring +1 if they disagreed with these statements).

Table 1 Description of the variables included in models testing the impact of environmental education on children's and parent's knowledge and attitudes

Variable		Description	Sample summary
Schoolchildren	Environmental education	Binary	47 with environmental education 79 without environmental education
	Age	Continuous	9–16 years
	Seen lemur	Binary	64% have already seen 36% have never seen
Parents	Children's knowledge	Continuous	Range from 0 to 19 with mean 9.38 (SD ± 0.79)
	Environmental education	Binary	32 parents have children exposed to environmental education 56 parents have children not exposed to environmental education
	Parent gender	Binary	52 men and 36 women
	Parent education level	Categorical	28 = none, 57 = completed between 0 and 5 years of education, 4 = completed between 5 and 7 years of education
	Parent origin	Binary	56 natives and 32 migrants

Attitudes were scored as neutral (coded 0) if the respondent did not agree or disagree with a given statement.

Data analysis

The demographic variables in the sample of people from villages exposed to environmental education and those not exposed were compared using a *t*-test. The total knowledge score was calculated by adding each correct answer; the maximum possible score was 19. No point was given for wrong answers or abstention. Total attitude scores were calculated by combining the five attitude statements for each of the seven species, providing a range from −35 to +35. All data were rescaled to a common range to allow direct comparisons.

To assess the effect of environmental education on children's knowledge and attitudes, we fitted a series of general linear models to the data. A candidate set of seven models were developed to assess the influence of environmental education on children's knowledge, with a separate set of seven looking at predictors of children's attitude. In both of these sets, explanatory variables included were child age, if they had seen a lemur or not and whether the child had received environmental education.

To assess the predictors of adult knowledge and attitudes, mixed-effects model were used to the data using the linear mixed effect (lme) package (Bates, Maechler & Bolker, 2008). To account for adults having more than one child in the dataset, a parent's ID was specified as the random effect. We fitted a candidate set of 19 models with knowledge as the response variable and the following explanatory variables: child's knowledge, if the village was exposed to environmental education, parent gender, parent education level, and origin as native to village or immigrant. To assess the predictors of adult attitudes, a separate candidate set of 19 models with parent attitude as the response and the same explanatory variables described above was developed. The corrected Akaike's information criteria (AICc) were used to rank the models.

Results

Summary of the sample

We sampled a total of 126 children (62 boys and 64 girls) between 9 and 16 years old and 88 parents (52 men and 36 women) from the four villages (Table 1 for a summary of the sample). There were no significant differences (*t*-test $P > 0.05$) in the demographic characteristics of the sampled children or parents from villages exposed to or not exposed to environmental education.

Knowledge about and attitudes towards lemur

Some lemur species are well known locally and widely recognized, while others are not. Children could identify fewer species of lemurs than parents, but some species are better known than others. Eighty-five per cent of parents and 54% of children could name the indri (*babakoto*), while only 50% of parents and 29% of children could identify the eastern woolly lemur (*fotsife*). Across the sample as a whole, 43% of parents and 49% of children reported that they believed that lemur hunting was illegal. However, this masks big differences between those exposed to and those not exposed to the environmental education (Supporting Information Fig. S1). In villages not exposed to environmental education, only 17 and 35% of parents and children reported that lemur hunting was illegal, while this was closer to 80 and 95% in exposed villages.

The percentage of children and parents who agreed with the four attitude statements varied across the seven species of lemur (Fig. 2). Both children and adults tended to agree with the statement 'it would make me sad if [species x] became extinct' (*mampalahelo raha lany taranaka*), although agreement was lower for the aye-aye than other species. Half of the children sampled believe all lemurs are crop pests (*manimba voly*), whereas the majority of adults believe the eastern lesser bamboo lemur was the only crop pest. Both children and adults tended to agree that most lemurs make them happy (*mahafaly*), except for the aye-aye. Similarly, overall, people do not appear to think of lemurs as scary animals, with the exception of the aye-aye; this was reported as scary (*mapataotra*) by 88% of children and 97% of adults.

Impact of environmental education on children

There was strong support for models including exposure to environmental education, suggesting that this is an important predictor of both children's knowledge about lemurs and attitudes towards them (see Table 2).

Exposure to environmental education is the strongest predictor of child's knowledge, with those exposed having higher knowledge scores (Fig. 3a). Older children and those who have seen a lemur also tended to score higher in terms of knowledge, as measured by this study. Similarly, exposure to environmental education appears to be a strong predictor of child's attitudes towards lemurs, as measured in this study (Fig. 3b).

Indirect impact of environmental education on parents

When testing predictors of parents' knowledge, the most highly supported model (>2 ΔAICc) retains the parameters gender and whether the village was exposed to environmental education (Table 3). There is no evidence for parents' knowledge being directly influenced by their child's level of knowledge (or vice versa) as child's knowledge was not retained in the most highly supported models. The predictors retained in the most supported model for parents' attitudes are origin, gender and whether the village had been exposed to environmental education (Fig. 4a). Once again,

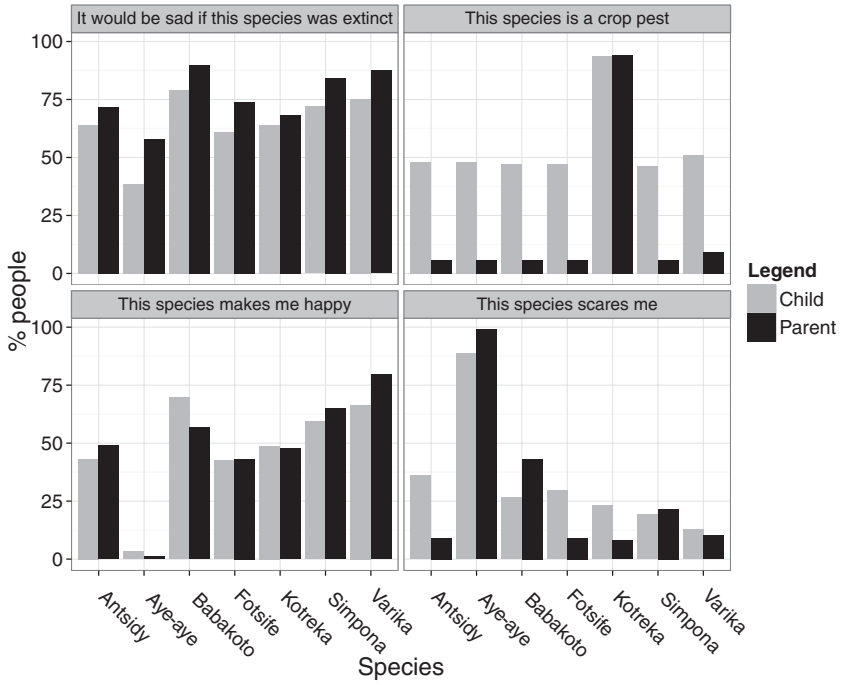

Figure 2 The percentage of children and parents who agreed with four attitude statements across seven species of lemur. The fifth attitude statement is not presented as this question was not asked for each lemur.

Table 2 Model selection table showing the five most highly supported models developed to assess the impact of environmental education on the knowledge and attitudes of children

Model	Age	Have seen lemurs	Exposed to EE	AICc	ΔAICc	Weight
Children's knowledge						
1	x	x	x	647.81	0	0.99
2		x	x	661.91	14.09	0.00
3	x	x		662.80	14.99	0.00
4			x	674.05	26.23	0.00
5	x		x	713.75	65.93	0.00
Children's attitude						
1	x	x	x	942.79	0	0.543
2	x		x	944.77	1.97	0.202
3		x	x	945.05	2.26	0.175
4			x	946.66	3.86	0.0786
5	x	x		956.88	14.09	0.00

Models are ranked by ΔAICc.
ΔAICc, Akaike's information criteria; EE, environmental education.

there was no evidence of a link between parent's attitude and that of their child (as measured by this study) (Table 3). The confidence intervals suggest these are weak relationships (Fig. 4b).

Discussion

Lemur knowledge and attitudes in the study region

Parents were generally better able to identify lemur species than children. The proportion of respondents who could correctly name a specific species varied between species. A very low proportion of people not exposed to the environmental education were aware that lemurs are protected by law (17% of parents and 35% of children). This confirms other recent studies that also found low levels of awareness of the law protecting lemurs in Madagascar, despite the fact that this law has been in place for more than 50 years (Keane *et al.*, 2011). In a study in the Ambohimahamasina commune (south-east Madagascar), 542 people were asked to classify 23 local species (including 14 protected species) into Madagascar's protection categories (protected species, game species or nuisance species). For protected species, only 56% of responses were correct (Keane *et al.*, 2011). Another study in Eastern Madagascar found that between 60 and 90% of people in a remote commune believed they

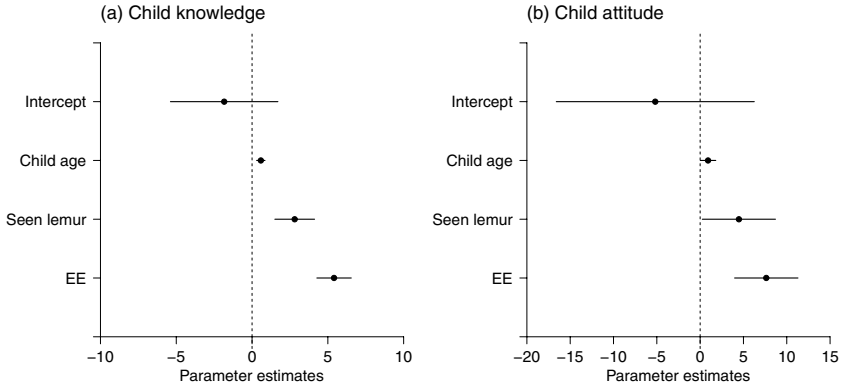

Figure 3 Parameter estimates showing predictors of children's knowledge about lemurs (a) and attitude towards lemurs (b), estimated from the most highly supported model. Both children's knowledge and attitudes are positively impacted by environmental education, age and whether the child has seen a lemur or not. The central circles are coefficient estimates for each parameter. Lines indicate 95% confidence intervals. EE, environmental education.

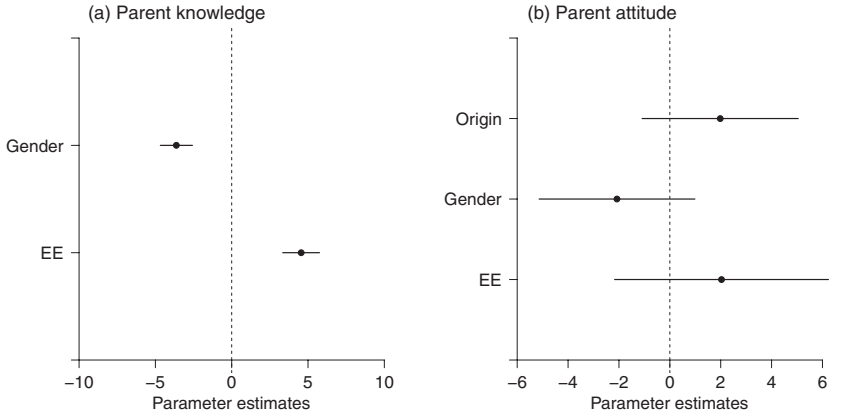

Figure 4 Parameter estimates showing predictors of parent's knowledge about lemurs (a, intercept = 12.48 ± 0.42, 95% confidence interval) and attitude towards lemurs (b, intercept = 12.79 ± 0.57, 95% confidence interval). If the village was exposed to environmental education, parents have higher knowledge about lemurs. The central circles are coefficient estimates for each parameter. Lines indicate 95% confidence intervals. EE, environmental education.

Table 3 Summary of the five most highly supported models developed to assess the impact of EE on parents' knowledge and attitudes

Model	Child knowledge	Gender	Parent education	Origin	EE	AICc	ΔAICc	Weight
Parents' knowledge								
1		x			x	558.31	0.00	0.80
2	x	x			x	563.76	5.45	0.05
3	x	x	x	x	x	564.80	6.49	0.03
4	x	x	x		x	564.98	6.67	0.03
5	x	x	x		x	564.98	6.67	0.03
Parents' attitude								
1		x		x	x	688.28	0.00	0.33
2		x			x	690.46	2.18	0.11
3			x		x	690.52	2.24	0.11
4				x	x	690.63	2.34	0.10
5	x	x	x	x	x	691.85	3.57	0.05

ΔAICc, Akaike's information criteria; EE, environmental education.

could legally eat lemurs; this figure was lower in communes around the Ambatovy mine who had been exposed to environmental education, but the majority (>50% for all species considered) believed lemur consumption was legal (Randriamamonjy, 2013). It is perhaps unsurprising that so many rural Malagasy are unaware of the protected status of lemurs, given the relatively low influence of the state in people's lives in some regions, and the relatively low capacity for enforcement of environmental law by the Malagasy government given the many demands on their resources (Rakotoarivelo *et al.*, 2011). It is important to note that in many areas, some lemur species are at least partially protected by traditional rules (*fady*, a type of taboo; Jones, Andriamarovololona & Hockley, 2008), although recent reports suggest that protective *fady* are rapidly eroding in parts of Madagascar (Jenkins *et al.*, 2011).

Respondents in our study reported very different attitudes towards the different lemur species in the study. The pattern though was very similar between parents and children, with positive attitudes towards the large diurnal species such as the indri and the sifaka and more negative attitudes towards the unusual looking aye-aye. Negative

attitudes towards aye-aye have been reported before. For example, they are considered a bad omen by people in the north of Madagascar (Simons & Meyers, 2001). Large, diurnal lemurs (particularly those with a more upright pose) are considered by some to be human ancestors and so revered (Jones *et al*., 2008). In our study area, respondents (especially adults) strongly identified eastern bamboo lemur as a crop raider, saying it damaged rice crops by feeding on the heads of ripe grain before harvest. We do not have independent information on the extent to which crop raiding by bamboo lemurs is a problem in this area (or other areas in Madagascar), but it would be worth further study as it is well known that species identified as crop pests are at higher risk of persecution (Lee & Priston, 2005). A number of lemurs have been reported as crop raiding in the past, including *Lemur catta* (sweet potato leaves; LaFleur & Gould, 2009) *Eulemur macaco* (fruit; Simmen *et al*., 2007), and species in the genera *Propithecus*, *Lepilemur*, *Avahi* and *Daubentonia* (Lee & Priston, 2005).

Evidence for impact of environmental education on children

A striking result of this research is that a year after the environmental education, participating children had higher knowledge levels and more positive attitudes towards lemurs than children with no exposure to the programme. The majority of studies evaluating the impact of environmental education are carried out immediately after exposure to the education activities (Jensen, 2014). This is one of the few studies that show increased knowledge and more positive attitudes can be maintained medium term after an environmental education programme took place. Although we cannot determine causation, this encouraging result suggests that even a single-day environmental education programme can have a lasting influence. Another interesting finding is that if a child has seen a lemur, they are more likely to have positive attitudes towards lemurs, supporting a widespread belief that direct experience of nature is an important component of improving environmental understanding (Kruse & Card, 2004; Farmer, Knapp & Benton, 2007).

Evidence for intergenerational knowledge transfer

There is an implicit, or sometimes explicit, assumption in environmental education focused on children that the benefits may be passed from children to adults. This is appealing as it would increase the efficiency of education activities if parents learnt from their children (Ballantyne, Fien & Packer, 2001; Damerell *et al*., 2013). Programmes which incorporate materials for children to take home, such as homework, and are thought to be more successful at promoting intergenerational knowledge transfer (Duvall & Zint, 2007). For example, Vaughan *et al*. (2003) show how providing colouring books about the environmental education target species (in this case scarlet macaws) can encourage children to communicate with parents about their learning experience. We show that the parents in villages exposed to environmental education had a higher level of knowledge (as measured in this study) than parents in villages not exposed. However, we did not find a relationship between the level of knowledge of a parent's own children and the parent's knowledge. The environmental education that was the focus of this study did not include any formal attempt to encourage children to talk to their parents. Without qualitative research following up with individual parents, it is difficult to infer the mechanism by which knowledge was transferred, but we suggest that adults in the community were likely to have discussed the education going on, even if not directly or exclusively with their own children. Further research that evaluates the impact of different approaches on intergenerational transfer would provide insight into effectiveness and cost-benefits of different approaches.

Limitations and caveats

An obvious caveat to this study is that our results depend on the villages being similar in terms of levels of knowledge and attitudes towards lemurs before the environmental education that Madagasikara Voakajy carried out, and that they have been similarly exposed to any relevant interventions by conservation organizations or government since. Mangabe is a new protected area without a long history of research or conservation. Madagasikara Voakajy is the legal manager of the protected area, and as such is aware of any activities by other NGOs in the area. They are working closely with the Ministry of Environment and Forests and would know of relevant enforcement or engagement activities. Of course, it is possible that the schools implemented different activities (e.g. through the personal interest of a teacher), but Madagasikara Voakajy found no evidence for such a difference despite careful enquiries. It is also important to note that this study focuses on a very simple measure of knowledge (knowledge of names, basic biology and protected status). We did not in any way seek to measure or investigate traditional ecological knowledge, which of course may be much deeper and more nuanced that what was measured in this study. We simply measure whether the information communicated during the environmental education programme was retained.

Another important caveat is that we make no claims as to the impact of this environmental education on damaging behaviour (such as bushmeat hunting or consumption) among the communities. Environmental education is often promoted as a way of increasing knowledge about biodiversity and biodiversity loss, and thus improving environmental attitudes and support for conservation (Dunlap *et al*., 2000; Salafsky *et al*., 2002). This progression from knowledge (the level of accurate information) to attitudes and behaviour is described as the 'knowledge-deficit model' (Durant, Evans & Thomas, 1989; Arcury, 1990; Kaiser, Wölfing & Fuhrer, 1999). Some studies using the knowledge-deficit model show a strong linear relationship between environmental

knowledge and attitudes (Sturgis & Allum, 2004; Allum *et al*., 2008). However, a range of factors besides knowledge and attitudes can also influence behaviour, including religious beliefs and feelings of responsibility (Conner & Armitage, 2006). Consequently, the knowledge-deficit model has received criticism for its simplification of the complex relationships between knowledge, attitudes and behaviour (Brunk, 2006; Heberlein, 2012). In this study, we collected no information about individual behaviours (e.g. propensity to hunt or eat lemurs). Studying such sensitive behaviours is indeed very challenging (Razafimanahaka *et al*., 2012) and was beyond the scope of this paper.

Despite these caveats, we believe that given the ongoing interest in environmental education in countries like Madagascar, a study reporting evidence on whether it meets its objectives of improving factual knowledge about, and attitudes towards, lemurs is still valuable.

Strengthening environmental education in Madagascar

Despite numerous calls for increasing the quality and quantity of environmental education in school curricula around the world (Monroe, 2003; Jacobson *et al*., 2006), there is concern that schools, especially in poor countries with high biodiversity, lack the human resources to implement effective environmental education, or do not prioritize training their teachers in this area because of understandable pressure on their budgets. Many teachers in Madagascar lack the confidence and knowledge to coordinate environmental education programmes (Ratsimbazafy, 2003; Dollins *et al*., 2010). There have been a number of very successful environmental education programmes in Madagascar where researchers have engaged with local schools and communities. In 2005–2007, Madagasikara Voakajy designed modules to integrate bat conservation in the primary school curriculum with educators from the Ministry of Education. By 2007, 129 teachers from four districts were trained in using the modules, and initiatives were taken locally to reduce bat hunting. Patel, Marshall & Parathian (2005) report on an education programme around Marojejy National Park, where presentations about silky sifaka behaviour, ecology and conservation threats were made to school children. More recently, Duke Lemur Center is working closely with two school districts to develop a teacher training manual (aligned to the existing primary school curriculum) and train teacher-trainers and teachers in using the manual (SAVA, 2012) Similar projects are run by the community association Mitsinjo (www.mitsinjo.org), which particularly emphasizes the importance of giving children firsthand experience of lemurs. A series of illustrated books about lemurs that live in Malagasy is produced and distributed by the Ako project. The recently published International Union for Conservation of Nature (IUCN) lemur conservation strategy (Schwitzer *et al*., 2013) calls for significant investment to scale up these sorts of initiatives in Madagascar.

Conclusion

We have shown that a 1-day environmental education session run by a small Malagasy conservation NGO in primary schools in the eastern rainforest of Madagascar had a measurable effect after 1 year on children's knowledge about, and attitudes towards, lemurs. Children exposed to environmental education also appear to influence parents' knowledge about lemurs, although we found no impact on parents' attitudes (which were generally quite positive). If a child has seen a lemur, they are more likely to have positive attitudes towards lemurs, supporting a widespread belief that direct experience of nature is an important component of improving understanding. In common with many high-biodiversity poor countries, Madagascar's education system lacks sufficient funds to arrange visits to forest areas to view lemurs, even for teachers, and many teachers lack the confidence and knowledge to run effective in-class environmental education. This study provides evidence to support conservation researchers collaborating with schools to help improve the knowledge and attitudes of children towards their nation's wildlife.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Figure S1. Knowledge that hunting lemurs is illegal children and parents exposed (EE) and not exposed to environmental education (no EE).
Table S1. Questions used to measure knowledge in this study.
Table S2. Statements used to measure attitudes among children and adults.