

## The Rufford Small Grants Foundation

### Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

Grant Recipient Details	
<b>Your name</b>	Ledis Regalado Gabancho
<b>Project title</b>	Ferns and lycophytes of Sierra de Cajálbana, Protected Area Mil Cumbres, Cuba, emphasizing in endemic, threatened, expansive and invasive species
<b>RSG reference</b>	9675-1
<b>Reporting period</b>	April 2011 – April 2012
<b>Amount of grant</b>	£ 6000
<b>Your email address</b>	<a href="mailto:ledisregalado@ecologia.cu">ledisregalado@ecologia.cu</a>
<b>Date of this report</b>	22 April 2012

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To provide an updated inventory of ferns and lycophytes of this area for vegetation sort			x	
To prepare an identification guide of ferns and lycophytes with pictures of species			x	We also prepared and distributed a guide of all invasive species, including flowering plants
To document the updated distribution in Sierra de Cajálbana of expansive and invasive fern species by producing GIS maps as a diagnostic of infested surfaces			x	We also documented distribution of all invasive species including flowering plants

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

N/A

3. Briefly describe the three most important outcomes of your project.

**a. Inventory of ferns and lycophytes of Sierra de Cajálbana, La Palma, Pinar del Río**

A total of 35 species were recorded in Sierra de Cajálbana during the field work. Before starting the prospection 14 species of 11 families of ferns and lycophytes had being collected in this range; these specimens are conserved at HAC, HAJB and BSC herbaria (Appendix 1). From these species, only the endemic *Adiantopsis asplenioides* and *Danaea nodosa* could not be relocated.

In total, 23 species of 13 families of ferns and lycophytes constitute new records to Sierra de Cajálbana (Appendix 1).

From the 35 species recorded, 28 were found growing in gallery forests, seven in pine forests, six in evergreen shrubwoods, three in secondary pine forest, while other six are ruderal (Appendices 1 and 2).

**b. Endangered, invasive and expansive species**

- **Endangered species** - Two threatened species were previously reported for Sierra de Cajálbana, *Adiantopsis asplenioides*, with the category of Critically Endangered and *Notholaena ekmanii*, a Vulnerable species (Appendix 1). *Adiantopsis asplenioides* was not relocated during this prospection and its last record from this area is December 3rd 1949. *Notholaena ekmanii* has not being collected since August 1954. On December 21st

2011, we found a small population (three mature individuals), growing rupicolous, in small fissures of a 3m high serpentine wall, close to a gallery forest.

- **Invasive species** – Four invasive species (*Macrothelypteris torresiana*, *Nephrolepis hirsutula*, *Pteris vittata* and *Thelypteris dentata*) of ferns and lycophytes were recorded in Sierra de Cajálbana, which are 11% of this group of plants in this area. *Nephrolepis hirsutula* can be commonly found in conserved and degraded pine forests. This is an alert because this species have displaced almost completely native species in herbaceous stratum of some pine forests in Eastern Cuba. *Macrothelypteris torresiana* and *Thelypteris dentata* were found in few places of gallery forest along Tortuga River. 10 individuals of *Pteris vittata* were found in a path. Other 16 invasive species of flowering plants were also recorded (Appendices 1 and 3). The most extended and noxious species are *Syzygium jambos* in gallery forests and *Hyparrhenia rufa* in deforested pine forests.
- **Expansive species** – Although we expected to find species of Gleicheniaceae as *Dicranopteris flexuosa* and the Dennstaedtiaceae *Pteridium caudatum* as the most expansive ferns, as occur in serpentine ranges in eastern Cuba, the most extended native species in Sierra de Cajálbana is the endemic *Odontosoria wrightiana*. *Dicranopteris flexuosa* is sporadically present in pine forests of Sierra de Cajálbana, while *Pteridium caudatum* is also acting as expansive in this kind of forest, but occupies a considerably less surface than *O. wrightiana* (Appendix 4).

**c. Documenting the updated distribution in Sierra de Cajálbana of expansive and invasive fern species by producing GIS maps as a diagnostic of infested surfaces**

Updated satellite pictures of Sierra de Cajálbana were used to identify and digitise all vegetation types, rivers and streams, as well as ways and paths. Geo-referenced information gathered during field work was assessed as part of Geographic Information System. Distribution of *Odontosoria wrightiana* as most extended expansive fern species and distribution of all plant invasive species in the most affected areas around Cajálbana Community were represented in maps as part of the report about expansive and invasive species (Appendix 4).

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

Local community of Cajálbana has benefitted from the project because booklets of identification for ferns and lycophytes as well as for invasive plants are available in local school and library.

**5. Are there any plans to continue this work?**

Yes, we will continue monitoring invasive species on this area together with the staff of Protected Area Mil Cumbres; we are planning to assess mechanical and biological control of *Syzygium jambos* in Tortuga River and to record data about native flora of gallery forests in this area, to contribute to their restoration. We plan also to continue searching the endangered endemic fern *Adiantopsis asplenioides*.

## 6. How do you plan to share the results of your work with others?

First of all, results were presented to the staff of Protected Area Mil Cumbres to contribute to the design of their management plans. Two students were capacitated in identification of ferns and lycophytes, as well as invasive flowering plant species.

Two papers are in preparation: a short communication about the new records of ferns and lycophytes for Sierra de Cajalbana, emphasising on the relocation of the endangered endemic *Notholaena ekmanii* after 57 years. The other paper focuses on situation of invasive species within the area with key information for management.

## 7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

The RSG was used over 12 months from April 2011 to April 2012.

## 8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Transport	200		200	We decided to travel always by car because the bus to La Palma has a schedule always in the evening, not convenient to our work
Food supplies	1500	1390	110	Prices of goods varied
Fuel	500	700	-200	We used all the budgeted amount for transportation in this item
GPS	200	200		
Magnifying glass	200		200	We could not accede to buy magnifying glasses; they are not available in Cuba and it was not possible for us to buy them outside. We used this budgeted amount to print guides for invasive species
Tent	50	49	1	
Laptop	700	750	-50	Market price varied
Printer	350	250	100	Market price varied
Printer toners	200	200		
Digital Camera	700	690	10	Market price varied
Macro conversion lens	750	799	-49	Market price varied
Office Sheets	100	100		
Cardboards	150	150		
Guide publishing	400	710	-310	During the work, we found very important to divulge what an invasive species is and which species are invading this area. That is why we used the quantity destined to print the posters, the difference of budget in

				food supplies and the quantity destined to magnifying lens to print the guide for invasive plants
Total	6000	5978	12	I received the budget in Euros (€), with local exchange rate of 1.40142.

**9. Looking ahead, what do you feel are the important next steps?**

- Conducting an on-going prospection of invasive and expansive plant species in Cuba, recording distribution and biological data, not only for ferns and lycophytes but also for flowering plants.
- Completing inventories of ferns and lycophytes in other natural regions in Cuba, emphasising in relocation of endemic and endangered species and gathering relevant information of their natural history for their conservation.

**10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

RSGF logo was used in identification guides and the report to the protected area Mil Cumbres staff.

## Appendix 1

Ferns and lycophytes recorded from Sierra de Cajálbana in HAC, HAJB and BSC herbaria.

Species	Family	Category	Last year collected
1. <i>Adiantopsis asplenioides</i> Maxon	Pteridaceae	endemic, threatened CR (Sánchez et al. 2006 b and Urquiola et al. 2010, following IUCN 2001)	1949
2. <i>Adiantum fragile</i> Sw.	Pteridaceae		1968
3. <i>Anemia adiantifolia</i> (L.) Sw.	Anemiaceae		1949
4. <i>Anemia coriacea</i> Griseb.	Anemiaceae		1980
5. <i>Blechnum serrulatum</i> Rich.	Blechnaceae		1950
6. <i>Danaea nodosa</i> (L.) Sm.	Marattiaceae		1976
7. <i>Dicranopteris flexuosa</i> (Schrad.) Underw.	Gleicheniaceae	expansive following the criteria of Pyšek et al. (2004), Richardson et al. (2011)	1971
8. <i>Nephrolepis hirsutula</i> (G. Forst.) C. Presl	Nephroepidaceae	invasive (Oviedo et al. 2012) following the criteria of Pyšek et al. (2004), Richardson et al. (2011)	2007
9. <i>Notholaena ekmanii</i> Maxon	Pteridaceae	endemic, threatened VU (Sánchez et al. 2006 b and Urquiola et al. 2010, following IUCN 2001)	1954
10. <i>Odontosoria wrightiana</i> Maxon	Lindsaeaceae	endemic, expansive following the criteria of Pyšek et al. (2004)), Richardson et al. (2011)	1969
11. <i>Phlebodium aureum</i> (L.) J. Sm.	Polypodiaceae		1966
12. <i>Pteridium caudatum</i> (L.) Maxon	Dennstaedtiaceae	expansive following the criteria of Pyšek et al. (2004), Richardson et al. (2011)	1965
13. <i>Selaginella plumosa</i> (L.) C. Presl	Selaginellaceae		1996
14. <i>Thelypteris patens</i> (Sw.) Small	Thelypteridaceae		1976

Ferns and lycophytes recorded from Sierra de Cajalbana between April 2011 and April 2012. New records are marked with asterisk (\*).

Species	Family	Category	Pine Forest	Shrub-wood	Gallery Forest	Secondary pine forest	Ruderal
1. <i>Adiantum cristatum</i> L. *	Pteridaceae				X		
2. <i>Adiantum fragile</i> Sw.	Pteridaceae				X		
3. <i>Adiantum pyramidale</i> L. *	Pteridaceae				X		
4. <i>Anemia adiantifolia</i> (L.) Sw.	Anemiaceae				X		
5. <i>Anemia coriacea</i> Griseb.	Anemiaceae			X	X		
6. <i>Blechnum appendiculatum</i> Willd. *	Blechnaceae				X		
7. <i>Blechnum serrulatum</i> Rich.	Blechnaceae		X		X		
8. <i>Campyloneurum phyllitidis</i> (L.) C. Presl *	Polypodiaceae				X		
9. <i>Dicranopteris flexuosa</i> (Schrad.) Underw.	Gleicheniaceae		X		X		
10. <i>Doryopteris pedata</i> (L.) Fée *	Pteridaceae				X		
11. <i>Lycopodiella cernua</i> (L.) Pic. Serm. *	Lycopodiaceae				X		
12. <i>Lygodium cubense</i> Humb. & Bonpl. ex Willd. *	Lygodiaceae	endemic		X			
13. <i>Macrothelypteris torresiana</i> (Gaudich.) Ching *	Thelypteridaceae	invasive			X		
14. <i>Microgramma heterophylla</i> (L.) Wherry *	Polypodiaceae				X		
15. <i>Nephrolepis exaltata</i> (L.) Schott *	Nephroepidaceae		X				
16. <i>Nephrolepis hirsutula</i> (G. Forst.) C. Presl	Nephroepidaceae	invasive	X			X	
17. <i>Notholaena ekmanii</i> Maxon	Pteridaceae	endemic			X		
18. <i>Odontosoria wrightiana</i> Maxon	Lindsaeaceae	expansive	X	X	X		
19. <i>Pecluma plumula</i> (Humb., Bonpl. ex Willd.) M. Price *	Polypodiaceae				X		
20. <i>Phlebodium aureum</i> (L.) J. Sm.	Polypodiaceae				X		
21. <i>Pityrogramma calomelanos</i> (L.) Link *	Pteridaceae		X			X	X
22. <i>Pleopeltis polypodioides</i> (L.) E.G. Andrews & Windham *	Polypodiaceae				X		
23. <i>Serpocaulon triseriale</i> (Sw.) A.R. Sm. *	Polypodiaceae				X		
24. <i>Pteridium caudatum</i> (L.) Maxon	Dennstaedtiaceae	expansive	X			X	
25. <i>Pteris vittata</i> L. *	Pteridaceae	invasive					X
26. <i>Selaginella plumosa</i> (L.) C. Presl	Selaginellaceae			X			X

27. <i>Selaginella serpens</i> (Desv.) Spring *	Selaginellaceae			x	x		
28. <i>Selaginella cf. armata</i> Baker *	Selaginellaceae			x	x		
29. <i>Selaginella urquiolae</i> Caluff *	Selaginellaceae	endemic			x		
30. <i>Sphaeropteris myosuroides</i> (Liebm.) R. M. Tryon *	Cyatheaceae				x		
31. <i>Thelypteris augescens</i> (Link) Munz & I. M. Johnst. *	Thelypteridaceae				x		x
32. <i>Thelypteris dentata</i> (Forssk.) E. P. St. John *	Thelypteridaceae	invasive			x		
33. <i>Thelypteris hispidula</i> (Decne.) C. F. Reed *	Thelypteridaceae				x		x
34. <i>Thelypteris obliterated</i> (Sw.) Proctor *	Thelypteridaceae				x		
35. <i>Thelypteris patens</i> (Sw.) Small	Thelypteridaceae				x		x



Invasive species recorded from Sierra de Cajálbana between April 2011 and April 2012, according to the criteria in Oviedo et al. (2012) and Regalado et al. (2012).

Species	Family	Pine Forest	Shrub-wood	Gallery Forest	Secondary pine forest	Ruderal
1. <i>Acacia farnesiana</i> (L.) Willd.	Mimosaceae				x	
2. <i>Argemone mexicana</i> L.	Papaveraceae					x
3. <i>Casuarina glauca</i> Sieb.	Casuarinaceae				x	
4. <i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Mimosaceae	x			x	
5. <i>Eucalyptus</i> sp.	Myrtaceae	x				
6. <i>Hyparrhenia rufa</i> (Nees) Stapf	Poaceae	x			x	
7. <i>Macrothelypteris torresiana</i> (Gaudich.) Ching	Thelypteridaceae			x		
8. <i>Mangifera indica</i> L.	Anacardiaceae	x			x	
9. <i>Mimosa pigra</i> L.	Mimosaceae			x		
10. <i>Mimosa pudica</i> L.	Mimosaceae					x
11. <i>Momordica charantia</i> L.	Cucurbitaceae					x
12. <i>Nephrolepis hirsutula</i> (G. Forst.) C. Presl	Nephrolepidaceae	x			x	
13. <i>Oeceoclades maculata</i> (Lindl.) Lindl.	Orchidaceae			x		
14. <i>Psidium guajava</i> L.	Myrtaceae	x			x	
15. <i>Pteris vittata</i> L.	Pteridaceae					x
16. <i>Spathodea campanulata</i> P. Beauv.	Bignoniaceae				x	
17. <i>Syzygium jambos</i> (L.) Alston	Myrtaceae			x		
18. <i>Thelypteris dentata</i> (Forssk.) E. P. St. John	Thelypteridaceae			x		
19. <i>Urena lobata</i> L.	Malvaceae				x	x
20. <i>Zoysia matrella</i> (L.) Merr.	Poaceae				x	x

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7. Urquiola A., L. González-Oliva, R. Novo and Z. Acosta. 2010. *Libro Rojo de la Flora Vasculare de la Provincia Pinar del Río*. Publicaciones Universidad de Alicante, Alicante.