

## The Cycad Society Grant application

Population status and life history of *Zamia* in Chocó-Colombia hotspot

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Partial funding would be acceptable

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## Proposal

### **a. Abstract**

The Chocó region of western Colombia is one of the top biodiversity hotspots due to its levels of endemism, diversity, and biological complexity. However, the ongoing deforestation rates throughout the Chocó due to logging and agriculture expansion will unavoidably have pervasive impacts of the diversity and distribution of its flora and fauna. Moreover, the alarming levels of poverty of local communities and the scarcity of sustainable economic alternatives increase the pressure over forest resources every day. Since 1990, though, the CIB has developed a conservation program with the communities of this region as we understand that the conservation of the Chocó pluvial forests is only possible with the implementation of feasible and sustainable economic alternatives for the local communities on the basis of good science.

In the gardens and backyards at Coquí, a small Chocó town near the Pacific coast, *Zamia* plants (Cycadales: Zamiaceae) commonly grow. The enigmatic and attractive nature of these rare plants have prompted a burgeoning trade, specially with tourists and outsiders. We have reported five species of *Zamia* in the region, 4 of which are Critically Endangered according to the Red Data Book of the Plants of Colombia (Calderon *et al.* 2005, Donaldson 2003). Nothing is known, however, on the demographic impact of this exploitation. This project aims to provide a comprehensive assessment of the population status and life history of *Zamia* species in order to promote sustainable alternatives to the community of Coquí that helps reduce the impact of the current trade on *Zamia* populations.

### **b. Description of the project**

Study site Coquí is located in the Colombian Chocó Region near to Pacific coast. The first step is to review herbaria collection and bibliographic references. Carry on workshops in at least two strategic sites before starting the field exploration will also be part of the first step. The second step involves the identification of *Zamia* populations through field exploration and interviews with local people in Coquí area. The *Zamia* individuals recorded will be marked and geo-referenced during four months. Information of each individual found such as its life-cycle stage (seedling, juvenile, non-reproductive adult and reproductive adult), germination rate, and distance between individuals will be recorded and used to build up a demographic model. Information about forest structure, conservation state and soil description will be added.

The classification of life-cycle stages will be based on the size rather than on the age. These stages can be determined based on leaf number, leaflet number, and caudex size (e.g. Clark and Clark 1987; Negron-Ortiz and Gorchoy 2000). In-situ germination rate experiments will be performed by counting how many seedlings

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have germinated and survived (by the time of the census) from the pool of seeds collected (e.g. see Negron-Ortiz and Gorchoy 2000). Herbivory will be assessed as the percentage of foliar area missed at the time of exploration. Additionally, herbivores and potential pollinator insects will be collected and taxonomically identified (González 2004). Data analysis can be performed using statistical packages designed for demographic analysis.

The seedlings resulting from the germination rate experiments, will be donated to botanical gardens with gene-bank programs and to local schools and communal houses that show interest and compromise with plant conservation.

### Reference

- Calderón E., Galeano G. y García N. 2005. Libro rojo de plantas de Colombia Vol II. Palmas, frailejones y zamias. Instituto Alexander von Humboldt, Instituto de Ciencias Naturales-Universidad Nacional de Colombia, Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Bogotá.
- Clark D. A. and Clark D. B. 1987. Temporal and environmental patterns of reproduction in *Zamia skinneri*, a tropical rain forest cycad. *Journal of Ecology* 75:135-149.
- Donaldson, J. S. 2003. Status Survey and Conservation Action plan: Cycads. Pp. 86. IUCN/SSC Cycads Specialist Group. IUCN, Glan, Switzerland and Cambridge, UK.
- Gonzales F. 2004. Herbivoría en una gimnosperma endémica de Colombia, *Zamia encephalartoides* (Zamiaceae) por parte de eumaeus (Lepidoptera:Lycaenidae). *Rev. Acad. Colomb. Cienc* vol 28, 1007:233-243
- Negron-Ortiz, V., and D. L. Gorchoy. 2000. Effects of fire season and postfire herbivory on the cycad *Zamia pumila* (Zamiaceae) in slash pine savanna, Everglades National Park, Florida. *International Journal of Plant Sciences* 161:659-669.
- Tang W. Donaldson J.S. and Walters T. 2003. A Unifying Framework for Cycad Conservation In: Donaldson, J. S. 2003. Status Survey and Conservation Action plan: Cycads. Pp. 86. IUCN/SSC Cycads Specialist Group. IUCN, Glan, Switzerland and Cambridge, UK.
- Raimondo, D. C., and J. S. Donaldson. 2003. Responses of cycads with different life histories to the impact of plant collecting: Simulation models to determine important life history stages and population recovery times. *Biological Conservation* 111:345-358.

### ***c. Statement of how the project fits the interests of TCS***

Conservation of *Zamia* species will be taken as a model for conservation of natural resources in the Chocó, The evolution and ecology of these ancient plants are intriguing and so it's the conservation in a area of high exploitation. The lack of information on the demographic impact of this exploitation in the Chocó region prevents any planned conservation effort. A comprehensive assessment on *Zamia* population status, viability, and natural history would be the basis for sustainable initiatives that offer better opportunities to local people and would serve as a model for conservation in the region. In addition, documenting the distribution and current population status of the endangered species would support the establishment of protected areas. By involving the local communities in the development of this conservation project we expect to consolidate a permanent program in the area.

### ***d. Proposed timetable for entire project from start date to completion date***

Activities:

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- a. Workshops and fieldwork involvement will encourage local people to participate actively in the conservation of *Zamia* and will let them appreciate their intrinsic value.
- b. Surveys to locate populations and quantify the demographic parameters of *Zamia* species.
- c. Based on the above studies, identify threats inherent to the life history of *Zamia* species and propose recommendations to mitigate the impact of exploitations.
- d. To produce a brochure for conservation organizations that includes guidelines for the sustainable conservation of *Zamia* species in the Chocó.
- e. Final report
- f. Herbaria and reference review

#### Time Schedule

Month	1	2	3	4	5	6
a	x					
b	x	x				
c	x	x	x	x		
d					x	
e					x	
f						x

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**e. Detailed budget for the entire project, including:** 1) a listing of all other sources from which funds are currently being sought for the proposed project, 2) any support already confirmed or received, and 3) amount being requested through the application

<b>Heading</b>	<b>Details</b>	<b>Total cost</b>	<b>Requested or obtained from other sources*</b>	<b>Requested from The Cycad Society Grant</b>
<b>Travel</b>				
- local	Air travel: Medellín-Chocó-Medellín (US\$94 ticket price)	94		94
	Local transport (boat)	200	100	100
<b>Logistics</b>				
-accommodation	During fieldtrip exploration (US\$ 5 day X 120 days)	600		600
-subsistence	During fieldtrip exploration (US\$4 x 120 days)	480		480
	Local guide remuneration (US\$4.5 day x 120 days)	540		540
<b>Materials</b> -equipment	Global Positioning Systems (GPS)	200	200	
	Fieldtrip (metric tape, notebooks, calipers, hardboard clipboard)	20		20
<b>Communication</b>	Brochure (USD\$ 0.045 unit x1000 units)	45		45
<b>Researcher salary</b>	(monthly: USD\$ 406.2 x 6 months)	2412	2412	
<b>TOTAL COST</b>		<b>4591</b>		
<b>Requested or obtained from other sources</b>			<b>2677</b>	
<b>Requested from Cycads Society</b>				<b>1879</b>

\*Corporación para Investigaciones Biologicas (CIB)