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Newsletter of the IUCN/SSC Amphibian Specialist Group

Habitat change and amphibian conservation in the Atlantic Forest of Bahia, Brazil

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Idyllic weather invites an early morning walk on the sandy beaches of the coast of Bahia. Tourists experiencing the beach can't imagine that about 10 cm below the sand surface lies a tiny frog – the four eyed frog (*Pleurodema diplolistris*). This anuran digs into the clean, clear sand, searching for moisture and escaping the heat of the day. Every year thousands of people visit this part of the country; this increasing popularity is stimulating all types of human development, which results in severe habitat change and loss.

Restinga

The northeast of Bahia houses a unique ecosystem – the Restinga. Bahia contains around 4% of all Restinga in Brazil (SCHINEIDER and TEIXEIRA, 2001), including a portion of this habitat in the Atlantic Forest, classified as a high biological importance area (SOS, 2008).

***Four eyed frog,* Pleurodema diplolistris**

VOL 89 OCT 2008

WHAT'S INSIDE

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Because the Restinga is a hot and dry ecosystem, amphibians have specific requirements for the resources there. The maintenance of these habitats is crucial for the conservation of this biodiversity (ROCHA et al., 2007). As a result of their adaptations and environmental quality requirements, habitat degradation and loss represent a big threat to frogs.

Tourists can't imagine that 10cm below the surface of the sand lies a tiny frog

There is a pressing need to measure to what extent habitat changes are affecting amphibian populations and communities, and find out which species are suffering its direct effects.

The aim of this study is to investigate the impact of habitat loss on anurans along 220 km of coast covering the entire current protected areas network.

Field work consists of surveying anurans within the region, classifying species threats and population dynamics, as well as applying environmental techniques to reduce habitat loss and minimize the risks to ecological communities, by preserving or restoring habitats.

We are covering 19 localities in eight coastal municipalities, from Salvador to Jandaíra on a long term study that began in January 2005 and is ongoing. The study area includes all Restinga habitat types (sand dune beaches; scrub vegetation; ponds; and dry forest).

These studies will help us to identify priorites for amphibian conservation within the region. Most of the protected areas allow sustainable use, which compromises species survival because of intense habitat change promoted by urban and tourism development. Therefore, understanding species geographic distributions is crucial to direct and reinforce conservation public policies.

In addition to environmental management, under the auspices of the Centro ECOA we are conducting the Pro-Restinga, an NGO project working alongside IBAMA (National Environmental Institute) and ICMBio (Chico Mendes Biodiversity Institute), to create protected areas in the region. These will represent the first PA's with integral protection and may serve as important refuge for endangered amphibians and other vertebrates. These areas are intended to cover 1/3 of the total Restinga range, with over 78,000 ha protected.

Allobates olfersioides

Leptodactylus troglodytes

There are some significant outcomes from the project: During the last three years we

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have censused over 2,000 individuals from 49 anuran and 1 caecilian species, representing over 5% of Brazilian diversity.

For the next three years, the project will focus on five target species. Our preliminary results indicate that these are the most threatened by the environmental loss in the region: *Allobates olfersioides*, *Phyllodytes melanomystax*, *Hyalinobatrachium eurygnathum*, *Pleurodema diplolistris* and *Leptodactylus troglodytes*. These frogs exhibit specific habitat use strategies within this ecosystem. The first three are closely tied to bromeliad species' (*Hohenbergia littoralis*, CR), endemic to this portion of the Atlantic Forest. *Pleurodema diplolistris* lives buried into the sand to escape dehydration, especially during the dry season, and *L. troglodytes* depends on the quality of permanent and temporary ponds throughout the year.

We have already found that *H. eurygnathum* (not previously described for the region), *Allobates olfersioides*, and *P. melanomystax* are strongly associated with bromeliad abundance, and where these plants are removed frogs are absent or exhibit very low abundance. However, even *P. diplolistris* and *L. troglodytes,* which occurred in high densities on preserved habitats, were absent from sites further south with more human pressure. Therefore, species were well represented in the far north, where human development has not yet resulted in extensive habitat change.

Hyalinobatrachium eurygnathum

General findings to date include:

- Landscape context is important for amphibians — conditions in the matrix influence their presence and abundance in remnants.
- Larger remnants supported more amphibians. However, smaller heterogeneous remnants were used by many species for shelter and breeding.
- Important interactions occurred between patches and amphibians. Many species occurred in the matrix because of the spatial juxtaposition of two landscape components (Restinga scrub and temporary pond).
- Structural complexity within Restinga (large scrub vegetation surrounded by "blow-outs" formations (MENEZES, 2007)) influenced the persistence of anurans, especially *P. melanomystax* which is endemic to the ecosystem in the states of Bahia and Sergipe (IUCN, 2008).
- We strongly recommend, in the short term, measures to create public and private protected areas, to preserve, study, monitor and describe population trends for these amphibian species in the region.

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Acknowledgements

We thank Centro ECOA –UCSAL – coordination for promoting amphibian conservation in Bahia; IBAMA for the partnership. APA de Mangue Seco management council, for the support; Lacerta Ambiental for the financial aids on projects; Dr. Richard Griffiths, DICE/Kent for helping on this article and especially the IUCN/SSC ASG for the opportunity.

Limb malformations in Microhylids in Mihintale, Sri Lanka

Anslem de Silva, W.P.R. Chandrathna, H.M.N. Chalaochani, M.M Gooneksekera, T.V Sundarabarathi & S. Nathaneal

Preliminary studies on malformations, abnormalities, injuries and parasitic infections in amphibians in the country by one of the authors (Anslem de Silva) have observed malformed and parasitic infected amphibians in several locations of the country. This communication is on the investigations conducted from May to August 2008 on congenital malformations in Microhylids inhabiting the campus park of the Rajarata University and within a one kilometre radius from the campus, located in Mihintale (80021' 11.7"N and 080 30' 09.6" E) in the dry zone lowlands (150-170 m above sea level), in Sri Lanka. The following malformations were identified using the guide by Meteyer (2000. Field Guide to Malformation of Frogs and Toads. Biological Science Report).

Figure 2. Ecotmelia in hind limb

Figure 1. Ectomelia in hind limb

FAMILY: MICROHYLIDAE Günther, 1858

Genus: Kaloula Gray, 1831

Kaloula taprobanica (Common bull frog) checked 21 specimens and malformations observed in 1 (5 %).

Genus: Microhyla Tschudi, 1838

Microhyla rubra (Red narrow mouth frog) checked 9 specimens and malformations observed in 1 (11 %)

***Figure 3. Ectrodactly in* Ramanella variegata**

Genus: Ramanella Rao and Ramanna, 1925

Ramanella variegata (White-bellied pug snout frog) checked 79 specimens and malformations observed in 9 (11%)

Genus: Uperodon Dumeril and Bibron, 1841

Uperodon systoma (Balloon

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***Figure 4. Missing finger in* Kaloula taprobanica**

frog) checked 8 specimens and malformations observed in 1 (13%)

Of the deformities observed in our preliminary series, three specimens of *Ramanella variegata* and one *Microhyla rubra* had ectromelia in the hind limb (Figure 1 & 2) and six specimens had missing digits (fingers and toes). Ectrodactyly in *Ramanella variegata* (Figure 3) and missing finger in *Kaloula taprobanica* (Figure 4). The first report on malformations of Ramanella variegata from Mihintale on missing fingers was reported by Chalalochni (2007). Radiography of the malformed frogs showed that the bones of the particular malformed limb when compared to the normal limb were smaller (Figure 5). A high rate of agrochemicals is used in agriculture and plantations (tea etc) in Sri Lanka. A number of research articles on malformations due to the effects of agrochemicals and Trematodes which acts at the 'limb-bud' during its formation are available in Froglog past issues. Pesticides and chemical fertilizers are used extensively in agriculture and plantations in Mihintale area where there are many paddy and maize fields and vegetable cultivations. Presently detail investigations are in progress on these aspects.

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Acknowledgements

The Amphibian Conservation Seed Grant to the first author and permission for the study granted by the Dept of Wildlife Conservation.

DAPTF Seed Grants

Tim Halliday

Recipients of DAPTF Seed Grants are generally expected to publish the results of their projects in refereed journals, or as articles in Froglog. The following papers report work supported by DAPTF Seed Grants awarded to Rebekah Gibble (2004) and Tibor Hartel (2004):

Gibble, R. E., Rollins-Smith, L. & Baer, K. N. (2008) Development of an assay for testing the antimicrobial activity of skin peptides against the amphibian chytrid fungus (Batrachochytrium dendrobatidis) using Xenopus laevis. Ecotoxicology & Envtl. Safety: 71; 506-513. (baer@ulm.edu)

Hartel, T. (2008) Weather conditions, breeding date and population fluctuation in Rana dalmatina from central Romania. Herpetol. J: 18; 40-44. (asobeka@gmail.com)

Possible competition between two frog species in the Seychelles Islands

Justin Gerlach

Six species of frog are recorded from the Seychelles islands, the four endemic Sooglossidae are all considered to be Vulnerable and are restricted to high forest. The other two species are largely lowland species. The tree frog Tachycnemis seychellensis is widespread in lowland marshes on four islands and is considered Least Concern, it also occurs along mountain rivers and streams. The Mascarene frog Ptychadena mascariensis is abundant in lowland habitats and was probably introduced in the 19th century.

Tree frog **Tachycnemis seychellensis**

Although the tree frog is frequently heard along mountain streams on Mahé, Praslin and La Digue and in lowland marshes on the latter two islands, it is very rarely encountered on Silhouette island. Over the past 10 years there have been only four sightings of the species on Silhouette, three from within the main settlement on the island. These have all been single adult females and no calling males have been located. In July 2008 a female was found near a stream in the settlement. Closer examination revealed the presence of larger tadpoles in the stream and some of these were collected and reared. Half of the tadpoles were Mascarene frogs and half tree frogs. The Mascarene frogs developed rapidly, leaving the water in a few days. In contrast, development of the tree frogs was extremely slow.

The two species are ecologically separated as adults (Mascarene frogs feeding in low vegetation and tree frogs feeding at least 1m above ground) and the mouthparts of the tadpoles indicate at least some larval nice separation. However, the extreme differences in developmental rate suggest that there is scope for significant competition between the larvae if resources are limiting. This may mean that the highly abundant, adaptable and fast developing Mascarene frogs may have the potential to exclude tree frogs. Competition could explain the scarcity of tree frogs in lowland areas of Silhouette where Mascarene frogs are highly abundant. Mascarene frogs have been recorded as far as 550m above sea level these have only been isolated individuals and it may unlikely that they will exclude tree frogs from higher altitudes. Research is continuing into the larval ecology of the two frogs to determine under which conditions competition may be important.

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Seven new species of Ecuadorian glassfrogs discovered: Future uncertain

Diego F. Cisneros-Heredia

Surveys developed by Ecuadorian researchers over the last two years resulted in the discovery of seven new species of Glassfrogs and the first country-reports of eight species (Cisneros-Heredia & McDiarmid, 2007 and citations therein; Bustamante et al. 2007; Cisneros-Heredia & Morales-Mite, 2008; Yánez-Muñoz & Cisneros-Heredia 2008; Cisneros-Heredia et al. in press). These studies were developed by the Museo Ecuatoriano de Ciencias Naturales (Ecuador's national museum), King's College London, and Universidad San Francisco de Quito in coordination with researchers from other institutions, i.e. US Geological Survey and Pontificia Universidad Católica del Ecuador.

Centrolene durrellorum ***© Mario Yánez-Muñoz***

Glassfrogs (family Centrolenidae) are endemic to tropical America and with over 140 species constitute one of the most diverse families (Frost, 2008). Currently, 46 species of Glassfrogs are known to inhabit Ecuador (Cisneros-Heredia and McDiarmid 2007; Coloma 2008; Frost 2008). Six of the new species (*Centrolene condor, Centrolene durrellorum, Centrolene mariaelenae, Cochranella amelie, Cochranella sp*. nov. Cisneros-Heredia et al. in press, *Nymphargus laurae*) and three of the recently recorded species (*Centrolene medemi, Cochranella oyampiensis, Hyalinobatrachium ruedai*) were found on eastern Ecuador, one of the least known areas in the country.

Nymphargus cochranae
© Roy McDiarmid

About 40% of the Centrolenidae are threatened by extinction, including three of the recently-described species: *Centrolene mariaelenae, Centrolene durrellorum*, and *Nymphargus laurae* (IUCN 2008). While diseases have been linked to some glassfrogs' population declines (e.g., Lips et al., 2006), causes for most declines are uncertain and remain poorly studied (Bustamante et al., 2005; IUCN 2008).

Centrolene Mariaelenae
© Jesse Delia

Rapid destruction of natural habitats is one of the most serious human-generated factors threatening biodiversity (IUCN, 2008). Deforestation alters energy budgets and water cycles, changing local climate patterns (Lawton et al., 2001). Despite being identified as a major threat for amphibians together with infectious diseases and climate change (Stuart et al., 2004; Lips et al., 2005); very few research and conservation efforts have focussed on the effects of habitat loss and the

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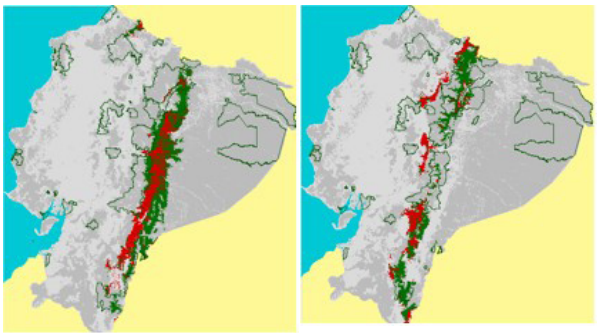
importance of in-situ conservation (Gardner et al., 2007; Bickford et al., 2008). Most attention has been on infectious diseases, their link with climate change and the development of expensive ex-situ initiatives (Lips et al., 2008; Mendelson et al., 2006; Pounds et al., 2006).

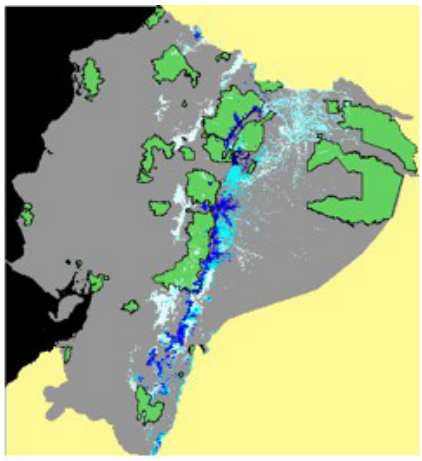
Hyalinobatrachium ruedai
© Diego F. Cisneros-Heredia

A study developed to predict the distribution of glassfrogs from eastern Ecuador and to estimate the impacts of deforestation (Cisneros-Heredia, 2008) show that deforestation may have already reduced up to 40% of the distribution ranges of all studied species. Models were developed using climate and elevation data at a resolution of 30 arc-seconds and the most recent deforestation map of Ecuador (2001). Results indicate that deforestation has intensively affected the eastern Andean foothills (300–800 m above sea level), upper montane forests and inter-Andean valleys (above 2000 m a.s.l.), and the northern Amazonian lowlands of Ecuador. Predictions suggest that almost half of the habitats suitable for *Centrolene audax*, *Centrolene buckleyi, Centrolene mariaelenae, Cochranella flavopunctata, Hyalinobatrachium pellucidum*, and *Nymphargus cochranae* have been deforested. These species have been reported as largely absent in historical localities and are considered threatened (Bustamante et al. 2005; Cisneros-Heredia and McDiarmid 2007; IUCN 2008).



Predicted distribution ranges for Cochranella flavopunctata (left) and Centrolene buckleyi (right). Green = Remaining areas; Red = Areas lost to deforestation; Dark Gray = Forested areas of Ecuador; Light gray = General Deforestation in Ecuador. Green lines = SNAP.

Habitat loss represents a significant factor that threatens the long-term conservation of amphibian populations, not just destroying natural ecosystems but greatly diminishing the capacity of species to adapt to future changes, such as climate change. It should be consider a primary factor in amphibian declines (Bickford et al. 2008) and not regarded beyond other threats such as diseases. In-situ conservation actions must be incorporated in every conservation plan and lead ahead of ex-situ actions. In Ecuador, public protected areas part of the National System of Protected Areas (SNAP) significantly mitigate the impact of habitat loss by conserving large areas with high species richness that in the future may help to miti-



Predicted deforestation in relation to the impacted centrolenid species richness. Green areas = SNAP. Light to dark blue scale from 1 to 8 sympatric species. Notice the few areas deforested inside protected areas.

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gate climate change impacts. The SNAP is not a perfect system, but if not for its existence, more hectares of forests would have been destroyed already.

Acknowledgements.
I am thankful to M. Yánez-Muñoz, R. W. McDiarmid, J. Delia, M. Ortega-Andrade, and M. Mulligan for their continuous support. To all curators and institutions that provided access to specimens and information (see Cisneros-Heredia & McDiarmid 2007 for a complete list), to J. M. Guayasamin, F. Nogales, and J. Valencia for their helpful comments, and to M. Yánez-Muñoz, R. W. McDiarmid, and J. Delia for their photographs. Financial support was kindly provided by M. E. Heredia; L. Heredia; the Smithsonian Women's Committee, the 2002 Research Training Program at the National Museum of Natural History—Smithsonian Institution; the Russel E. Train Education for Nature Program—WWF; Conservation International; and the "Fernando Ortíz-Crespo" Endangered Species Program managed by EcoCiencia and Conservation International.

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ANNOUNCEMENTS

Dr SD Biju receives Sabin Award for Amphibian Conservation

On 17 September, 30 guests gathered at the North Cabana of the Maritime Hotel in New York to honor the 2008 recipient of the Sabin Award for Amphibian Conservation: Sathyabhama Das BIJU. Dr Biju treated the guests an inspiring and visually stunning presentation about his discoveries in the Western Ghats.

Dr Biju was selected from a pool of outstanding candidates from around the world to receive the Sabin Award for Amphibian Conservation. This Award, which is in its second year, was instigated by the ASG to recognize an individual or group that has made a significant contribution to amphibian conservation and/or research.

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Claude Gascon addresses the guests

This years' Award recognizes Dr. Biju's extreme dedication to discovering and conserving the amphibian fauna of the rapidly vanishing Western Ghats biodiversity hotspot.

For fifteen years , Dr. Biju has been tirelessly working to document the amphibians of the Western Ghats, often using his personal earnings to fund his explorations. His mission: to document and propose conservation priorities through scientific methods. When he started his self-funded research project, he worked as a plant systematist in Tropical Botanic Garden and Research Institute in Kerala. Later, he quit this job to fully focus on frog research, and transferred to the Vrije Universiteit Brussel to obtain a PhD on amphibians of the Western Ghats. He is nowleading a research group at the University of Delhi as an associate professor.

When he initiated his research in the Western Ghats, there was very little objective evidence for assessing conservation priorities of the amphibian fauna. Biju conducted over 1000 field visits throughout the Western Ghats and documented over 850 distinct populations of amphibians. Through directed field expeditions, he tracked and re-discovered rare species which were known only from century old descriptions.

After 15 years of exploration and research, Biju has gathered evidence for about 100 species new to science. The discovery and description of an entirely new frog family (Nasikabatrachidae, 'the purple frog'), sent ripples through the entire scientific community and also caught international attention of the popular press. This species was described as a 'the coelacanth of frogs' and 'a once in a century find'. Biju's prolific outputs brought a fresh fascination for amphibians among many Indian scientists and forest officials, and provided the 'push' needed to increase the pace of amphibian research in India. The borrowing purple frog also has im-

Andy Sabin describes his passion for amphibians

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portant conservation implications. Inundation of large chunks of valley forests in the Western Ghats by dam projects could spell disaster to this ancient amphibian and many other endemic taxa. India now has Nasikabatrachus to use as a flagship to promote the conservation of important habitats in the region.

Biju has closely associated with IUCN/SSC-CI/CABS from 2002 onwards on the categorization of the Western Ghats and Sri Lankan amphibian fauna as part of Global Amphibian Assessment (GAA www.globalamphibians.org).Biju's findings reveal exciting information on extraordinary diversity and local endemism. About 70 species (including undescribed species) of frogs are known only from a small area of roughly less than five-kilometers square. This finding has huge implications for the conservation of the amphibian fauna of the Western Ghats.

The passion of Biju for his frog research is, just as his new family discovery, a 'once in a century find'.

Andy Sabin presents the plaque to Dr. Biju

Instructions to Authors

FROGLOG publishes a range of articles on any research, discoveries or conservation news relating to the amphibian decline phenomenon. We encourage authors describing original research to first make submissions to a refereed journal and then, if appropriate, to publish a synopsis in Froglog. Submissions should be in English, normally no more than 1000 words and follow the style of FROGLOG Vol 83 (as should references). You may also submit images, maps, figures or tables. We encourage the submission of photographs to accompany text. Short news items and press releases are also acceptable. Please submit potential contributions to Robin Moore at the address in the box to the right.

FROGLOG is the bi-monthly newsletter of the Amphibian Specialist Group (ASG). Articles on any subject relevant to the understanding of amphibian conservation, research and / or assessments should be sent to: Robin Moore, Editor, Conservation International, 2011 Crystal Drive, Suite 500, arlington, VA 22202, USA. E-mail: rdmoore@conservation.org