

A New Challenge for Amphibian Conservation in Madagascar: The Invasion of *Duttaphrynus melanostictus* in Toamasina Province

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Madagascar, one of the world's biodiversity hotspots (2), is known worldwide for its rich communities of unique and diverse plant and animal species. Currently, 290 amphibian species are documented, with probably over 200 more waiting to be described, classifying the country as the 12th highest in terms of amphibian species richness (3; see also <http://www.globalamphibians.org>).

There are many threats to Malagasy amphibians, including habitat loss, infectious disease and human exploitation for consumption and the pet trade. A national monitoring plan for the early detection of chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*), has recently been implemented by the Chytrid Emergency Cell (CEC) with the support of the Chytrid Working Group (CWG; 5). However a new danger is now threatening the amphibian communities of Madagascar—the introduction of the Asian toad *Duttaphrynus melanostictus* (1).

The Asian or Black-spined toad (Fig. 1) is a distant relative of the Cane toad (*Rhinella marina*), one of the most successful invasive amphibian species worldwide, best known for causing severe ecological problems in Australia via poisoning of predators, competition with burrow-nesting birds and disruption of nutrient pools and parasite dynamics. There is now a concern that the Asian toad may wreak similar havoc in Madagascar, where native species may be threatened by predation, competition for resources, or suffer from effects of the toad's natural defensive toxins.

Much like the Cane toad, *Duttaphrynus melanostictus* is highly fecund. It has been reported to lay around 40,000 eggs per clutch, although precise data for the Madagascar populations are lacking. It is poisonous, has a generalist diet and is well adapted for life in agricultural and urban areas. Recent surveys highlight that the first records of *D. melanostictus* in Madagascar may date back to 2010, although the first identification was available to the scientific community in late March 2014 (1). Since then, toads have been observed around Toamasina in easter Madagascar. Toamasina is a major seaport in Madagascar where many shipping containers, goods and vehicles arrive from abroad, although it is uncertain by what means the toad introduction actually took place.

Considering the high fecundity of the toad and high suitability of Madagascar's habitat and climate there is a real concern that



Fig. 1: A picture of *Duttaphrynus melanostictus* from Toamasina surroundings, Madagascar. Photo: Bernard Lambana Richardson.



Fig. 2: Jean Francois from the Madagascar Fauna and Flora Group (MFG) maps area for social surveys. Photo: Maya Moore.

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the species could rapidly spread throughout the island. Especially problematic is the likelihood of native predators feeding on the toad and being poisoned, having evolved in the absence of related taxa and their toxicity. Moreover, there is a concern that the species could enter the residual rainforests of Madagascar, areas of unique biodiversity and endemism. Not far from Toamasina is Betampona Nature Reserve, the last remaining fragment of low altitude rainforest in the area, which harbors an exceptionally high number of endemic amphibians, many of which have yet to be described (about one third of the species of amphibians found there appear to be novel and in need of description) (4).

Malagasy authorities have identified Christian Randrianantoandro (from the Amphibian Specialist Group) as the national coordinator to address this new threat. A group of national and international experts on amphibians and invasive species is currently working together with the national coordinator in order to assess the chances of the toad eradication. As a first step to coordinating the effort, the team has been divided into small Working Groups (WG) to deal with different aspects of the project. The *Survey, Education & Prevention WG* is currently conducting delimitation surveys in order to identify the extent of occurrence of this toad. The same WG is also preparing educational materials to inform local people of the threats posed by this toad to both humans and animals. An invasive-species expert who has identified professionals that can draft a feasibility study for *D. melanostictus* eradication coordinates the *Feasibility Study WG*. The *Chytrid & Sample Analysis WG* carries out phylogeographical analyses to identify the source of introduction, and to screen the collected material for the presence of various

infectious diseases (e.g. *Bd*, Chlamydiales, Amphibiocystidiosis, *Ranavirus*). The *Fundraising WG* is working to raise funds to meet these goals. Last but not least, the *Communication WG* is responsible for maintaining active communications between the different WGs and the Malagasy authorities.

In order to be successful, the actual eradication measures, based on a thorough feasibility study, must start very soon. Hence, time is short, and we here issue an urgent call to the conservation community to boost the fundraising effort.

All [online donations](#) received in support of this project through the ASA will be directed towards better delimiting the distribution of *Duttaphrynus melanostictus* within Madagascar, production and dissemination of education materials, and development and execution of a feasibility plan for eradication, while the more academic research activities are being self-funded by the researchers involved.

References

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Fig. 3: Partner's meeting held in Toamasina to plan initial toad distribution surveys. Photo: Maya Moore.