

**Conservation of the re-discovered endangered freshwater crab *Louisea balssi* on Mount Manengouba in the Cameroon Highlands**

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By

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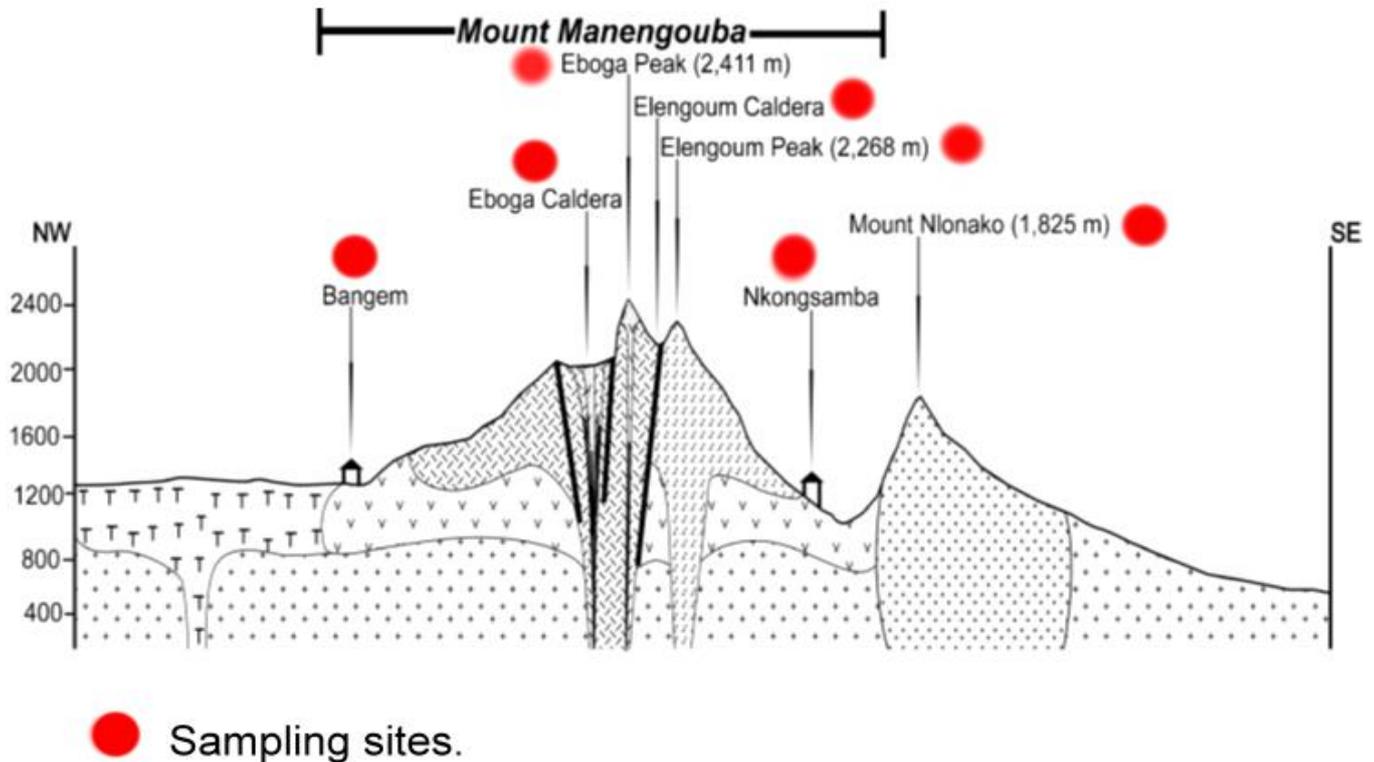


**Dr. Pierre A. Mvogo Ndongo (Ph.D).**



**Dr. Pierre A. Mvogo Ndongo (Ph.D.) and field team.**

The pilot project in 2016 supported by the 2<sup>nd</sup> Rufford Small Grant made the dramatic discovery of the ‘lost species’ *Louisea balssi* in a small forested stream in Man’s Lake Manengouba in southwaestern Cameroon after more than a century of being lost to science. This finding inspired a preliminary conservation effort aimed at protecting the small newly rediscovered population of *L. balssi* (which was funded by my Booster Grant) which would also benefit the whole ecosystem of the Manengouba Ecological Reserve. The conservation initiative consisted of the collection of preliminary ecological and population data on the species together with educational messaging for the local population (specifically tailored for villagers and townspeople living near the Manengouba Ecological Reserve) aimed at reducing threats to *L. balssi* such as reducing intensive agriculture and stopping the uncontrolled use of pesticides. This work carried out a biodiversity inventory of the freshwater crab fauna of Manengouba Ecological Reserve and the surrounding area (Fig. 1). I have followed this up with further systematic surveys (on behalf of conservation action plan) in lowland and upland zones in Manengouba Ecological Reserve. Additional aims of the project supported by this Booster Grant were to understand the ecological condition of Man’s Lake Manengouba.



**Fig. 1.** Map modified from Tefogoum *et al.* 2014.

Part of the project supported by the 2<sup>nd</sup> Rufford Small Grant allowed extensive field research at Manengouba Ecological Reserve from March to May 2017. A second field survey was conducted for 10 days following the receipt of the Booster Grant on 21 Feb. 2018. The combined results of these surveys funded by the 2<sup>nd</sup> Rufford Small Grant and Booster Grant were published (see reference below) in the journal *Zootaxa*.

**Mvogo Ndongo P.A.**, von Rintelen T., Albrecht, C., Tamesse J.L. & Cumberlidge N., 2018. Lost species in Cameroon: rediscovery of the endangered freshwater crab, *Louisea balssi* (Bott, 1959) (Brachyura: Potamonautidae), with notes on its ecology and conservation. *Zootaxa*, 4231 (2), 273–280. <https://doi.org/10.11646/zootaxa.4231.2.9>.

From March 2018 up to the present we have conducted field surveys in Bangem (Bakossi), Eboga Caldera, Eboga Peak, Elengoum Caldera, Elengoum Peak, Nkongsamba, and Mount Nlonako (see Fig. 1). The compilation of the threats to *L. balssi* assessed during all of the research surveys are summarized in Mvogo Ndongo *et al.* (2018). It is clear to us that the long-term survival of *L. balssi* depends heavily on the persistence of the canopy in the small forests that surround the shores of Man’s Lake Manengouba because the canopy shades the streams from direct sunlight and keeps the habitat moist and humid. In this pilot project, we are not yet able to report population data of *L. balssi* (as we did with *L. edeaensis* at Bedimet island of Lake Ossa). This is because access to most of our sites (at Bangem Bakossi, Eboga Caldera, Eboga Peak, Elengoum Caldera, and Elengoum Peak) is restricted for the time being due to social unrest in this part of Cameroon (the so-called ‘Anglophone crisis’). Despite this, we were able to

gain access to localities in Nkongsamba and Mount Nlonako. So, we were sometime obliged to change the locality due to the insecurities condition.

### I. Biodiversity inventory of freshwater crabs from Manengouba and surrounding areas.

Nine species of freshwater crabs belonging to three genera (*Louisea*, *Potamonemus*, and *Sudanonautes*) were collected from different parts of the study area: Bangem (Bakossi), Eboga Caldera, Eboga Peak, Elengoum Caldera, Elengoum Peak, Nkongsamba, and Mount Nlonako (Table 1)



**Fig. 2.** *Potamonemus mambilorum* was collected from Eboga Caldera, Eboga Peak, Elengoum Caldera, and Elengoum Peak



**Fig. 3.** Habitat of *Potamonemus mambilorum*



**Fig. 4.** *Louisea balssi* was collected from Eboga Peak (Manengouba).



**Fig. 5.** Habitat of *Louisea balssi*



**Fig. 6.** *Potamonemus* sp. n. was collected from Bangem (Bakossi), Eboga Caldera, Eboga Peak, Elengoum Caldera, and Elengoum Peak.



**Fig. 7.** Habitat of *Potamonemus*



**Fig. 8.** *Sudanonautes* sp. n. from Bangem (Bakossi).



**Fig. 9.** *Potamonemus asylos* lineage



**Fig. 10.** *Potamonemus* n. sp. 2 from Bangem (Bakossi), Eboga Caldera, Eboga Peak, Elengoum Caldera, & Elengoum Peak



**Fig. 11.** *Louisea* sp. (cf. *edeaensis*) from Mount Nlonako.



**Fig. 12.** Habitat of *Louisea* sp. (cf. *edeaensis*)



**Fig. 13.** *Potamonemus asylos*, sp. n. was collected from Bangem (Bakossi), Nkongsamba, Mount Nlonako and Korup National Park..



**Fig. 14.** *Sudanonautes* sp.n. from Nlonako Ecological reserve in a mating embrace.



**Fig. 15.** *Sudanonautes faradjensis* from Dja Ecological Reserve in southern Cameroon was collected as comparative material

### Comments

The Cameroon highlands are a high priority area for conservation. They harbour a high number of (partly endemic) species and genera of animals and plants, many of which are unknown to science. The

surveys of the freshwater crab fauna in a series of aquatic habitats was done over eight months, and covered three main altitude zones (lowland < 800 m; submontane 800-1600 m; and montane > 1600 m). Other localities *viz.* Nlonako, Korup National Park, Korup and Dja Faunal Reserve were visited in order to compare species and habitat data with those of Manengouba. In Mt. Nlonako, we dramatically rediscovered a new population of an endangered species of the genus *Louisea* Cumberlidge, 1994. This new population will be a centre of our 2<sup>nd</sup> Booster after completing this project. The surveys of Bangem (Bakossi) and Manengouba (Eboga Caldera, Eboga peak, Elengoum caldera, Elengoum peak) produced ecological and specimen data (morphology, tissue samples for further genetic analyses) as well as chemical and physical water parameters. The latter are still under analysis, but when they are ready the results will be published and made available to the relevant parties. The following images (Figs. 16, 17) show the differentiation of water quality of Man's and woman's Lake Manengouba.



**Fig. 16.** Man's Lake Manengouba



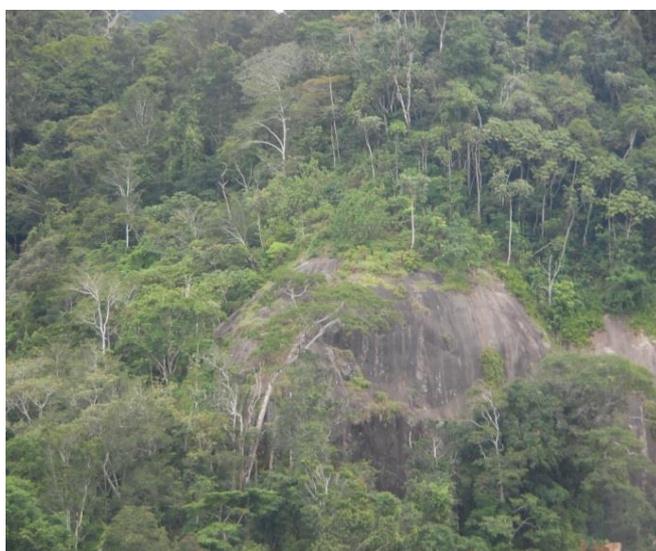
**Fig. 17.** Female's Lake Manengouba



**Fig. 18.** A research visit at National Park of Korup Reserve



**Fig. 19.** A research visit at Mt. Nlonako Ecological



**Fig. 20.** A research visit to Dja Faunal Reserve



**Fig. 21.** A research visit to Chutes Ekom Nkam

The project focused on developing a conservation action plan for the endangered freshwater crab *Louisea balssi* (Bott, 1959) which was recently rediscovered after a gap of 117 years. I collected a wealth of new data on the habitat requirements, population levels, and threats to *L. balssi*, as well as on its geographical range / Extent of Occurrence, and Area of Occupancy. These data will be submitted to the IUCN's Freshwater Crustacean Specialist Group (chaired by Prof. Neil Cumberlidge, USA) who will then organise the formal reassessment of the species and the revision of the Red List extinction risk assessment that will be freely available via the Red List website for a global audience. Furthermore, I will educate local people (capacity building) in an effort to slow down the pressure of the forest ecosystem and on the crab's sensitive habitat (because its survival clearly depends on the canopy remaining intact).

## V. Educational component

Since I was last here there has been a mass movement of people were out of the research area due to social unrest in Anglophone Cameroon, but despite this we were able to interact with some of the local people who had not moved out of their villages. The on-going educational component in this project was aimed at encouraging local people to become aware of the negative impacts of agriculture on the freshwater ecosystems on Manengouba Ecological Reserve and the surrounding areas that could negatively impact populations of crabs. Before the field studies began we met with the Chiefs in this area. The targets of the educational messaging were the local people living around Manengouba Ecological Reserve where the only known extant populations of *L. balssi* are found. The stability we found in the Manengouba area was no doubt due to the migration of much of the population because of the crisis in Anglophone Cameroon. The main threats to *L. balssi* were identified as the intensive agricultural practices that degrade and destroy the natural vegetation in many of the Manengouba Ecological Reserve. Our preliminary results showed that the water chemistry of Man's Lake Manengouba made it unsuitable for any life form – both invertebrates (insects, molluscs, crabs, shrimps etc.) and vertebrates (fish, amphibians, snakes, birds etc.) suggesting that there may be an accumulation of lethal gases in this volcanic crater lake. The first results collected confirmed this.

I am currently planning an international congress in Cameroon in the near future (2019) on “**The Role of decapod crustaceans in the sustainable management and conservation of forest and wetland ecosystems in Sub-Saharan Africa**”. The aim is to bring a large group of people from Cameroon and other countries that represent NGOs, Universities and other research centers, to make them aware of the dramatic and worsening ecological situation in Man's Lake Manengouba.

This project has already led to the publication of four articles in international scientific journals, and I have plans to publish the rest of my results soon (currently in progress). However, I still need a full support from other organisations to realise all of my plans. Therefore, I looking for a 2<sup>nd</sup> Booster Grant as well as grants from other organisations to complete these additional manuscripts. At the moment, the Natural History Museum in Berlin, Germany is also providing some support for this research and for future initiatives.

- I. A taxonomic revision of the freshwater crab genus *Potamonemus* Cumberlidge & Clark, 1992 (Crustacea: Potamoidea: Potamonautidae) with description of a new species
  
- II. Phylogeographical analysis of Cameroonian populations of three species of freshwater crab of the genus *Sudanonautes* Bott, 1955 (Brachyura: Potamoidea: Potamonautidae) with description of a new species

- III. A taxonomic revision, colonization history and phylogeographic structure of the Cameroonian endangered freshwater crab species genus *Louisea* Cumberlidge, 1994 with description of a new species: implication for conservation
- IV. Evolutionary origins and biogeographical analysis of the endemic freshwater species genus *Buea* Cumberlidge et al., 2018 with description of three new species, from Southwestern tropical rainforest of Cameroon

Table 1. Summary of the results of the combined field surveys in southwestern Cameroon

FIG	Species	Bangem (Bakossi)	Eboga Caldera	Eboga Peak	Elengoum Caldera	Elengoum Peak	Mount Nlonako	Nkong-samba	Korup NP	Dja Ecological Reserve
2	<i>Potamonemus mambilorum</i>		X	X	X	X				
4	<i>Louisea balssi</i>			X						
6	<i>Potamonemus</i> n. sp. 1	X	X	X	X	X				
8	<i>Sudanonautes</i> n. sp. 1	X								
9	<i>Potamonemus asylos</i> lineage	X								
10	<i>Potamonemus</i> n. sp. 2	X	X	X	X	X				
11	<i>Louisea</i> sp. (cf. <i>edeaensis</i> )						X			
13	<i>Potamonemus</i> n. sp. 3	X					X	X	X	
14	<i>Sudanonautes</i> n. sp. 2						X			
15	<i>Sudanonautes faradjensis</i>									X