

## Short Communication

### The endemic land snail *Gulella taitensis* of the Taita Hills forests, Kenya: on the brink of extinction

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**Abstract** This paper describes the distribution, population size and conservation needs of the land snail *Gulella taitensis* (Gastropoda: Streptaxidae) endemic to the Taita Hills, Kenya. The species was investigated using timed searches between July and December 2000. In total 37 snails were recorded from only five of nine forest fragments searched. The snail was generally more abundant in the smaller forest fragments. The species appears to be a forest specialist, exhibiting preference for the least disturbed sections of forest. The small population size, restricted distribution and concentration in the smallest

and most fragile forest fragments suggests the species is on the brink of extinction. The species fulfills the requirements for changing its conservation status from Endangered to Critically Endangered on the IUCN Red List. Promotion of the Forest Reserves to a conservation category that provides greater legal protection is necessary.

**Keywords** Endemic, Gastropoda, *Gulella taitensis*, Kenya, land snail, Red List, Taita Hills.

*Gulella taitensis* is a land snail (Gastropoda: Streptaxidae) endemic to the Taita Hills forests, Kenya (Verdcourt, 1983). The species is currently categorized as Endangered on the IUCN Red List (IUCN, 2006) because of threats from habitat loss and disturbance due to human activities. This categorization was, however, based on non-malacological secondary data rather than specific field investigations of the species. Prior to the study described here no field surveys had been carried out to determine the species' distribution and status, information vital for identifying conservation options. Here I report a survey of the distribution and population size of *G. taitensis* in nine forest fragments in the Taita Hills, propose a change in the species' Red List status, and make recommendations for the species' conservation.

The Taita Hills forests (Fig. 1) comprise the northernmost extension of the Eastern Arc range in south-east Kenya, a densely populated region of high agricultural potential. The forests have been heavily manipulated because of an increasing demand for agricultural land and natural resources by the expanding human population. Currently the forests are reduced to small fragments ranging in size from <1 ha to 200 ha, mainly restricted to the summit areas of the hills (Kalle, 2001).

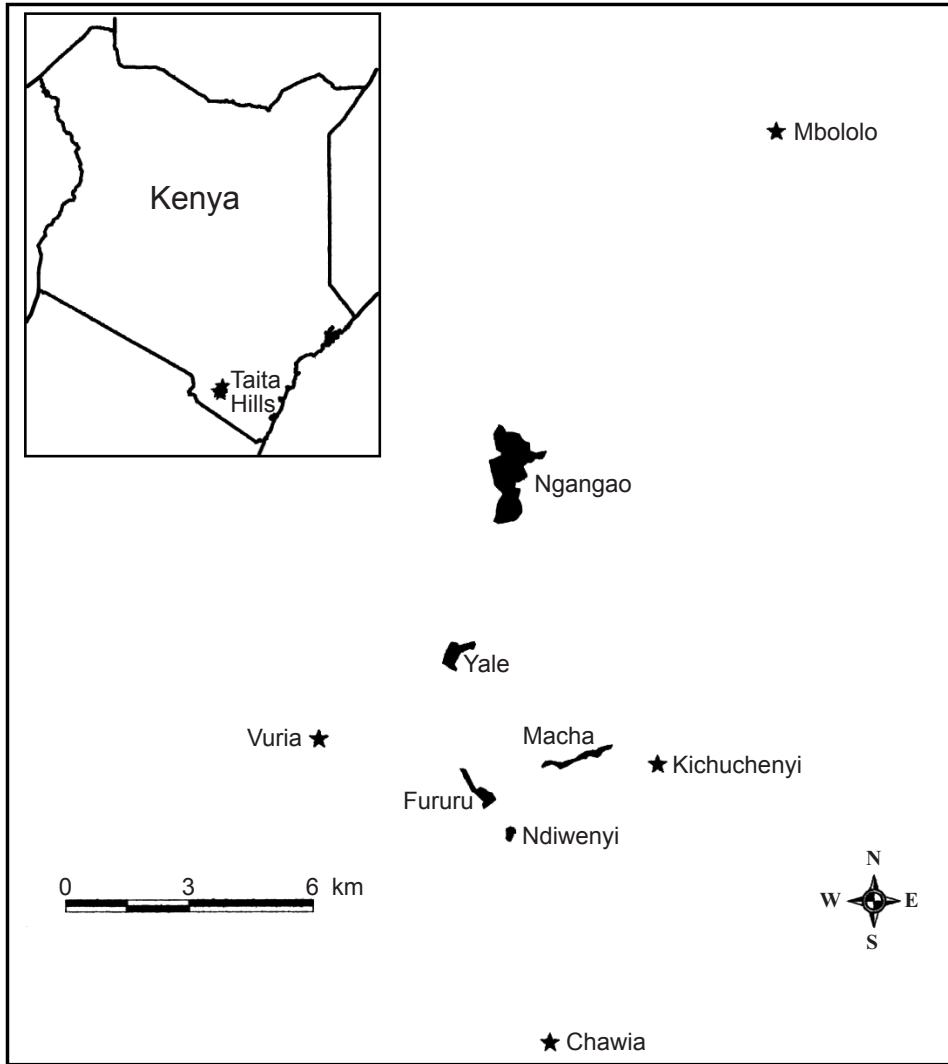
Despite the threats facing these forests they support high levels of regionally rare and endemic plant and animal species. Three species of birds (*Turdus helleri*, *Zosterops silvanus* and *Apalis melanocephalus*), three species of butterflies (*Papilio desmodi teita*, *Charaxes xiphares desmodi* and *Cymothoe teita*), one reptile (*Amblyodipsas teitana*), one amphibian (*Afrocaecilia teitana*) and three snails (*Gulella taitensis*, *Thapsia buraensis* and *Zingis radiolata*) are endemic to the Taita Hills (Collins & Clifton, 1984; Brooks *et al.*, 1998; Tattersfield *et al.*, 1998).

Of the 12 forest fragments in the Taita Hills the nine largest and least disturbed were searched between July and December 2000, each for a fixed time period (Lange & Mwinzi, 2003). Live snails were found and left on site. The nature of the sites where the species was recorded was also briefly noted. The search effort, i.e. the number of hours spent searching, in each forest fragment depended on the forest size and ranged from 12 hours in the smallest forest fragment to 36 hours in the largest fragment. The searches focused beneath leaves, under fallen dead wood, within moss mats growing on tree trunks and in litter on the forest floor.

A total of 37 live snails were found. The species was recorded from only five of the nine forest fragments searched: Vuria, Mbololo, Fururu, Ndiwenyi and Ngangao (Table 1). For reasons that are not clear the highest snail abundance was reported from one of the smallest fragments, Vuria forest, followed by Fururu and then Ngangao. Only one snail was recorded in each of Ndiwenyi and Mbololo; the latter is the largest fragment searched. Although it is unlikely that we recorded all of

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**Fig. 1** Location of the nine forest fragments in the Taita Hills searched for *G. taitensis*. The outlines of the fragments indicated with stars are not available. The inset indicates the location of the Taita Hills in southern Kenya.

**Table 1** The nine forest blocks that were searched for *Gulella taitensis*, with approximate size of each block, search effort and the numbers of snails recorded in each. Forest areas taken from Githiru & Lens (2004), Bytebier (2001) and Kalle (2001).

Forest	Size (ha)	Search effort (h)	No. of snails
Ngangao	135	20	5
Kichuchenyi	1	6	0
Ndiwenyi	4	4	1
Macha	2	8	0
Yale	2	8	0
Vuria	2	12	24
Fururu	8	12	6
Chawia	95	16	0
Mbololo	220	24	1
<i>Total</i>	469	110	37

the snails present, the relative sampling effort facilitated the examination of all potential *G. taitensis* habitats. These counts are therefore the best available estimates of

the minimum population size of the species in the forest fragments of the Taita Hills.

*G. taitensis* appears to be a forest specialist. We mostly recorded it in the least disturbed areas of forest, characterized by mature trees, moist forest floor litter and thick moss mats on live or dead fallen tree trunks. The species was generally found in the forest floor litter and only in a few cases up to 0.5 m above ground, buried in thick moss mats on tree trunks, particularly in Vuria forest.

*G. taitensis* appears to be on the brink of extinction. The fact that only 37 snails were recorded in the entire survey (a total of 110 h of searching) is a cause for great concern. This concern is further exacerbated by the observation that the largest populations are in the smallest and most fragile forest fragments, notably Vuria (2 ha) and Fururu (8 ha). These forests are potentially the most vulnerable to excision given their small size and proximity to dense human settlements. I suggest, based on this survey, that

the species' present categorization as Endangered (IUCN, 2006) needs to be changed to Critically Endangered based on criteria (IUCN, 2001) B1b(i)c(i)+B2b(ii)c(ii)+D1, i.e. extent of occurrence is <100 km<sup>2</sup> (B1) and inferred to be declining (b(i)) and fluctuating (c(i)), the area of occupancy is <10 km<sup>2</sup> (B2) and also inferred to be declining (b(ii)) and fluctuating (c(ii)), and the known mature population is small <50 (D1).

Although the survey described here was carried out in 2000 there have as yet not been reports of destruction of any of the forest fragments. However, neither has there been any development of conservation measures that could lessen concern for the future survival of *G. taitensis*.

Currently the forest fragments in which *G. taitensis* lives are protected as Forest Reserves (Githiru & Lens, 2004) but this status is probably insufficient for effective conservation of the species. Disturbance continues through illegal extraction of forest resources, mainly fuelwood and fodder (Githiru & Lens, 2004). Promotion of these Forest Reserves to a conservation category that provides greater legal protection is necessary. This is a matter that needs to be addressed by the managing agency for these forests, the Forest Department. Knowledgeable and motivated guards will be vital to the success of any improved conservation of these forest fragments (Githiru & Lens, 2004).

Investment in community conservation through regional conservation lobby groups, and community awareness and educational programmes on the value of forest conservation will be important. It is difficult to expect community support without the offer of alternatives for the resources harvested from the forests, and in this regard initiation of projects likely to ease human dependency on the forests is also necessary. Agroforestry, for example, would contribute to easing the pressure on dependency for fuelwood, building material and fodder. Monitoring of *G. taitensis* to keep track of population trends and to recognize any potential crisis promptly is also a necessary prerequisite for any conservation programme for the species.

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### Biographical sketch

Charles Lange is Head of the Department of Invertebrate Zoology, National Museums of Kenya. His early interests were in wildlife management and conservation. He recently developed a research interest in the linkages between biodiversity conservation and human health, and carried out research on the impact of anthropogenic disturbances on freshwater snails in Lake Victoria and the implications of this for potential snail borne diseases.