





**SHORT COMMUNICATION**

# From *Linderiella baetica* to gambilusa: Involving children in conservation by giving a new species a common name

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**Abstract**

1. The knowledge and awareness that the general public has about aquatic invertebrates is often poor, even when they are highly threatened. The frequent lack of popular names and the unattractiveness of the scientific ones may be among the factors hindering the knowledge of these organisms and, consequently, the awareness of their conservation status and the willingness to conserve them.
2. *Linderiella baetica* (Crustacea, Branchiopoda, Anostraca) was discovered in 2007 in southern Spain and is considered a critically endangered species. However, being a small invertebrate inhabiting generally unappreciated temporary ponds, this species was completely unknown by the general public, even in the area in which it occurs.
3. To increase the knowledge and awareness of *L. baetica*, 1,347 children from five schools within its distribution area participated in a contest to select a common name for this newly described taxon. The winning name, gambilusa (Andalusian shrimp), will be used in the future by the Spanish Ministry of Environment and hopefully by the general public to identify the species.
4. The contest was found to have increased the knowledge about the target species in a sustained manner, as 1 year later, 93% of the children recognized gambilusa as a crustacean, 75% remembered its typical habitat, and 89% broadly identified its geographical distribution.
5. This kind of name-choosing contest is applicable for different regions and taxa to raise awareness on the conservation of threatened but poorly known biota.

**KEYWORDS**

awareness, contest, school, temporary ponds, threatened species

## 1 | INTRODUCTION

The conservation of biodiversity needs not only technical advances but also social support for conservation initiatives. Individual willingness to conserve tends to be directly related to the amount of contact with and knowledge about a threatened ecosystem or taxon, and a lack of knowledge may thus be a hindrance for the conservation of

non-charismatic taxa (Wilson & Tisdell, 2005; Vincenot et al., 2015). Most well-known taxa are charismatic, large-bodied birds and mammals (Ballouard, Brischoux & Bonnet, 2011; Vincenot et al., 2015; Balding & Williams, 2016), whereas the general public tends to have little understanding of aquatic invertebrates, their ecological traits and the drivers of their declines (Martín-López, Montes & Benayas, 2007). Having a common name is a first step to

start knowing a taxon (Link-Pérez et al., 2010), but several groups of organisms, including many newly described species, lack common names. The Latin binomial scientific name may be unattractive to the general public and may limit the dissemination of knowledge for the organisms that lack a common name, which risk being recognized and valued only by a few specialists (Braby et al., 1997).

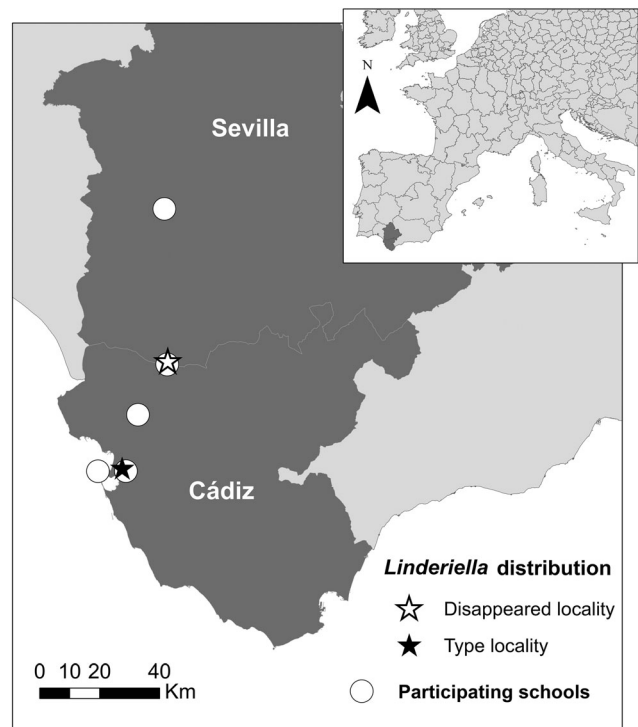
The crustacean *Linderiella baetica* (Branchiopoda, Anostraca) was described as a new species in 2009, after being discovered in 2007 (Alonso & García-de-Lomas, 2009). It is a small aquatic invertebrate (6–7 mm) that inhabits freshwater temporary ponds and is known to the date from a single locality, despite having been broadly searched for in at least 1,648 ponds sampled throughout Spain, of which 720 ponds were sampled within the region of Andalusia (García-de-Lomas et al., 2016). Owing to this extremely restricted range, the species should be considered as Critically Endangered according to the criteria of the International Union for Conservation of Nature (IUCN) (García-de-Lomas et al., 2017). Large branchiopods do not have vernacular common names in Spanish, making it difficult to disseminate knowledge on this group and raise awareness about its frequent poor conservation status (García-de-Lomas et al., 2017).

A school contest to provide a common name for the newly described, range-restricted *L. baetica* was promoted and implemented, targeting primary schools distributed throughout the natural distribution area of this species. This article describes the methodology used in the contest and an estimate of the increase in knowledge about the target species obtained by assessing the children's knowledge 1 year after the contest. The usefulness of this kind of initiative in raising conservation awareness for poorly known taxa, and its transferability to other systems and organisms, is discussed.

## 2 | THE SCHOOL CONTEST

The contest was developed in five schools included in the known distribution area of *L. baetica* (Figure 1) and targeted primary education courses (age 6–12 years). A coordinator was designated to provide material and supervise the implementation of the methodology at each participating school. Each participating course received a brief teacher's guide with basic information on *L. baetica* (taxonomy, natural history, distribution, and conservation), with particular focus on the unique feature of resting eggs, which was used as the icon of the contest. An illustrative poster (Figure 2a) was displayed in each class to inspire the contestants.

The process to select a common name was structured in three phases. In the first phase, each child proposed a name using a participating sheet that could be completed at home. In total, 1,347 students from 58 classes participated in the contest (between 175 and 395 students per school). The teacher of each class collected the common names proposed and wrote them down on the board, and the children voted for one name by a show of hands. As a result, each school provided one name per participating class (between 12 and 15 names). In the second phase, the common names selected in each school were sent to a different participating school to



**FIGURE 1** Geographical distribution of the gambilusa, *Linderiella baetica* (Crustacea, Branchiopoda), and location of the schools participating in the contest. The inner panel shows the location of Cádiz and Sevilla provinces in southern Spain

promote cross participation among schools. Again, the children had to vote by a show of hands on their preferences among the pre-selected names. The three names attracting the highest number of votes in each school were used to form a final list of 15 names. The final phase included a jury composed of 10 people, comprising limnologists from different Spanish universities (Girona, Barcelona, Sevilla, and Cádiz), the Doñana Biological Station-CSIC research centre, two wetland managers, two environmental associations and a town councillor from the city that houses the only known locality of *L. baetica*. Contest coordinators were not part of the jury to avoid conflict of interests. The jury gave scores of 6–10 points to five of the 15 final names following a triple-blind method: (i) no juror knew the identity or the school of the children proposing the final names; (ii) no student knew the jurors' identities; and (iii) no juror knew the scores given by the rest of the jury.

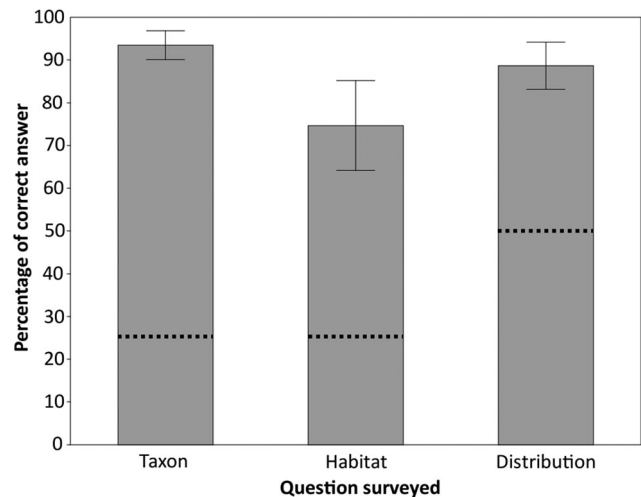
'Gambilusa' was the winning name. It had been proposed by a 10-year-old girl from Palomares del Río (Sevilla). This name arose from the combination of 'gambita' (little shrimp) and 'andaluza' (from Andalusia) in its popular pronunciation 'andalusa'. Her school enthusiastically organized the awards ceremony, preparing large drawings of the gambilusa and other threatened species from southern Spain (Figure 2b,c). The winner received a naturalist backpack equipped with net, magnifying glass, compass, and sample jars and a guided excursion to a temporary pond nature reserve with her class.



**FIGURE 2** (a) Poster used to inspire pupils in the classrooms of the participating schools (the main text in Spanish means 'give a name to a new species'). (b) Awards ceremony (photo courtesy of J.M. Amarillo). (c) Large drawing of the gambilusa decorating the awards ceremony

### 3 | POST-CONTEST SURVEY

One year after the contest, the extent to which this initiative had helped to improve the knowledge of the target species among the participant students was evaluated, using a survey with three simple questions. As the gambilusa is a small invertebrate that had been discovered only recently in a small temporary pond, a habitat poorly valued by the general public, it was assumed that before the contest, the participating children did not know this species. The first question dealt with the taxonomic position of the gambilusa (what kind of animal is the gambilusa?) and had four possible answers: (i) vertebrate, (ii) crustacean, (iii) bird; and (4) plant. The second question asked about its habitat (where does gambilusa live?) and also had four answers: (i) in the sea; (ii) in meadows; (iii) in rain ponds; and (iv) in city parks and gardens. Finally, there was a closed question about the distribution of gambilusa (is gambilusa present in Andalusia?). The first two questions had a random probability of the correct answer of 0.25, whereas the probability was 0.5 for the third question. As sixth grade students left school in the year of the survey, children aged 11–12 could not be included. The numbers of classes and children for each course (grade) were as follows: first grade (three classes, 72 children), second grade (eight classes, 197 children), third grade (10 classes, 245 children), fourth grade (10 classes, 237 children), and fifth grade (12 classes, 297 children). The number of classes for the first grade was considered insufficient and was excluded from this analysis.



**FIGURE 3** Overall percentage of correct answers obtained in the survey for the different questions related to gambilusa taxonomy, habitat, and distribution. Each bar represents the mean percentage  $\pm$  SD of  $n = 5$  schools. The dotted line inside bars represents the random probability of the correct answer

The students had a high percentage of correct answers for the three questions, clearly above the percentages that would have resulted from a random response (Figure 3). The percentages of correct answers were not significantly different either among the three

questions of the survey ( $P = 0.19$ ,  $F = 1.87$ ,  $df = 2, 12$ , one-way ANOVA) or among children in different grades (second to fifth grades, Kruskal–Wallis test).

## 4 | RAISING AWARENESS

Environmental education is widely used to increase knowledge and promote favourable attitudes towards the conservation of biodiversity (Rakotomamonjy et al., 2015), and the school contest followed several guidelines proposed to promote the success of conservation initiatives. First, the contest provided basic environmental education through the teacher's guide, which is essential for providing knowledge and awareness of the target species (Pipher, 1996; Wilson & Tisdell, 2005). Second, the contest involved children at schools within the natural range of the target species, who are likely to spread the acquired knowledge and attitudes to their families (Vieitas, Lopez & Marcovaldi, 1999; Rakotomamonjy et al., 2015). Third, children made a relevant contribution to the contest by actively contributing to 98.9% of the selection process (they selected 15 finalists out of 1,347 proposed names). Such active participation aimed at increasing their motivation in the conservation of the target species (Western & Wright, 1994; Durbin et al., 1996). Fourth, the awards included an excursion in which the children had direct contact with nature by sampling and recognizing the target organism and its habitat. Although contact with nature should be frequent, the present action may contribute in a small way to mitigate the increasing concentration of people in urban areas (Miller, 2005).

As for other aquatic invertebrates, the small-sized gambilusa lacks the features of charismatic fauna, so increasing awareness of the importance of its conservation is challenging, which includes the provision of significant services that have cascading effects across ecosystems (García-de-Lomas et al., 2012; Collier, Probert & Jeffries, 2016). The conservation of the gambilusa necessarily requires the conservation of its habitat. Temporary ponds also provide breeding habitats for amphibians and other invertebrate species, some of them considered as 'living fossils' (Vanschoenwinkel et al., 2012), with unique adaptations to periodic drought, e.g. diapause (Williams, 2001). The existence of the gambilusa in a single location can also compromise its conservation – for example, by increasing the risk of habitat destruction by developers for whom the species' conservation compromises other interests and uses. The results shown here provide evidence of the usefulness of the name-giving contest for improving understanding about a new and uncharismatic species by the general public. A comparable contest was held for primary and secondary school children from southern Spain to give the Spanish common name (salinete) to the Andalusian toothcarp (*Aphanius baeticus*), an endemic and small (<50 mm) fish from southern Spain. The influence of the contest on the knowledge and attitudes of participating children was not evaluated, but the resulting common name is now widely used by environmental managers and researchers (Leunda et al., 2009). In Norway, middle-school students sampled local ponds and were able to contribute to the generation of common names for

water fleas. Common names may stimulate interest if they capture the interest of general naturalists and young people (Chalkley, 2014).

The words used to form common names may affect the way people perceive the organisms. Common names can describe biological features, distribution, natural history, and/or phylogeny of the organism (Sarasa, Alasaad & Pérez, 2012) and thus can be very informative on their own. Naming species can be beneficial or it may lead to unexpected negative consequences for conservation. For example, the name of the Hitler beetle (*Anophtalmus hitleri*), a species described from Slovenian caves in the 1930s (Scheibel, 1937), has promoted the interest of amateur collectors, which has in turn led the species to a threatened status (Khalaf, 2010). In some cases, the words 'rat', 'wild', 'stray', or 'killer' in its common name are less likely to receive positive human attention and support for conservation (Karaffa, Draheim & Parsons, 2012; Ehmke, Fitzsimons & Garnett, 2018). However, in certain cases (e.g. invasive species such as the killer shrimp *Dikerogammarus villosus* or the killer alga *Caulerpa taxifolia*), a pejorative name can encourage conservation initiatives. Consequently, some conservationists have even proposed changing the common name of certain species to avoid this negative perception (Kristof, 2010). In this regard, the participation of a jury of experts in the final phase of a contest may reduce the risk of potentially conflicting common names.

Naming a new species is a simple way of connecting specialists and the general public and, as shown here, may increase knowledge and awareness of poorly perceived species. With some basic precautions to avoid conflicts or counter-productive results, initiatives such as the one described here can constitute easy-to-implement actions for raising interest among local communities in species lacking a common name. This approach can alleviate, at least in part, the 'public dilemma' that complicates the effective protection of many invertebrates (New, 2008; Cardoso et al., 2011).

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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