

Abstract

Global ecosystems are facing great challenges and human activities keep playing major roles in driving species to the brink of extinction. In the last century, vertebrate extinction rates were 100 times higher than the estimated background extinction rates, and pressures continue to rise. The field of conservation biology, through synergetic work across fields, aims to restore damaged ecosystems and prevent further degradation. However, the current lack of species-specific data and increasing demand for natural resources hinder species survival and ecosystem health. Here we explore the demand for turtles and tortoises in the international wildlife trade and reveal that trade volumes have dramatically increased over the last 40 years. We further reveal the lack of connection between trade volumes and species' threat status, hampering population recovery and growth. We capacitate regions with detailed information to enforce legislation that promotes sustainable trade and urge European and Asian countries to make regulatory changes towards reasonable volumes of trade. Moreover, we present the first comprehensive index on demographic knowledge across 32,144 species of amphibians, birds, mammals and reptiles, revealing that high-quality information in the form of life-tables or matrices is only available for 1.3% of the species assessed. The scarcity of data to test evolutionary theories, such as the inevitability of deterioration with age, hampers conservation efforts as well as advances in the field of biology. To demystify theories of ageing in particular, we accessed demographic data from turtle and tortoises' populations under human care and show that 32 out of the 69 studied species have constant mortality rates throughout their lives, avoiding age related deterioration. Contrary to humans and rats, we reveal that for turtles and tortoises, age has a very small influence on longevity. Here we unveil the great potential of data from populations under human care for improving basic biological knowledge and also in filling existent demographic knowledge gaps. We particularly explore the importance of these data for aquatic taxa by identifying

species of conservation concern currently held at aquariums that can support either the assessment of extinction risk or repopulation programmes. Aquariums and zoos globally are in a privileged position to provide expertise in breeding biology and supporting restoration of healthy ecosystems from which stressors have been eliminated. Examples of restored areas are the intentionally deployed wrecks that we here map in connection with aquariums and barrier reefs. The data we provide empower better conservation actions and decision making across taxonomic groups.