STATUS AND RECOMMENDATIONS FOR *IN SITU* ANOA (*Bubalus* sp.) WITH SUGGESTED IMPLICATIONS FOR THE CONSERVATION BREEDING POPULATION

(*Status dan Rekomendasi Anoa* (Bubalus *sp.*) *In Situ dengan Implikasi untuk Konservasi Populasi Berbiak*)

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ABSTRAK

Ringkasan ini menguraikan status konservasi in situ kerbau kerdil Sulawesi. Trend populasi yang dilaporkan dalam dua belas tahun terakhir mengarahkan penulis dalam menyoroti arti penting konservasi populasi berbiak di lokasi ex situ pada masa mendatang. Anoa terdiri dari dua jenis kerbau kerdil *Bubalus depressicornis* & *B. quarlesi* endemik Pulau Sulawesi, Indonesia. Kajian distribusi anoa berdasarkan laporan historis dan sebagai hasil data lapang terbaru (1990-an sampai 2002) menyoroti terjadinya penurunan di keseluruhan pulau, terutama di semenanjung selatan dan timur laut. Penurunan terjadi akibat perburuan lokal untuk daging dan kehilangan habitat. Sebagian besar populasi secara cepat mengalami fragmentasi. Konservasi populasi *viable* pada akhirnya akan membutuhkan pengelolaan metapopulasi dan peran yang lebih besar dari populasi di kebun binatang.

Kata Kunci: in situ, anoa, konservasi, populasi berbiak.

INTRODUCTION

Anoas are dwarf buffaloes, endemic to the Indonesian island of Sulawesi (and offshore islands). They are the smallest of the Bovini, standing about a meter tall at the shoulder. Two species are presently recognized, the lowland anoa *Bubalus depressicornis* and the mountain anoa *Bubalus quarlesi* (Groves, 1969; Corbet and Hill, 1992; Wilson and Reeder, 1993). Both anoa species are classified as Endangered by IUCN (http://www.redlist.org/, August 2004), are legally protected under Indonesian law (Jahja, 1987), and are included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (UNEP-WCMC, 2000). The anoas are an important species for locally and internationally defining the identity of the wildlife in the Wallacea bioregion, known for its high bio-diversity and endemism.

The two species taxonomic status is still under debate (Mohr, 1921; Groves, 1969; Weise, 1979; Kakoi, *et al*., 1994; Schreiber, *et al*., 1999). Work on this is on-going and will be reported when the analyses are completed. The data presented below has been complied by the authors from field surveys and a literature review, including information from 1990 to 2002. Further details have recently been published by Burton, *et al*. (2005).

CONSERVATION STATUS

Key areas for future conservation of anoa have been identified where sufficiently large numbers are present that are likely to maintain a viable population in the long-term. These include Lore Lindu National Park, Bogani Nani-Wartabone National Park and environs, the Upper Paguyaman / Nantu area, Morowali Nature Reserve, Tanjung Peropa Wildlife Reserve, Lambu Sango Wildlife Reserve or Buton Utara Nature Reserve.

Hunting (mainly for meat) and the loss of suitable habitat are the major threats to the anoa, and recent reports indicate that hunting is by far the more serious of the two. Anoa meat was usually sold for Rp5000–7500 per kilogram (*ca*. £0.50 per kg), but one hunter said he could sell anoa meat for Rp22,500/kg (*ca*. £1.60/kg) (J. Burton, personal observations, 2001). In rural areas, there appears to be little awareness of the protected status of anoas, and villagers readily recounted their hunting experiences to researchers (Schreiber and Nötzold, 1995). Recently anoas have been extirpated from Tangkoko Batuangus – Dua Saudara NR (J. Riley, personal communication 2001). During the Anoa Population and Habitat Viability Analysis Workshop (PHVA) available data on life history was used with the VORTEX Program to estimate the population viability of different population sizes under three levels of hunting

pressure (Manansang, *et al*., 1996). These simulations highlight the threat that even the largest anoa populations face from hunting levels that could now be occurring throughout Sulawesi.

Habitat degradation and loss is the second most significant threat to the anoas. Many anoa populations are becoming isolated as the forest around the protected areas is cleared or converted to plantations. Total forested area remaining on Sulawesi in 1985 was estimated to be between 42 and 49% of the land area of the island (Holmes, 2000; Mathews, 2002). Although 11.9% of the island is protected, loss of suitable anoa habitat within protected areas is as much a problem as in unprotected forest (Aden, *et al*., 2001), such as Lore Lindu National Park and Bogani Nani-Wartabone NP.

The fragmentation of these once contiguous forests will reduce the natural movement of anoa between forest patches. This may cause the loss of genetic diversity and increase the chance of population extinctions (Gilpin, 1991; Wang and Caballero, 1999). However, assessing the scale of the threat posed to the anoa by shifting agriculture and fires is hampered by the lack of knowledge of their habitat requirements. This has recently been altered with research on anoa's diet and habitat preferences by Mustari (2004).

The conservation breeding population in zoological collections doubled in size in the 10 years prior to the studbook's publication; there were 125 animals in European, North American, and Asian zoos in December 1998. However, management of the captive breeding program is still hampered by the uncertain taxonomic status of the anoa, and the insecure classification of those animals currently in zoos (Nötzold, 1999). The genetic study of wild anoa presently underway will lay the foundations for the urgently needed clarification of the genetic representation of animals in the *ex situ* population.

CONSERVATION RECOMMENDATIONS

Anoa need to be protected from hunting by enforcing the existing laws of the Republic of Indonesia, particularly the Conservation of Natural Resources and Ecosystems Act (UURI No. 5). Law enforcement should be combined with an environmental education campaign that stresses that the anoas are unique to Sulawesi and in danger of being lost forever. Successful anti-poaching activities require frequent patrols of key protected areas. In order to make the selling of illegal meat difficult, the Indonesian authorities should target bush meat sellers at village and town/city markets (Lee, 1999).

While the work conducted to date has done much to bring up to date our knowledge of the distribution of anoa on Sulawesi and its offshore islands, we still know rather little about the details of regional population sizes and population trends. For the majority of sites we merely know that anoa are present or are absent/likely to be absent. This makes it difficult to focus conservation efforts effectively. There is, therefore, still a need for an island-wide survey to quantify major anoa populations. In order to devise the most representative conservation strategy, the surveys should aim to locate populations throughout the island in order to preserve the full biogeographic variation exhibited by these species. In addition, populations from the full range of vegetation types and elevations used by the anoa need to be identified for inclusion in an effective anoa conservation strategy. This is especially significant due to the near total loss of lowland forest in Sulawesi.

On paper Sulawesi boasts an impressive system of protected areas. Unfortunately many of these areas are poorly managed, understaffed, and lack the basic resources required for effective conservation. The priority areas for conservation management should also be assessed. The largest areas of habitat are likely to be the top priorities, because these areas are likely to contain the populations most resilient to demographic and genetic problems and the effects of hunting (see Conservation Status, above).

For effective management of wildlife it is necessary for protected area staff to be adequately trained in surveying and monitoring techniques. It is necessary to explain to people living around protected areas why their activities need to be controlled and why wildlife, which they might otherwise utilise, should be conserved. Conservation-oriented NGOs need to determine whether conservation-education schemes exist in the communities around the most important protected areas in Sulawesi; if not then these should be initiated as a high priority.

By combining the above-mentioned recommendations with the forthcoming publication of the genetic study of the anoa's taxonomy, the *in situ* and *ex situ* population will form a feasible conservation strategy to maintain a viable anoa population in the future. The *ex situ* population should be developed and maintained as a vital alternative gene pool as well as a source of individuals for future reintroduction. The conservation breeding population should be as genetically representative of the wild population as possible. Results from the *in situ* genetic study will inform detailed genetic analysis of the *ex situ* animals and facilitate effective breeding.

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