Rat-free habitat doubled in the Chagos Archipelago

The Chagos Archipelago (British Indian Ocean Territory) lies at the southern end of the Laccadives-Maldives-Chagos ridge, in the geographical centre of the tropical Indian Ocean. The 47 islands are uninhabited, with the exception of a US naval facility and UK forces personnel on the largest island, Diego Garcia. Chagos is one of the most remote and pristine reef systems in an increasingly pressured Indian Ocean, whose surrounding shores have suffered extensive exploitation and degradation.

Chagos supports globally significant populations of hawksbill and green turtles and the most diverse breeding seabird community in the region. The islands are also thought to provide an important biogeographical link between west and central Indo-Pacific reef communities. The former copra industry replaced much of the original vegetation with coconut palms, and seabird colonies suffered heavy exploitation. Despite its remoteness, protection and current lack of habitation there are continuing pressures on the Chagos environment from climate change, illegal fishing, maritime tourism and invasive species.

Invasive black rats *Rattus rattus* on 36 of the 47 islands predate seabird and marine turtle eggs and hatchlings, and suppress the regeneration of native flora. The 2003 Chagos Conservation Management Plan identified the eradication of black rats from Eagle Island as an urgent conservation priority. At 243.5 ha Eagle Island is the second largest, and eradication of its rats would double the rat-free habitat of the entire archipelago. Also, as the only rat infested island in the Great Chagos Bank the risk of re-invasion from other islands is very low.

The Chagos Ecological Restoration Project took place in February–April 2006 with the aim of eradicating the estimated 8,000 rats from Eagle Island. The project was managed by Fauna & Flora International (FFI) and funded primarily by the Foreign and Commonwealth Office/DFID Overseas Territories Environment Programme and the DEFRA/FFI Flagship Species Fund, with additional support from the Chagos Conservation Trust, Syngenta, Thames Water and Wexas. Vital logistical support was provided by the Chagos 2006 research expedition led by Charles Sheppard of Warwick University, UK, the Captain and crew of the Pacific Marlin Fisheries Patrol Vessel, and the US naval facility and UK forces personnel on Diego Garcia.

Eagle Island is remote, with no existing infrastructure and limited external support systems. The considerable operational challenges were managed through rigorous team selection and detailed logistical planning. The field team of 10, selected from over 100 applicants, had expertise in invasive species control, field logistics and expedition medicine. Life-support systems used for the project included satellite phones, water desalination and filtration equipment, VHF radios, a composting toilet, tents, tinned food, a solar power system and a comprehensive medical kit.

During the first 6 weeks a 30 * 30 m baiting grid was established by cutting 82 km of transects by hand with machetes through often dense vegetation. This enabled access to all parts of the island to establish 2,844 regularly spaced baiting points. The choice of grid size was based on the need to ensure at least one baiting station in the home range of every rat. A bait station was placed at each baiting point and restocked daily with bait over a 4-week period. In addition, bait was hand-broadcast between transects at regular intervals to increase coverage. The bait was 20 g wax blocks containing 0.005% brodifacoum, a second generation anticoagulant poison.

During the daily visits to bait stations in the poisoning phase details were recorded of any signs of rat activity, which disappeared completely at 20 days into this phase. Additional monitoring systems (live and snap traps, chew sticks and extensive day/night monitoring walks) were used to adapt baiting in remaining areas of activity. Post mortems of the five individuals caught during >1,000 trap nights showed that each was fully poisoned and would have subsequently died.

The risk of impacts on non-target species was considered low and no impacts were detected. Hermit and coconut crabs are attracted to the bait but are unaffected by the poison, and were of great assistance in stripping rat carcasses. Impacts caused by human activity were minimized by using a composting toilet, removing or destroying all waste, and using biodegradable flagging tape. The project also resulted in the most detailed mapping of the island to date and a vegetation survey was carried out using the extensive network of transects.

A post-eradication visit will be undertaken later in 2006 to confirm the eradication of the Eagle Island rat population. The expected success of this project should provide a greatly improved habitat for breeding

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seabirds and marine turtles and be an important first step in restoring the natural vegetation of Eagle Island.

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Saving the addax

The addax *Addax nasomaculatus*, a medium-sized antelope that inhabits the dunes and sandsheets of the Sahara, is one of the rarest and most threatened mammals. Formerly present in suitable habitats from the Atlantic to the Nile, addax now number <500 in the wild (J.E. Newby, in press, *Addax nasomaculatus* (de Blainville). In *The Mammals of Africa. Vol. 6. Artiodactyla*. J.S. Kingdon & M. Hoffmann, eds, Academic Press, Amsterdam). Their survival depends on urgent and comprehensive action in their last remaining strongholds in the impoverished Sahelian nations of Chad and Niger (R.C. Beudels *et al.*, in press, *Addax nasomaculatus*. In *Sahelo-Saharan Antelopes: Status and perspectives*. CMS Technical Series Publication 10). Over-hunting is by far the greatest threat to the addax's survival, with drought, desertification and habitat encroachment having a cumulative impact. Although highly adapted and capable of surviving for years without drinking water the addax does have its limits, and when long-term drought occurs it is driven out of the desert into marginal areas that are increasingly occupied by herders and subsistence farmers.

Given the low numbers and high degree of dispersion of the remaining addax, only a large-scale regional approach will guarantee the survival of a viable and genetically robust population. Conservationists must work together creatively on the total stock available, including animals held in captivity, to bolster populations in the wild. Luckily, the addax does well in captivity and the zoo community currently manages *c.* 500 animals in >50 institutions (T. Correll pers. comm., H. Engel pers. comm.). Sizeable herds of reintroduced, captive-bred addax currently exist in both Morocco and Tunisia and efforts are underway in both countries, as well as in Algeria, to put more animals back into the wild (T. Woodfine *et al.*, 2004, A summary of past and present initiatives for the conservation and reintroduction of addax and scimitar-horned oryx in North Africa. *Proceedings of the EAZA 2004 Conference, Kolmarden*, pp. 208–211. EAZA Executive Office, Amsterdam; E. Spevak *et al.*, 2006, Returning the addax and the oryx to Tunisia. *Communiqué (April 2006)*, pp. 13–14. The American Zoo & Aquarium Association).

Spearheaded by the Sahara Conservation Fund (see *Oryx*, 39, 121–122), an addax conservation strategy has been drafted, forming the basis of an ambitious campaign to raise the USD 5 million required for its implementation. With strong support from the Fund's backers and the governments of both Chad and Niger, a consortium of donors is growing that includes the French government, the Convention on the Conservation of Migratory Species, African Parks Foundation, the Wildlife Conservation Society, National Geographic, the Iara Lee & George Gund Foundation and Addax Petroleum Services. Top priorities of the strategy are the establishment of well-managed protected areas in the Termit region of eastern Niger and the Bodélé area of western Chad.

Recognizing the special challenges posed by highly-mobile, wide-ranging desert species, new approaches are needed to complement more traditional ones based on the control of poaching and the establishment of parks and reserves. Approaches are needed that are as flexible and as mobile as the addax itself, and in the vastness of the Sahara it is with the nomadic human population that the best chance of finding solutions exists. Their unique knowledge and presence could provide the addax and other wildlife with the surveillance, protection and custodianship required.

By securing the remaining addax and neighbouring habitats it will be possible to create a dynamic and an environment favourable to the recolonization by the addax of a large part of its former range, stretching from Chad through Niger and into Algeria, Mali and beyond. There is no shortage of suitable habitat, human population density is low and a network of protected areas exists. As can be seen in the reintroduction initiatives in Tunisia, Morocco and Algeria, there is growing local interest in seeing the addax back in the wild.

Saharan wildlife is facing an unparalleled extinction crisis, with not only the addax threatened by extinction but also the dama and slender-horned gazelles, Barbary sheep, desert populations of cheetah and ostrich, and numerous populations of bustards. For the scimitar-horned oryx it is already too late. Let's make sure that the addax and other species do not follow.

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Technology with a conscience

The Technologies for Conservation & Development project (t4cd) is a joint initiative of Fauna & Flora

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International and ResourceAfrica, a Pretoria-based development NGO, and is funded by the Vodafone Group Foundation. The project seeks to bridge the divide between the solutions offered by the world of technology and the acute needs of the conservation and development community. On 24–25 January 2006 the project held a 2-day Conservation and Appropriate Technology Conference at the Microsoft Research Centre in Cambridge, UK. This was a unique opportunity to unite representatives of the conservation and technology fields.

The event showcased an inspiring range of conservation and development projects that utilize technologies. Examples include the use of PDAs with icon based software to enable indigenous groups to collect and transmit data on animal movements or forest management, convergence of GSM mobile technology with GPS to track grey seals in the North Sea and elephants in Kenya, and using Google Earth to map protected areas, species distribution, and the movements of animals.

While there are diverse examples of fruitful integration of technologies into conservation and development projects, information is widely dispersed and often not in the public domain, suppliers of equipment are rarely cited, and information about funding for projects or training in the use of technologies is not centralized. The congregation of stakeholder opinions at the t4cd conference confirmed the need and demand for this information management role to be filled. The t4cd team has developed a model for an information Hub that builds an on earlier output from the project, the ICT Conservation Resource CD-ROM, launched early in 2005. This CD-ROM, which is available from FFI, contains a wealth of information about technologies available to conservation and development practitioners, as well as details of projects that are already embracing technologies in their work.

Central to the Hub will be an online resource that builds on t4cd's existing database and provides comprehensive details of technologies available for communication, data management and information sharing (including GIS and remote sensing), remote power supply, and tracking. Supporting this technical information will be an expanded database of conservation and development projects taking advantage of such tools, and a clearing house of grant schemes, training courses and sources of support for projects using technologies.

t4cd will continue to work on its pilot projects in southern Africa, building on its existing expertise in field implementation. The project also has permanent UK staff working on the Hub, and is seeking further funding for this work. The process of updating and expanding the existing database has already begun. For more information, or to inform us of a technology, project or grant scheme that you think should be included in the Hub, contact Zoë Cullen, as below.

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Implementing the recovery programme for the Yangtze River dolphin

The Critically Endangered Yangtze River dolphin or baiji *Lipotes vexillifer* is the world's rarest and most threatened cetacean. Baiji were only encountered 17 times during a series of intensive surveys in 1997–1999, although more recent opportunistic sightings indicate that the species still persists in very low numbers, and a range-wide survey will be conducted in late 2006 (see below). The factors responsible for the species' decline (severe habitat degradation, rolling hook, electric and explosive fishing, boat collisions) are still at work and may be increasing, and establishment of an *ex situ* breeding population under semi-natural conditions is now regarded as an essential short-term goal for the continued survival of the species. The favoured site for establishing this population is the Tian-e-Zhou National Baiji Reserve, a 21 km oxbow appended to the Yangtze near Shishou City, Hubei Province, which currently supports a translocated breeding population of Yangtze finless porpoises *Neophocaena phocaenoides asiaeorientalis*.

However, although the baiji recovery programme has been recommended by numerous scientists and policy makers for 2 decades, and is endorsed by the Chinese Ministry of Agriculture, it has yet to be implemented or even fully planned. It is essential that capture and translocation efforts to initiate the recovery programme take place in the immediate future, but before this is possible a series of logistical requirements must be fulfilled, involving both infrastructural and staffing improvements at Tian-e-Zhou, and technical and financial support for the capture and translocation operations.

A 2-day meeting was hosted at SeaWorld, San Diego, USA, on 17–18 December 2005, and attended by representatives from a range of Chinese and international organizations. Financial support was provided by Ocean Park Conservation Foundation, Hong Kong, and Conservation International. The main purpose was to address how capture and translocation operations and associated infrastructural developments could be implemented and financially supported. A full implementation timetable and detailed budget for the first 3 years of the recovery programme was developed (see http://www.baiji.org/wuhan_workshop/san_diego_meeting.html).

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Earlier baiji and finless porpoise capture attempts have utilized 15+ boats, 50+ participants, and 2 km capture nets but smaller-scale capture operations would be less expensive and pose less danger of accidental entanglement to captured animals. The meeting's consensus advocated the use of two fast 9 m capture boats with 200 hp 4-stroke engines deploying two 500 m * 7–8 m fine-mesh nets, assisted by additional boats, and with a maximum involvement of 20–30 crew and 6–10 boats. Captured baiji should be moved immediately to Tian-e-Zhou by helicopter to minimize stressful translocation time. Each capture operation will need to last up to 2 months, and can only be carried out during the Yangtze low-water period (October–April). Five capture-translocation operations should be attempted during 2007–2009 to establish a viable *ex situ* breeding population at Tian-e-Zhou before the Yangtze population undergoes a further decline or becomes extinct.

A research facility at Tian-e-Zhou will be completed in 2006 but lacks laboratory, veterinary or support equipment. The most important requirement is a floating holding pen complex for soft-release of translocated baiji and subsequent monitoring of released animals. Two-three small inflatable craft are required to access the offshore holding pens, monitor and manage dolphins and porpoises, and enforce local fishing restrictions. Two keepers and associated support staff must be employed to maintain the holding pen complex and work with translocated baiji. International veterinarians and cetacean behavioural specialists must also be on-hand for several months to monitor baiji health and behavioural status, administer appropriate veterinary care, and provide on-going training for Chinese scientists and technical staff and students. An updated study of fish biomass is also required to assess baiji and finless porpoise carrying capacity in the oxbow.

It is now imperative to secure sufficient funds to provide long-term support for the baiji *ex situ* recovery programme. Without such investment, and without a concerted international conservation effort, the baiji faces imminent extinction.

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Successful pilot Yangtze freshwater dolphin expedition

In preparation for a November 2006 range-wide baiji survey, the Institute of Hydrobiology, Chinese Academy of Sciences, and the baiji.org Foundation co-organized a 9-day pilot expedition on the Yangtze near Wuhan to develop methodology for locating the last baiji river dolphins. The expedition took place during 17–25 March 2006 along a 235 km section of the middle reaches of the Yangtze. Team members included staff from Tian-e-Zhou and Xinluo National Baiji Reserves, Yueyang Fisheries officials, scientists and students from the Institute of Hydrology's Baiji Research Team, as well as invited cetacean survey and water quality specialists from US NOAA Fisheries and the Swiss-based EAWAG Water Research Institute.

The team spent 8 days aboard the Institute's research vessel, surveying upstream and downstream between the cities of Wuhan and Yueyang. They surveyed with binoculars and the naked eye, made recordings of ambient noise under various conditions, and took water and sediment samples from the main channel, Dongting Lake and the Shishou Oxbow Reserve. Based on the daily sighting rates of previous surveys the team did not expect to see any baiji in such a short period but were encouraged by the number of porpoises observed.

The industrialized Yangtze presented the pilot expedition team with challenges unknown in other large river systems. They concluded that traditional observational and acoustical survey methodologies for cetaceans would have to be significantly adapted to find the elusive baiji in a habitat that has become a superhighway for China's booming economy. The team will continue to test and refine the methodology in the months leading up to the range-wide search. Acoustical engineers from the Institute of Hydrology are working with the Japanese National Research Institute of Fisheries to develop software filters to help separate the faint baiji whistles and finless porpoise clicks from the ambient noise produced by the Yangtze's shipping traffic. They are also considering modifying and using autonomous recording systems, developed for locating dugongs, to help detect any submerged baiji missed by the observer crews.

Travelling in two ships, the international team will cover over 1,700 km of the Yangtze River from the Three Gorges Dam to Shanghai, and provide the first information in over 10 years on the number of baiji and finless porpoises in the Yangtze. Scientists and decision-makers hope to use these data to develop a conservation strategy to pull the species back from the

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brink of extinction and start work on a programme for the recovery of the Yangtze ecosystem.

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Arabian Conservation Workshop

The 7th International Conservation Workshop for the Fauna of Arabia took place at the Breeding Centre for Endangered Arabian Wildlife in Sharjah, UAE, over 19–22 February 2006 and was attended by 95 representatives from 23 countries. Attendees comprised experts from across the region and outside, representatives of IUCN specialist groups, government officials, and members of the captive breeding community. These annual workshops are sponsored and organized by Sharjah's Environment and Protected Areas Authority. Their principal purpose is assess the current status of species or groups of taxa occurring in the Arabian Peninsula, make Red List assessments, evaluate threats to biodiversity at a regional scale and recommend appropriate conservation action. The format is based on, and has evolved from, the Conservation Assessment and Management Plan process developed by the Conservation Breeding Specialist Group. Most of the workshop tasks are carried out in separate working groups, with a series of presentations completing the agenda. Networking is recognized as an important subsidiary benefit, and several collaborative initiatives have resulted from previous workshops. This year's programme covered Arabian leopard, Arabian tahr and Nubian ibex, shrews, rodents and hedgehogs, small raptors and owls, and freshwater fauna. The Critically Endangered Arabian leopard *Panthera pardus nimr* has featured regularly at the workshops (see also this issue pp. 287–294 and 295–301). Status reports and maps of current distribution have now been prepared for each range state and these, together with a summary of the successful captive breeding programme, will be published later this year by the IUCN Cat Specialist Group as a special issue of Cat News. The 2006 workshop agreed to develop a regional conservation strategy for the leopard on the Arabian Peninsula and to hold a strategic planning workshop in Sharjah in early 2007. The Arabian tahr *Hemitragus jayakari* is a small caprinid endemic to the Hajjar Mountains of south-eastern Arabia. An Arabian Tahr Working Group has been established and meets regularly to coordinate conservation work. The current status of 36 species of small mammals was assessed using standard taxon data sheets. Records of some species are few and survey and research priorities were highlighted. An appropriate Red List category was assigned to each species and outline conservation strategies were drawn up where data were adequate. A similar exercise was completed for all small raptors and owls breeding on the Peninsula. Finally, a freshwater fauna group concentrated on freshwater habitats across the Peninsula, collating and developing the results of working groups at previous meetings on freshwater fish, amphibians, and freshwater invertebrates. A system for classifying freshwater habitats and an outline strategy for their conservation at the regional level was developed.

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Botanic Gardens: more than just a pretty place

Botanic Gardens Conservation International (BGCI) recently launched the report *Botanic Gardens: Using Biodiversity to Improve Human Well-being* (K. Waylen. BGCI, Richmond, UK. ISBN: 1-905164-08-4, also available at http://www.bgci.org/wellbeing). Although botanic gardens are well recognized for their role in plant conservation, few people associate them with practical contributions to improving lives, even though these issues are linked. An extensive literature review and multilingual survey contributed the many case studies in this report, which highlights the diversity of the work of botanic gardens for well-being. Gardens across the world make contributions to improving healthcare, improving nutrition, alleviating financial poverty, and improving community and social relations. Many botanic gardens, such as Aburi Botanical Garden in Ghana, promote the improved nutrition and health of their local communities through their support for home gardens. Other projects range from horticultural therapy to training disadvantaged minorities in useful skills and sustainable handicraft production. Many projects are relevant to both developed and developing countries, including education about vegetables for healthy eating, and greening projects for urban neighbourhoods.

Education and research for useful plants underpin the ability of botanic gardens to conduct projects for well-being. A typical example is Kisantu Botanic Garden in the Democratic Republic of Congo, which conducted research on the popular fruit mangosteen to enable farmers to extend the fruit's shelf life. Other gardens, such as Botanic Garden Fundación Xochitla in Mexico, focus on developing locally cultivated plants for the ornamentals market. Networks and partnerships are

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also crucial: some projects involve collaboration between gardens, linking relatively affluent gardens with communities in poorer regions, and in many cases the unique role of botanic gardens is complemented by partnerships and collaborations with non-botanic garden institutions, such as local healthcare clinics.

Botanic gardens are clearly much more than just pretty places. This report illustrates they are uniquely placed to use plant diversity to contribute to human well-being. Given the scale of the crisis facing our efforts for both conservation and development, BGCI believes that it is an ethical and practical imperative that botanic gardens are mobilized for this goal.

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Eastern Arc Mountains, Tanzania

In December 2005 an application was made by the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism of the Government of Tanzania to place the Eastern Arc Mountains on the tentative list of World Heritage sites. This initial step in the World Heritage listing process was accepted by UNESCO, and the Tanzanian government is now seeking to complete the full proposal to include the forests of the Eastern Arc Mountains on this list of sites of outstanding universal value. In addition, on 31 March 2006, in Morogoro, Tanzania, a conservation endowment fund was launched that is dedicated to the conservation of the globally important forests of the Eastern Arc Mountains. The Eastern Arc Mountains Conservation Endowment Fund is being supported for its first 5 years using a USD 2 million investment from the government of Tanzania (World Bank IDA funding), and having met all eight of the benchmarks set by the World Bank will now receive a further USD 7 million from the GEF Trust Fund to capitalize the endowment. These funds will be invested offshore and the interest generated will be used to support long-term conservation actions in this global centre of biodiversity. Despite this excellent start, it has been estimated that in order to deliver concrete conservation impact across the Eastern Arc Mountains the Fund will need at least USD 20 million in its endowment, and hence fundraising efforts will continue. Anyone wishing to contact the Fund or learn more of its work and the Eastern Arc Mountains should visit http://www.easternarc.or.tz

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