

Kouprey Express – a mobile environmental education project

Cambodia is being reborn after the many years of war and civil strife that destroyed much of its infrastructure, institutions and population. Despite these losses it retains 35% of its land as forest cover and provides vital habitat for over 70 threatened species of wildlife including tigers, sun bears, Asian elephants and the Siamese crocodile. Thus, whilst there is still some forest to save, WildAid's Cambodia Conservation Program has been working since January 2000 with the Cambodian Government to protect wildlife and habitats against poaching, illegal trade and uncontrolled logging. However, it has been recognized that the enforcement programme will have greater impact if it is combined with complementary education programmes.

In 2002 Zoos Victoria agreed to provide an educator to support development and delivery of the Kouprey Express, WildAid's mobile conservation education unit. This uses a modified bus and is based on similar programmes from the Caribbean in the 1990s. The bus has been fitted out with a range of activity stations and painted outside with murals featuring Cambodia's wildlife. The programme's main objectives are to (1) increase environmental awareness in communities living around National Parks and Protected Forests, (2) offer school children lessons on wildlife and conservation, and (3) raise awareness of threats to wildlife.

The unit commenced operation in October 2004 with technical support from Zoos Victoria and funding from Free The Bears, US Fish & Wildlife Service, US AID and Care for the Wild International. The local Khmer teachers were drawn from the Forestry Administration of the Ministry of Agriculture, Forests & Fisheries and the Department of Nature Conservation & Protection in the Ministry of Environment. The Zoos Victoria educator spent 1 month in Cambodia developing the teaching programmes, training the teachers and delivering funds for teaching tools and equipment. The team spends 3 weeks out of each four visiting designated communities to deliver programmes to school children during the day and the broader community at night.

Major outcomes up to the end of October 2005 have been (1) lessons to more than 6,000 children living in communities surrounding 12 protected areas, (2) evening shows to 57 communities, (3) more than 35,000 villagers attending meetings on wildlife and forestry laws, (4)

almost 5,000 postcards collected from children, to be sent to the King, asking him to help stop wildlife poaching and killing, and (5) wide use of the Kouprey Express at public events to further promote wildlife conservation.

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Invertebrate conservation in the Falkland Islands

Terrestrial invertebrate conservation in the 13 UK Overseas Territories has received relatively little attention compared to that on the UK mainland. This is despite the fact that the UK mainland has relatively few endemic species. Only seven UK terrestrial invertebrate species are given endemic status by the two British Red Data Books covering insect and non-insect terrestrial invertebrates, whereas >680 terrestrial invertebrates have been recorded as endemics in the Overseas Territories (data compiled by the UK Government's Joint Nature Conservation Committee report *Biodiversity: The UK Overseas Territories*).

Having a surface area >12,000 km² and comprising over 780 islands, the Falkland Islands are the largest of the UK island Overseas Territories. To help conserve the Islands' unique fauna, Falklands Conservation has launched a major new initiative to both survey, then produce a biodiversity action plan for the Islands' invertebrates. The Falkland Islands Invertebrates Conservation Project was launched in September 2004 and is funded through a Darwin Initiative grant awarded by the UK Department for the Environment, Food and Rural Affairs with additional support from the Falkland Islands Government. The grant funds three austral summer field seasons of data collection, the first of which was successfully completed during January–April 2005. Subsequent field seasons are planned for 2006 and 2007, with taxonomic work being carried out at the University Museum of Zoology, Cambridge, and the Natural History Museum, London.

The aims of the Project are twofold. Firstly, to advance the knowledge of Falkland Island invertebrates to provide for their protection and to develop sustainable policies to ensure their long-term survival. Secondly, to raise local awareness and knowledge of the invertebrate

biodiversity of the islands, providing reference collections, databases, and an infrastructure of local expertise, built through annual training courses, as Project legacies.

Falklands Conservation is a UK registered charity founded by the late Sir Peter Scott and fellow conservationists in 1979 with the aim to monitor and protect the exceptional wildlife of the Falkland Islands (see <http://www.falklandsconservation.com>). A quarterly Project newsletter is available in electronic format. Anyone who wishes to be added to the mailing list for the newsletter please email ann@falklands-nature.demon.co.uk

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The harpy eagle restored to former Central American range

The Near Threatened harpy eagle *Harpia harpyja* of Central and South America is one of the largest raptors in the world. Its populations have been drastically reduced in Central America by hunting and habitat destruction, and the last documented sighting of a harpy eagle in Belize was in April 2000. That bird was later known to have been shot. Combined efforts between The Peregrine Fund Panama, the Government of Belize, The Belize Zoo and Programme for Belize have been working to ensure that this species is re-established into its former range within the Selva Maya, a 22,000 km² tract of tropical forest that extends from Belize into Guatemala and Mexico.

Harpy eagle chicks, captive-bred at The Peregrine Fund's Neotropical Raptor Center in Panama, are first released in Panama. They are monitored there and maintained within protected areas until they become independent and are hunting on a regular basis. At this point they are transferred, usually singly, to Belize and released into the 100,000 ha protected forests of the Rio Bravo Conservation Management Area in north-west Belize. This forest has abundant prey for the harpy eagle.

From March 2003 to November 2005, 10 harpy eagles were brought from Panama and released in the Management Area. Eight have survived. Documented prey over a 2-year period have included possums, kinkajous, coati-mundis, spider monkeys, porcupine and grey fox. The birds are monitored by both radio telemetry and satellite transmitters, and this information is providing the first data on the dispersal behaviour of subadult harpy eagles. One of the birds has dispersed 150 km from its initial release site, and data obtained on dispersal patterns will be valuable for other release and management programmes for large forest eagles. The Peregrine Fund has begun a year-long ecological study of the harpy

eagles released in the Rio Bravo Conservation Management Area. The aim is to examine seasonal differences in home range, diet and foraging patterns. In particular, prey selection in Belize will be compared with prey selection already documented in Panama.

In August 2005 a Memorandum of Understanding was signed between the Selva Maya countries of Belize, Guatemala and Mexico for the conservation of the remaining natural resources of this biodiverse region. The restoration of the harpy eagle in Belize is poised to see its success permeate into these neighbouring countries, thus empowering the mandate of the Memorandum. It is hoped that a self-sustaining population of harpy eagles will once again inhabit the forests of the Selva Maya.

The Belize restoration programme is complemented by an environmental education programme designed and implemented by The Belize Zoo. This programme includes billboards along two major highways showing the harpy eagle with the message *Protect Predators – They Balance Nature*, school and community visits by Belize Zoo educators, a daily radio programme about the restoration programme, distribution of posters, and local news coverage of harpy eagle releases and special events. It is hoped that this successful programme will serve as a role model for other raptor restoration projects.

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The Garamba-Yemen link and the near extinction of the northern white rhino

Yemen remains the main recipient of rhino horn from Africa. The bulk of this horn imported into Yemen in 2005 came from the northern white rhino. The last population of this subspecies, in Garamba National Park in the Democratic Republic of Congo (DRC), was virtually obliterated in 2005 and may no longer be viable.

Since 2003 the price of rhino horn has risen in Yemen from c. USD 1,200 to 1,500 per kg wholesale in the capital Sana'a. This suggests that demand has increased, with Yemeni men willing to pay more for a *jambiya* (the traditional curved daggers still worn by most men in the northern part of the country) with a rhino horn handle.

Sana'a traders indicate that Sudanese businessmen are buying the horns from southern Sudan and that the horns originate from the DRC. This information links up with the disastrous fate of Garamba's white rhino population in northern DRC where in 2003 there were 30 remaining but now there are probably <10 due to heavy poaching by Sudanese and Congolese entering the Park. Only 4 rhinos (2 adult males and 2 adult females) were counted in an intense aerial survey in August 2005.

The present trade route for horn out of Sudan is from Khartoum by air direct to Sana'a. Traders state they have no problem smuggling the horn out of Khartoum, but it is more difficult bringing it through the airport in Sana'a. Horn apparently also enters Yemen at Aden airport. The previous route was via Djibouti and across the Red Sea, but this sea route is no longer used because Naval ships, especially from western nations, are patrolling the Red Sea and the Somali coast searching for terrorist suspects and illicit consignments of weapons.

In the first half of 2005 c. 45 kg of horn, mostly of white rhino, were allegedly brought into Yemen. Normally the amount is less, with consignments reaching Yemen about five times per year in small quantities of 2–5 kg. A white rhino's two horns weigh on average 5.5 kg in total and those of a black rhino c. 3 kg. Traders in Yemen say they have also recently received horn from Tanzania, but in small amounts. According to reliable sources in Yemen most of the horn brought into Sana'a is purchased by one particular family. Some horn is apparently also brought into Yemen to be given as gifts to prominent families.

Jambiyat with new rhino horn handles are for sale in the souq of Sana'a and in Taiz. A new rhino horn, of c. 2.5 kg, was recently spotted in the Sana'a souq, suggesting that craftsmen have little reason to hide them at the moment as government inspections are neither thorough nor sufficiently numerous. This illicit business still threatens central and eastern Africa's rhinos and as a result the northern white rhino is almost extinct. The government of Yemen needs to do more to curb the trade and reduce demand for horn, and DRC is not taking adequate action to save its rhinos.

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Swamp deer sighting in Uttaranchal State, India

The swamp deer *Cervus duvaucelii duvaucelii* of India and Nepal is categorized as Vulnerable on the IUCN Red List, with the major threats being habitat loss and degradation, and hunting. In India the species' stronghold is Dudhwa Tiger Reserve and Kishanpur Sanctuary in Uttaranchal State, with a combined population in 2004 of c. 1,250. A small population of swamp deer has also been reported in Hastinapur in Uttar Pradesh.

Jhilmil Jheel wetland is situated on the bank of the River Ganges in Chidiyapur forest range in Haridwar district, Uttaranchal State. Nine huts occupied by pastoralist Gujjars are situated at the edge of forest surrounding Jhilmil Jheel, and there is a small village to the south of the wetland. These people have been settled in

the area since the 1950s; most of them are from Punjab, Himachal Pradesh and Garhwal. On 1 February 2005 we visited Jhilmil Jheel to explore the possibility of reintroducing rhino into the area. While surveying the area on foot and by elephant we found hoof marks of swamp deer. We heard the call of a stag, and were then able to observe 34 swamp deer within an open patch of grassland along a water channel. There were nine fully grown stags, does and a first-year fawn. We also found swamp deer antlers. We returned to the area on 3 February 2005 and sighted 30 swamp deer.

On 6 February 2005 the Minister of Forests visited the area and in a meeting the local villagers stated they were keen to be resettled elsewhere, and indicated the area to which they would prefer to move. A proposal to relocate the villagers of Jhilmil Jheel is now under consideration, and on 14 August 2005 Jhilmil Jheel was gazetted as a Conservation Reserve for swamp deer. A detailed long-term project proposal for the management of the new Reserve has been prepared and sent to the Ministry of Environment and Forests for possible funding.

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Monitoring matters: evaluating locally-based biodiversity monitoring in developing countries

Because biodiversity monitoring is often costly and difficult to sustain it is relatively less developed in poorer regions, and is sometimes considered irrelevant by resource managers and local communities. However, where the aim of monitoring is to obtain data for management decisions, alternative approaches involving individuals with little formal education are emerging. Locally-based monitoring in developing countries includes a spectrum of approaches from participatory monitoring, where aims and objectives are defined by local residents, to ranger-based monitoring in reserves. What distinguishes these approaches is that local people are directly involved in data collection and interpretation. The potential value of locally-based schemes is already evident in wealthier countries, where data from volunteer monitoring often guides conservation and, occasionally, government policy. The scope for similar collaboration between professionals and local people in developing countries has not been fully explored, but

could be considerable. Nordeco (Denmark) and Cambridge University (UK) hosted an international conference in 2004 to examine case studies of locally-based monitoring in developing countries (see October 2005 special issue of *Biodiversity and Conservation* and also <http://www.monitoringmatters.org>).

The conference concluded that, in terms of cost, locally-based monitoring is cheap relative to professional monitoring, even though start-up costs can be high. The median cost of funding for locally-based monitoring across 13 case studies was found to be *c.* 5% of that used for management. Low recurrent costs also increase sustainability. In Ghana, for example, a ranger-based monitoring scheme operated for 30 years, with salaries paid by government and only sporadic external funding. On the other hand, in community situations locally-based monitoring cannot be sustained unless the benefits of monitoring outweigh the costs.

Some scientists are sceptical of the ability of locally-based monitoring schemes to accurately detect underlying trends but the conference concluded that scientific comparisons of locally-based with professional monitoring schemes are too rare for firm conclusions to be drawn. Like other monitoring approaches, locally-based methods are vulnerable to various sources of bias and imprecision. Problems include a lack of measurement or identification experience on the part of observers, small sample sizes, inefficient distribution of sampling effort, potential conflicts of interest and a risk, in the absence of careful documentation, of methods drifting over time or of results reflecting long-term perceptions rather than current trends. However, these problems also apply to monitoring in resource-rich countries, and solutions, involving careful *a priori* planning and better training of observers, have been developed.

Another conclusion was that locally-based monitoring can play a strong positive role in helping communities initiate effective and appropriate conservation management action. Management decisions emanating from local monitoring schemes are often made promptly because they sidestep multi-layered bureaucracies. Rapidly implemented decisions address immediate threats to the environment, and often lead to community-based actions that protect habitats, species and the local flow of ecosystem benefits. In comparison, monitoring by scientists is often slow in leading to local management actions, but may have greater potential for influencing national and global policies.

Locally-based monitoring can also reinforce existing community-based resource management systems and change attitudes towards more environmentally sustainable management. Many schemes not only improve collaboration and communication between local stakeholders and government authorities but also improve transparency and governance, and increase compliance

with laws. Moreover, some schemes translate local knowledge into government language, thereby empowering local residents.

Local schemes are particularly well suited for certain kinds of data collection. For instance, whereas changes in the extent of some biomes are most efficiently monitored top-down, e.g. via remote-sensing, for many others habitat loss proceeds primarily via degradation rather than wholesale conversion. Few large-scale programmes exist for tracking such changes in habitat condition but new meta-analytical techniques mean that data from diverse small-scale studies using locally-based monitoring approaches could, if properly coordinated, be synthesized to elucidate larger-scale patterns. The same may also hold for monitoring changes in the delivery of some key ecosystem services.

The conference participants concluded that the establishment, testing and encouragement of locally-based monitoring in developing countries should be a priority for the conservation community. If properly designed and carefully tailored to local issues, locally-based monitoring can provide valuable data, cost-effectively and sustainably, while simultaneously building capacity among local constituents and promoting practical and effective management interventions. Investments in monitoring should be carefully tailored to management aims, and monitoring protocols should be designed in a scientifically robust manner. Moreover, locally-based efforts are not always the right or only answer: data collection by scientists will often be essential. Further scientific comparison is needed between professional and locally-based monitoring schemes in developing countries to evaluate their ability to detect underlying changes in populations, habitats, and the provision of goods and services. Practical needs include consideration of how to make technical support and guidance more accessible. The considerable success of 'citizen science' in richer nations provides a powerful argument for its extension to the developing world.

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Influence of mastic cultivation on the orchid diversity of Chios, Greece

The study of the orchids of the Greek island of Chios has shown it to be exceptionally rich, with 76 species recorded so far (*Illustrated Checklist, Orchids of Chios, Inouses and Psara*, Mike Taylor, 2005, Pelineo Editions, Chios, Greece.). In one locality, near Olympi, a 5 ha site has been discovered that has 35 species, including 20 species considered rare in a European context, six local and nine common. This is remarkable knowing that Rhodes, considered a veritable Mecca for orchid researchers and enthusiasts, has 40 recorded species.

The eastern Mediterranean is a centre of diversity for the genus *Ophrys*. The Olympi site, with 24 recorded species of *Ophrys*, including 15 considered rare and the presence of hybrids, offers a unique research opportunity. The lack of herbicide and insecticide use also adds to the attraction of the site. Discussions are ongoing to create an orchid sanctuary at Olympi in cooperation with the Gum Mastic Growers Association of Chios.

I was recently asked to produce teaching materials for use in the Chios primary schools environmental education programme on the relationships between the cultivation of 2 million mastic trees *Pistacia lentiscus* and the plants and animals that live amongst them. As I researched this subject I realized the major influence that the cultivation of mastic has had in supporting the orchids of Chios and how this activity has created ideal conditions for the ongoing colonization of Chios by species from adjacent territories. Orchids are ruderal, meaning that they require some irregular minimal disturbance to surface soils, as has been traditionally used by farmers in cultivating their mastic trees. This gentle farming offers ideal conditions for germination of the wind dispersed seeds and supports the growth of plants to maturity and setting and dispersal of seed.

One of the incidental benefits of mastic cultivation is the shepherding of goats from mastic terraces during spring and summer. Traditionally herds of goats wintered on lower ground, including mastic terraces, returning to upland areas before the spring emergence of orchids. Orchids are therefore free from the danger of being grazed during flowering and seeding. The hilly nature of Chios resulted in the use of terracing for ease of access by farmers and for irrigation purposes, and terraces also provide a range of microenvironments that allow orchid species with wide ranging but specific requirements to thrive in close proximity.

Discussion with Dr Ilias Smyrnioudis, of the Gum Mastic Growers Association, on the recommended cultivation regime for mastic showed that it closely matches the needs of wild orchids. The widespread and shallow root system of mastic trees precludes deep ploughing

near the roots. Cultivation recommendations limit soil disturbance to <50 mm. Hence, traditional cultivation involves limited physical intervention, this being confined to keeping the ground below gum mastic producing branches bare of vegetation, the ground being covered in chalk to aid the collection of clean gum 'tears'.

This non-intrusive cultivation is in contrast to the regular and deep ploughing used in the cultivation of olives. On Chios the cultivation of olives is secondary to that of gum mastic, unlike surrounding islands that have intensive olive production and, consequently, a relatively impoverished orchid fauna. Maintenance of traditional mastic cultivation in Chios will secure the survival of its orchid diversity, which is becoming widely known throughout European research institutions, natural history societies and ecotourism operators. Increased visits to Chios by visitors wishing to see orchids will produce significant additional income for local villagers.

There have been a few but increasing incidents of inappropriate ploughing near mastic plantations that are unlikely to increase yields but that damage some of the rarest and most sought after orchids. Dissemination of information regarding these matters will reduce instances of excessive ploughing. Many of the insect pollinators of Chios orchids also act as natural pest controllers of injurious insects. Fortunately, damage to Mastic trees is infrequent and should remain so as long as inappropriate use of insecticides is avoided. The survival of these insect pollinators is essential for the survival of the populations of orchids as without them the orchids would not set seed and colonies would eventually die out.

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Guidelines for Applying the Precautionary Principle

Guidelines for Applying the Precautionary Principle to Biodiversity Conservation and Natural Resource Management have been issued by the Precautionary Principle Project, a joint initiative of Fauna & Flora International, IUCN, Resource Africa and TRAFFIC. These Guidelines represent the first set of guidance for the Precautionary Principle in biodiversity conservation and Natural Resource Management, and it is hoped that they will inform and assist decision makers, policy makers and managers in interpreting and applying the Precautionary Principle across a wide range of contexts. These Guidelines are necessary because conservation and Natural Resource Management virtually never have consistent, high quality information about the threats with which

they deal. Whether the context is protected areas, ecosystem services, trade in wildlife, invasive species or fisheries, decision makers must grapple with poor or incomplete data, inherent unpredictability, and ignorance. How decision making responds to this uncertainty has a major impact on its success in achieving environmental and sustainable development objectives. Waiting until evidence of impending harm or damage is clear and unambiguous will often mean it is too late to prevent serious, costly or irreversible environmental harm. The Precautionary Principle urges action in advance of certainty about threats, supporting anticipatory, preventative action against potential harm. The Guidelines include guidance on topics such as the relationship of the Principle to other rights and principles, turning the abstract principle into operational measures, the relationship of precaution to scientific, indigenous and traditional knowledge, the need for participation in precautionary decision making, characterizing uncertain threats, allocating responsibilities for providing evidence, and adaptive management. They are the product of an international consultative process carried out from 2002 to 2005, involving a wide range of experts and stakeholders from different regions, sectors, disciplines and perspectives. This process included three regional workshops, an international set of 27 case studies, discussions within international policy fora, and a final international review workshop. The Guidelines are available in English, Spanish and French at <http://www.pprinciple.net>, and a colour brochure with further background information and illustrative cartoons is available in English only. Contact Barney Dickson (barney.dickson@fauna-flora.org) or Rosie Cooney (rosie.cooney@gmail.com) for further information.

FrontlineSMS – a text messaging system for NGOs

Uptake of mobile phones in both developed and developing countries continues unabated. The African continent alone has witnessed growth rates in excess of 100% in the past 12 months. In many cases mobile telephony has become people's only means of telecommunication in areas where landline infrastructure is generally poor. Mobile phones are now considered a key tool in closing the digital divide and rates of ownership, even among

some of the poorest members of society, are surprisingly high.

As mobile phone ownership grows, so does access to, and use of, text messaging (SMS). Unlike costly voice calls, text messages allow people to communicate both nationally and internationally at relatively low cost. The potential of mobile phones, and SMS in particular, to provide some of the poorest people in the world with local, relevant information has not gone unnoticed, and many NGOs are beginning to look closely at the potential of this technology.

Patients now receive SMS reminders to take their medicine, saving time and money travelling to local clinics. Farmers receive details of market prices and demand for their products before heading off to market. National parks communicate details of dangerous animals, providing an early warning system to mitigate against human/wildlife conflict. Young people living in the slums of Nairobi receive texts alerting them to job opportunities in the city. The breadth of use of SMS is staggering.

Until now many NGOs have independently implemented SMS systems, some going as far as designing and developing their own applications. This is of little use, however, to the wider community. FrontlineSMS was launched towards the end of 2005 specifically to bridge this gap, aiming to provide an affordable, standalone, turnkey SMS solution for NGOs. FrontlineSMS gives access to 'bulk' SMS technology and provides the facility to carry out small- to medium-scale trials before embarking on larger projects. Although SMS systems do exist, few if any have been designed with the NGO sector in mind and almost all require reliable internet connectivity, a problem in many developing countries. FrontlineSMS works off a laptop, a cable and most standard GSM mobile phones, giving true portability, and users are encouraged to share views, experiences and ideas via an online forum, providing feedback for future versions of the product.

A number of trials are currently underway, with the product available to the wider NGO community from January 2006. Further details are available at <http://www.frontlinesms.com>

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