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introducing
cc kids

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GEORGE SWAN



Cover art by Aindri Chakraborty

Fill in the blank:

One key word that should always send up a red flag to all of us who care about animals is “_____”. . . . When I hear that word, I know for sure that there is some sort of hunting, fishing, trapping, etc., involved . . .¹

The correct answer is “conservation”. Conservationists, in their efforts to save the world’s species, sometimes, need to capture, translocate, cage, injure and even kill individual animals. Not surprisingly, these actions raise the hackles of animal rights and welfare groups - such as People for Ethical Treatment of Animals (PETA), from whose website¹ the above lines were taken – whose aim is to protect the rights of every single individual animal. The articles in this edition of CC all deal with the thorny issue of animal rights in conservation: should we eradicate invasive animals from islands? How should we deal with stray dogs that attack wildlife in the Trans- Himalayas? Or feral horses that destroy natural vegetation in Australia? Do zoo animals have a role in conservation?

We are also happy to announce the launch of a Current Conservation children’s section, from this edition onwards. More about this from our editors Matt, Ankila and Kalyani:

*If you’re 10 years old, plus or minus a few
And you enjoy the outdoors, plants, animals and birds
Then starting this summer we have something new
Current Conservation Kids, just for you!*

*There’s a project to join, and stories to read,
Fun facts about nature for you and your friends,
There’s the bull and the bear and the bumbley bee
And you must meet, George, who works in a tree!*

*We hope you’ll enjoy this, we’d love to know.
Tell us your thoughts, send us ideas you have.
Round up your classmates and start a pen pal group,
Or send questions for George if you want to know more!*

¹<http://prime.peta.org/2011/08/cons>

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An interview with Josh Donlan

*Josh Donlan is the founding director of Advanced Conservation Strategies, a non-profit organisation that aims to promote novel solutions and ventures, based on solid science, to solve conservation problems. From 2002 to 2006 he served as Chief Scientist on Project Isabela in the Galapagos islands, a bold conservation intervention to rid islands of feral goats that were decimating the natural vegetation. **Hari Sridhar** spoke to **Josh Donlan** to find out more about Project Isabela and the animal rights and welfare issues surrounding invasive species eradication on islands.*

Hari Sridhar: To begin, can you tell the reader what invasive species are and why they are particularly problematic on islands?

Josh Donlan: Before worrying about whether a species is invasive – which necessarily means it is highly interactive with other species -- we need to first answer the question is it native or exotic. Defining non-native species can often be not straightforward and somewhat complex depending on your view of ecological history. In some cases, it is very clear that a species is non-native, such as rats and cats on islands, because very few islands have an ecological history of mammals. In other areas, especially in continental areas, it can be more complicated or grey. Take horses in North America. Most people view horses in North America as non-native, but actually, horses evolved in North America and then radiated out and later went extinct in North America. So, the horses that are in North America today are very similar genetically, and probably ecologically, to the horses that were present here 10,000 years ago. Therefore, whether or not you consider horses ‘non-native’ depends on what your baseline is. On islands, more often than not, it is easier to tell whether a species is non-native because their ecological histories are clearer. For me the first step is always this, to see whether a species is native or not, independent of its impact. Whether it is invasive or not, and what we do about that, is the next step.

*HS: Please tell us a little about the history of “**Project Isabela**” and how you got involved in it.*

JD: The history of this project is quite long. It began in the late 1990s when a group of experts got together for a workshop in Galapagos to brainstorm on what to do about feral goats. These goats had been on the Galapagos archipelago for a long time - over 100 years - and had recently moved from southern Isabela into northern Isabela island and were having significant impacts on the ecosystem there. At that time, the largest island from which goats had been removed was about 17,000 hectares. Isabela is over 500,000 hectares. If you had asked the average conservationist working on islands and invasive species at that time, he would have probably said it would be impossible to remove goats from such a large area, given the current best practices and success to-date for invasive species management on islands. The result of that workshop was that the participants concluded it might be possible to do this using new techniques largely developed in New Zealand and Australia. Next began a long process of fund raising, strategy development, and capacity-building to launch Project Isabela, whose main goal was to first remove goats from Santiago island, which was around 60,000 hectares, and then moving on to Isabela island. My role was of Chief Scientist, working with the practitioners to collect all sorts of data on the eradication process itself — information that could be used to develop

methodologies to make eradications more cost-effective. We also collected data to understand, from a biodiversity perspective, both the impacts and the benefits of removing goats from these islands. Project Isabela was successful and a game-changer for the eradication of feral goats and other invasive herbivores from islands. Today, these mega-eradications are increasingly common.

HS: What was the problem with the goats?

JD: The goats were clearly having major direct and indirect impacts on the ecosystem. The Galapagos islands have no history of native mammalian herbivores. The goats, through their grazing and browsing, were changing plant community structure and in some cases leading to local extinctions of plant species they preferred to feed on. These direct impacts, in turn, had indirect impacts such as altering hydrology patterns and reducing numbers of tortoises, which are the main herbivores and a keystone species on the island. After the goats were removed, we have been able to document the positive impacts. For example, the Galapagos rail (*Laterallus spilonota*), which is endemic to the Galapagos, was thought to be extinct on Santiago island due to the impacts from goats and pigs. Through the use of surveys using an audio playback system, we were able to repeat rail surveys conducted in the mid-1980s. Estimated densities had increased by over an order of magnitude, largely due to vegetation recovery. The benefits of invasive species eradication on the Galapagos Islands have been documented on other islands for other species as well.

HS: Right from the beginning, was it clear that removing goats was the only way to deal with this problem? Were other ways of tackling the problem considered?

JD: Certainly other possibilities were discussed, such as control programmes. But it was felt that, over the long term the best strategy and certainly the most cost-effective and low-risk strategy was complete removal. Having said that, there still are, as far as I am aware, small numbers of goats that are connected with the local communities on southern Isabela island. So the long-term strategy is to have 'Judas goats' out on the island as a biosecurity measure to help manage the risk of reintroduction or reinvasion.

HS: What are 'Judas goats'?

JD: 'Judas goats' were originally developed in New Zealand. Project Isabela took Judas goats to the next level, in terms of developing it as a conservation tool for invasive species management. With the proper resources, it turns out it is relatively easy to remove 90% of a feral population, but it tends to be really expensive and really hard to remove the last animals. To give you a real-world example - in Santiago island, around 79000 goats were removed from the island in 4.5 years spending USD 6.1 million. Removing the last 100 goats cost USD 2 million and took almost two years! The last animals are extremely difficult and expensive to remove. Judas goats are a technique to deal with this problem. You capture live goats, radio-collar them and put them out on the landscape to take advantage of the social biology of goats, i.e. other goats are drawn to the collared goat and vice versa. You go find your Judas goats with a helicopter and remove all the goats around them. In our case, we had around 400 Judas goats all across the island, at the same time for a year, to remove the last animals.

HS: Was there opposition of any kind to your proposal to remove the goats?

JD: It was definitely controversial. Unlike eradication projects in the US, Europe and New Zealand, the controversy wasn't so much from an animal rights or animal welfare perspective. It was mainly opposition from people who were using the goats, e.g. some fishermen claimed that they used the goats on fishing camps, occasionally hunting them. So there was some community opposition with respect to access and use. It turns out that these benefits are probably relatively minor compared to, what could be argued were, the societal benefits of goat removal. But it certainly was controversial, and it is complex on Galapagos because there is a long history of controversy and conflict between the communities and the national parks, mostly around fishing permits. This conflict tends to impact all sorts management actions by the National Park. So Project Isabela became part of the larger controversy that is long-standing between communities and government agencies that are managing the park.

'Judas goats' were originally developed in New Zealand. Project Isabela took Judas goats to the next level, in terms of developing it as a conservation tool for invasive species management. With the proper resources, it turns out it is relatively easy to remove 90% of a feral population, but it tends to be really expensive and really hard to remove the last animals.

HS: But wasn't there any opposition on grounds of animal rights and welfare?

JD: No, there wasn't. It is somewhat surprising given the fact that it was the largest eradication project in the world at that time and still is one of the largest eradication projects. But we did not experience any opposition from animal rights or welfare groups, unlike other invasive species eradication projects I have been part of in the US, which have often gone to court.

HS: For a naïve observer this might seem like a somewhat strange situation – killing thousands of a 'semi-wild' species to safeguard another wild species. What would you say to such an observer?

JD: That's one of the main questions that comes up around this fairly aggressive conservation action of invasive species eradication. My view largely comes down to values and what kind of world do you want to live in. Do you want to live in a world that's dominated by a few species that are the same everywhere you go – rats and dandelions and goats – or do you want to live in a world where there's diversity and different species in different places? If

you look at the big picture, we are seeing this global homogenisation of biodiversity – if I go to California or the Mediterranean or the west coast of Australia I see the exact same weed species. It is pretty striking. And more so on islands. Islands have been disproportionately impacted by invasive species for a variety of reasons. So the question really is what do we value more. On an island, do we value a rat that exists in lots and lots of places, or a bird species that's on the verge of going extinct, that breeds only on three or four islands in the world? In my view that's what often justifies this aggressive action of invasive species eradication.

HS: You mention that in other eradication programmes in the US and Australia/New Zealand there has been opposition, even court battles, on animal rights/ welfare grounds. Can you tell us more about that?

JD: You can probably divide the opposition into two different issues – one is a straightforward animal rights and welfare issue. Rats have rights and they deserve to exist on this island whether they are native or not, and whether they are having species and ecosystem impacts or not. These groups are just ethically against killing any animal which is, in my view, problematic since animals die (and kill) all the time. The other issue is around safety. For example, the best practice for removing rodents are toxicants – rodenticides which are often broadcast over an entire island by helicopter. There can be short-term



impacts on non-target species. And, in situations like New Zealand, there are often long-term programmes that are using toxicants. So there have been concerns and oppositions around potential impacts beyond the target species. This is a justified concern. And in fact, a lot of effort is being spent on developing practices that are as safe as possible and that mitigate any impacts on non-target impacts. Also, educating the public on not only on the short-term impacts but also the long-term conservation benefit is important. It's a pretty complicated situation and a challenge to communicate that to the public and to the policy makers. In my view, invasive species eradication should be viewed through a cost-benefit perspective. Often, the benefits outweigh the costs.

HS: Does opposition along animal rights/welfare lines usually come from organisations or from the local people?

JD: From both. Depends on the context of the species that you are eradicating and the techniques you are using. I find that, as long as we are safely eradicating a species and we frame it in the big picture, we often end up convincing people of the value of invasive species eradication. I'll give you an example. There is an island called Guadalupe where Laysan albatrosses (*Phoebastria immutabilis*) were being decimated by feral cats. A female albatross, with a chick on the nest, would go off on a feeding trip—flying tens of thousands of kilometres up to Alaska—to find food for its chick. It returns, feeds its chick, and makes the long journey again. Then, one day, the chick is killed by a feral cat. In such a situation, who is one to say that the cat has priority over the albatross? That's why the animal rights argument is problematic, because it's relative. In my view it is easier to make the argument that Laysan albatrosses are more important than cats, in this case, because cats are more widespread. So I think the real debate, the more useful debate, should be about whether we are conducting these eradications in a safe way, and whether the benefits outweigh the costs. However, you are never going to convince everybody.

HS: I notice you have been involved in eradications of many different invasive animals – cats, rats, pigs, donkeys, beavers, goats etc. Does eradication become more of a challenge in the case of animals that humans share a strong bond with? For example, is rat

Islands have been disproportionately impacted by invasive species for a variety of reasons. So the question really is what do we value more. On an island, do we value a rat that exists in lots and lots of places, or a bird species that's on the verge of going extinct, that breeds only on three or four islands in the world? In my view that's what often justifies this aggressive action of invasive species eradication.

eradication easier than cat eradication?

JD: On average I would say yes. You don't often see people rallying in the defence of rats – although it has happened in the US – in comparison to cats, which people keep as pets. And the island conservation community is finding itself having to deal with such issues more and more. As we have got better and better at removing invasive species from islands, we are taking on larger and larger islands. What this means is that we are now dealing with islands that are human inhabited. This adds a complex social layer – whether its pets, livestock, or a perceived or real risk to humans. Practitioners are having to deal with this human angle more and more, and are starting to do the social science and education to engage stakeholders, both on and away from the island, in order to get support for the eradication. This is all the more important in a place like India where you have a very different culture around animals and wide prevalence of vegetarianism. So we really need to tailor our strategy based on the species and the place.



HS: Does it also matter whether the invasive species is wild or domestic? For example, the Chital (Axis axis) is considered invasive in the Andaman islands in India, but it is also found wild in forests in mainland India.

JD: My view is that it raises a major challenge in communication. The general public doesn't necessarily appreciate ecological history or whether a species is native or exotic. In India, people have heard about and seen wild Chital in forests on the Indian mainland but they might not be aware that they never existed on Andaman island and might be bad for the ecosystem. I think it definitely raises a lot of social challenges, as well as policy challenges. We are increasingly seeing situations like this where practitioners are trying to navigate those challenges.

HS: Do you also take into consideration positive impacts that invasive species might have on the ecosystem?

JD: In my view, it all comes down to ecological history. If you take any typical oceanic island, chances are it has never had a native mammal. So it's hard to make an argument that a non-native mammal will be having positive impacts on the ecosystem, whether it's in terms of species interactions, biodiversity, or some ecosystem service. But there are exceptions. For example, there is a small Hawaiian island where an endemic goose called the Nene (*Branta sandvicensis*) went extinct. Now, conservation practitioners are using tortoises as an ecological substitute, in an experimental way to see if the tortoises can browse on the vegetation like the Nene did. So that's a situation where they

are hypothesising that the tortoise –a non-native species – can act as an ecological proxy for the extinct Nene and that it will have a "positive impact" on the ecosystem. A similar situation comes up with goat eradication. There are some striking examples where practitioners have removed goats from islands and you see this explosion of weedy plants. So now, in the last decade, practitioners have started to take more of an ecosystem approach to invasive species eradication by conducting invasive plant control operations at the same time as the goat eradication.

HS: Now, in the programmes you are involved in, do you reach out to animal rights groups and other stakeholders right from the beginning? Do you also run outreach programmes to explain to people why you are doing what you are doing?

JD: Certainly best practices have improved over the past decade or so. Nowadays, when conservation groups are planning eradication programmes one of the things they do first is engage groups that might have issues with the eradication or oppose the project. What a lot of people don't realise is that, in eradication programmes, the actual eradication – getting rid of rodents is a perfect example –might take one day with a helicopter. But in order to drop poison from a helicopter on one day, you are probably going to spend a year or two planning, getting permits, working with policy-makers, and getting all the stakeholders on board. So the planning and getting permits is usually the bulk of the work, compared to the actual on-the-ground eradication. And that's becoming increasingly the case because practitioners are starting to tackle these very complex eradications. Andaman Islands are a good example. The Andaman Islands are amazingly complex, not only because of social, political, and cultural factors, but also because there is a big city on the island. Not to mention, indigenous groups living in isolation nearby. This is not to say that the removal of invasive species would be easy, but the big challenge is the people. It is a people problem.

HS: Since you have visited Andaman and seen the problem first-hand, what is your view on the Chital issue? Do you think that the solution there too lies in eradication?

JD: From my limited experience in my trip over there, my view is, at the minimum, there is limited evidence suggesting that the species is having a negative impact on the ecosystem. We know that it's non-native. And that there is a whole suite of other non-native species that are likely having an impact. So the next obvious step is to commission a feasibility study that will objectively look at the available data – scientific as well as social – and try to make a roadmap for a cost-benefit analysis to explore a whole portfolio of potential management interventions, of which eradication will only be one. I think it is probably premature to say we should eradicate them, without doing the homework and looking at each of the management interventions that are possible.

The purpose of my trip there was to help start this long process, and try to educate the stakeholders on what is possible. Technically, based on what has been done elsewhere, removing Chital from the Andaman islands is probably technically feasible. But whether the benefits outweigh the costs, and whether it is feasible from a policy and social perspective are unanswered questions.

HS: I have one final question. The motivation to remove invasive species is because we see them as man-made changes. What we are trying to do is move the system back to what we see as more natural or pristine. But one could argue that humans today are part of the planet's natural system and eradication is just replacing one human-induced change with another. How do you decide where to draw the line? How far back in history does one go to consider something natural?

JD: Obviously, that's a very complex question. In terms of how we decide, I guess my initial reaction would be that it is above my pay grade! I don't make that decision. But, in general, I think it comes back to what I said earlier – it is asking what kind of world we want to live in. What is natural and



unnatural is a loaded question, and we can argue about it forever. Instead, I would ask myself, or the people I am talking to, about these complex issues – what type of world do you want to live in? Do you want to live in a world filled with rats and dandelions, or do you want to live in a world where there are all these cool endemic lizards on Andaman islands, even if you may never see them? Does that add value to your life? We know we are increasingly living in a world of rats and dandelions. Are these aggressive, and often controversial, conservation actions justified in order to maintain some of the biodiversity around the world? In my view, it is. As long as we can do it safely. And, as long as we are transparent about it. I think that's a simpler view than trying to say what is natural and what is unnatural. And like I said at the beginning, ecological history can provide a kind of a roadmap to where we want to go.

Hari Sridhar is a postdoctoral fellow at Indian Institute of Science, Bangalore, harisridhar1982@gmail.com.

Managing man's best friend in a Trans-Himalayan landscape



On most summer days, one is likely to find Skalzang sitting leisurely, basking in the morning sun, in the space adjoining the little hotel he runs in Kaza. As you pass him by, he'd greet you with a loud *Juley! Cha thung cha*: an invitation to join him for a cup of tea over some juicy local gossip. But on this particular day he looked rather animated. This former archer, who once represented India at the Olympics, seemed to be taking fresh target. *What's up?* I asked. I'm guiding the youth of our block. It's our turn to catch dogs today!

We need to go back in time to make sense of this seemingly-absurd statement.

The year was 2009. Project Snow Leopard had just been approved by the Ministry of Environment and Forests. Acknowledging the uniqueness of sparsely populated high altitude landscapes, Project Snow Leopard aimed to conserve its wildlife through landscape-level planning and approaches that would include local communities in this process. Taking a lead on proceedings, Himachal Pradesh became the first state to identify a landscape of c. 4000 km² to conserve under this project, in Spiti valley, which lies in the trans-Himalayan region of Himachal Pradesh, above an altitude of 3000m from mean sea level. The Upper Spiti Landscape (or USL) as it came to be known, was carved out of the upper catchment of Spiti River, and included Kibber Wildlife Sanctuary, along with the surrounding area covering close to 30 villages of the valley. In 2010, the Himachal Pradesh Forest Department (HPFD), along with Nature Conservation Foundation (NCF) began preparing

a management plan for the landscape, that would guide research and conservation work over the next 5 years. A team of young wildlife researchers, forest officers and a handful of Spitian youth, who worked with NCF, was formed to make the plan. I also was part of this team. A key component of the plan was to assess threats to wildlife and local livelihoods through field surveys and community interactions which would guide future work. As the team began to visit and speak with Spitians across villages, a rather unexpected threat kept cropping up in conversations—livestock predation by free-ranging dogs.

The trans-Himalayas are cold, dry, stark and sparsely populated. Spiti valley is inhabited by Buddhist communities who have practiced agro-pastoralism for many centuries. They combine farming, during the short summer, with rearing livestock for a dual source of living. People mainly rear sheep, goat, donkeys, horses, cows and yaks and attach high value to them. However, the situation is different in Kaza, the capital of Spiti, which is largely inhabited by Spitians from across the valley, who work in government jobs, and by non-local government officials. As a result, very few, if any, livestock are reared in this town. Kaza is also home to a blossoming, resource-intensive hotel business that supports rising tourism in the valley. Food waste generated from these hotels during the tourist season are an easy resource for free-ranging dogs. During the long winter, when livestock give birth, several new born calves do not survive their first year. With no systems to manage garbage in the smaller villages where livestock are reared, these calf carcasses too become easily available to dogs. The lack of effective garbage management has led to an increase in the dog population. Large parts of this population are free-ranging in nature and actively hunt livestock too. While Kaza and its neighbouring town of Rangrik are the epicentres of the flourishing dog population, the impacts, in terms of the livestock depredation, are mainly felt by the villages adjacent to these towns.

In order to assess the scale of the problem, we interacted with local herders from villages adjoining Kaza and Rangrik. This effort, to systematically collect data on the livestock predation caused by dogs, threw up a few unexpected surprises.

Kaza is home to a blossoming, resource-intensive hotel business that supports rising tourism in the valley. Food waste generated from these hotels during the tourist season, are an easy resource for free-ranging dogs. The lack of effective garbage management has led to an increase in the dog population. Large parts of this population are free-ranging in nature and actively hunt livestock too.

Between January 2009 and December 2010, a total of 809 livestock were reported dead in 25 villages. Of this, predation by free-ranging dogs was the biggest cause for mortality (338 livestock heads). Free-ranging dogs were killing more livestock than snow leopards and wolves combined. While snow leopards and wolves tended to hunt larger-bodied livestock, like yak, cows, donkeys and horses, free-ranging dogs specialised in hunting smaller-bodied livestock like sheep and goat. Even with the most conservative estimates of livestock prices, these damages by free-ranging dogs translated into monetary damages of no less than 1.6 million rupees (US\$.25,000), incurred over a period of two years in the 25 surveyed villages. Little surprise then that Spitians saw free-ranging dogs as a major threat. Similar data collected over subsequent years confirmed these trends. So severe was the problem that several villages had stopped rearing sheep and goat for fear of losing them to dogs.

The other risk from free-ranging dogs was to wildlife in the landscape. By 2012, there were reports of packs of free-ranging dogs trying to chase



Nature Conservation Foundation and Snow Leopard Trust

herds of blue sheep (*Pseudois nayaur*) and ibex (*Capra sibirica*). There were also reports of them chasing snow leopards off their kills, of a Himalayan wolf staying with a pack of dogs close to one of local villages and also of attempts to mate between a Himalayan wolf and a free-ranging dog. Such interactions of free-ranging dogs with wildlife, as predators and competitors, added a new dimension to the challenge in conserving wildlife populations in these high altitude landscapes. To add to this complex dynamic, free-ranging dogs compounded the problem through the possibility of them acting as disease vectors. Any breakouts of rabies, parvovirus or canine distemper within the wildlife population could be catastrophic. Clearly there was an overlap of interests, for the local community who were facing steep losses from these dogs and for conservation practitioners, like us at NCF, who were hoping to eliminate conservation threats the dog population posed in this fragile landscape.

But the dogs, sadly, were nobody's responsibility. Spiti doesn't have a municipality to worry over them. Technically, the Forest Department, Animal Husbandry or any other government department was not mandated to manage them. It was only the Spitians who felt the pinch. Conscious of this, the community had, even earlier (c. 2000), come together to catch the dogs and physically transport them out of the valley. It worked only for some weeks after which most of the dogs returned. People did not resort to culling them as they believed that would earn them bad karma. But speaking with





some of them suggested a feeling of helplessness. In an area where basic amenities can be hard to come by, an organised effort to control the dog population seemed unrealistic to most locals. Patience was running low, and there were sporadic reports from a few places in the valley of attempts to cull dogs.

In August 2013, the Divisional Forest Officer of Spiti convened a meeting in Kaza to initiate a discussion on this issue. Organising such a meeting was a suggestion made in the Project Snow Leopard management plan that had been prepared for the Upper Spiti Landscape. This meeting was attended by some key individuals of Kaza: local representatives of the Tribal Advisory Council, officers from the Additional District Collector's office, the Animal Husbandry Department and the Forest Department, the Pradhan of Kaza Panchayat and his deputies. After a rather sceptical start, everyone warmed up to the fact that action was needed but were unsure of what that could be. The suggestion of organising a camp to sterilise dogs was made, but that threw up more questions: who would operate on them, where would the medicines come from and, most important of all, who would go catch the dogs? Nevertheless, despite these unknowns, by the end of the meeting, the participants agreed to try and organise a sterilisation camp in Kaza. Through follow-up meetings, our team secured support of the Forest Department, Animal Husbandry and the District Administration to set things in motion to organise a sterilisation camp. Unclear of how to conduct the camp, we reached out to Dharamsala Animal Rescue, an NGO that works in animal welfare, who promptly volunteered to send two

But speaking with some of them suggested a feeling of helplessness. In an area where basic amenities can be hard to come by, an organised effort to control the dog population seemed unrealistic to most locals. Patience was running low, and there were sporadic reports from a few places in the valley of attempts to cull dogs.

of their experienced veterinarians. One of these veterinarians, Dr. Takpa Tenzin, who was also a Spitian, took great pains in guiding the preparations. Within a matter of two months, everything was ready, except for one minor detail: who would and how would we catch the dogs?

The Pradhan of Kaza Panchayat helped to solve this problem. An astute leader, who villagers looked up to, the Pradhan promised he would get the villagers to help. The following day, we were invited to a meeting where almost the entire village gathered. After briefing villagers about the situation, he said: It's up to us now. Suggestions started pouring in from all the people present. It was heartening to see that people were suggesting measures that would require their participation. No one was trying to pass the buck. Eventually, this was the suggestion that was most popular: each family would catch a dog, bring it to the sterilisation camp, and take care of it for four days after the operation, before letting it back out on the streets. Families who chose not to participate would have to pay a fine of five hundred rupees! We left the meeting, that day, unsure if anyone would turn up with dogs for the camp.

But we needn't have worried, because as we reached the venue on the day of the camp, there were at least 30 dogs waiting patiently with their

current conservation

kids



India meets the UK in a new pen-pal project for Current Conservation

The pen-pal tradition, where two school children living on different continents share their daily adventures, has become much less common than it once was.

Modern technology has offered wonderful new opportunities for instant long-distance communication. In many ways, it has made distances between people seem much smaller. It is now possible, for one sitting in his bedroom in India, to have a real-time video chat with a friend in London, Hong Kong, Sydney or Shanghai.

Traditional methods of communication, letters and brown paper parcels, are slow by comparison. They are rapidly becoming obsolete. However, traditional technologies have a tangible quality which cannot be replaced by an email. Although email gives us instant gratification, letters allow readers to feel closer. There is much excitement in receiving a hand-written letter, or ripping open, emptying and exploring the contents of a big parcel.

What if you combined the two, making the most of the digital realm's ability to connect people instantly, and sharing physical objects from friends in far flung places? This new Current Conservation project promises much joy for students by resurrecting the pen-pal tradition, and taking the best that old and new postal methods offer.

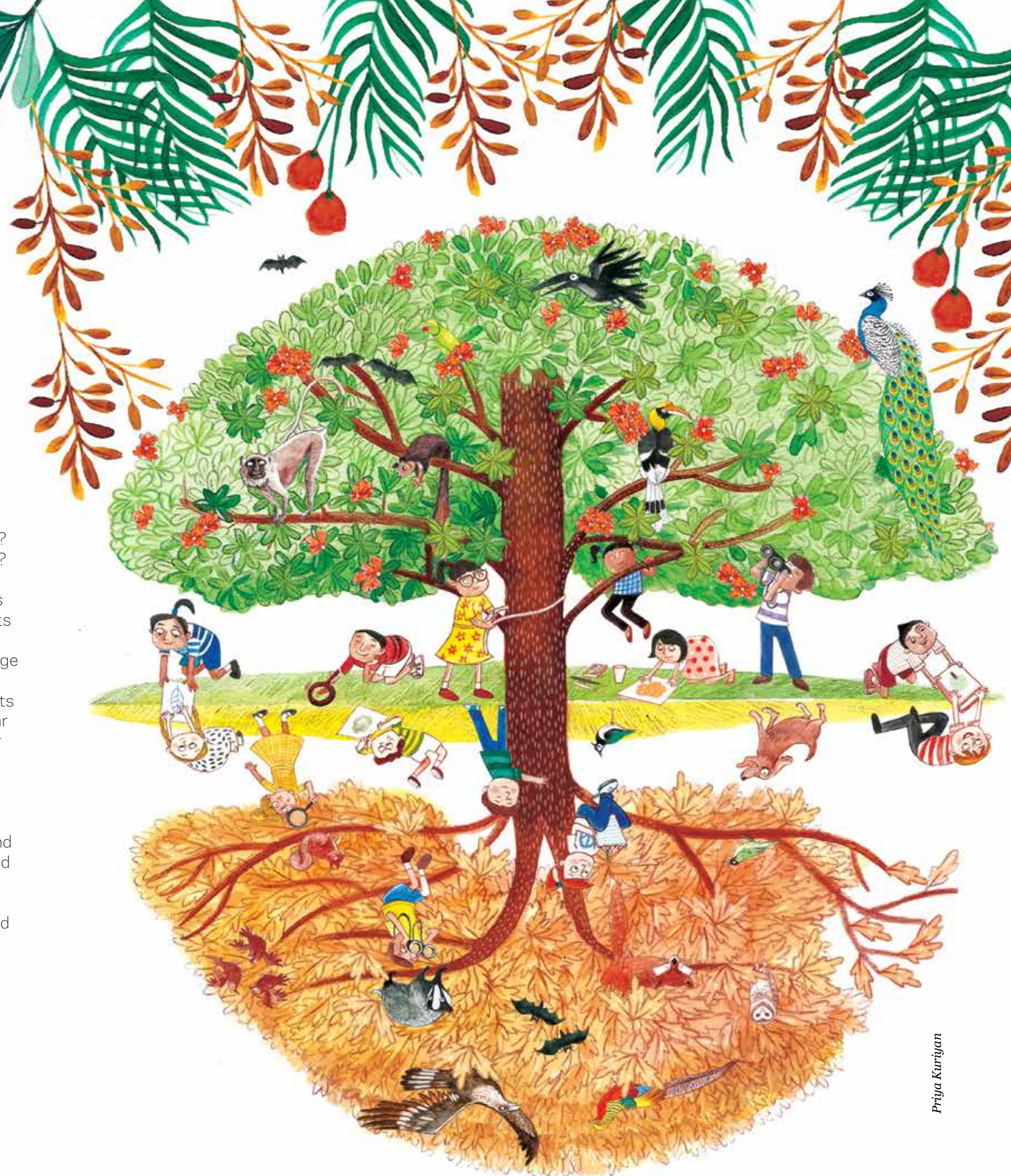
11-13 year olds from two schools, one in Cornwall UK, and another near Bangalore India, will establish the first trial partnership. The students will explore '**a year in the life of a tree**'. Working together and independently, children from both schools will observe a particular tree.

They will collect, illustrate and share stories about the tree and its many visitors. The documentation could be a painting, a collection of leaves, lists of bird species seen among the branches or anything else that has

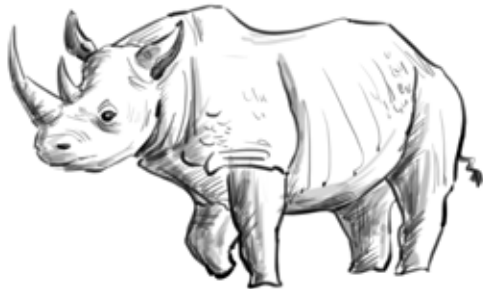
captivated their imagination. What species live in the tree? What do its flowers look like? When does it fruit? What sound do its fluttering leaves make when you sit beneath its branches on a breezy day? The schools will then exchange their natural diaries, and maintain a record of the sights and sounds they see and hear from their windows, and their counterpart's windows, a continent away.

Current Conservation will document this partnership, and display some of the exchanged experiences. The pen-pal project will bridge the gap between the technological and natural worlds.

If your school wishes to participate in the pen-pal project, please write to us at : matthew.creasey@gmail.com (U.K), or hiremath@atree.org (India). We look forward to hearing from you!



The African black rhino
(*Diceros bicornis*)



{Dicero comes from the Greek words, Di = two and Ceros = horn and Bicornis from the Latin words, Bi = two and Cornis = horn} Also called the hook-lipped rhino, it's hook-shaped upper lip helps grasp and rip plants.

Diceros bicornis bicornis
Diceros bicornis michaeli
Diceros bicornis minor and
Diceros bicornis longipes
are all sub-species of the African black rhino found in the dry deserts, wet forests and Savannah grassland.

Length (head and body)

3.0 - 3.8m

Height (at shoulder)

1.4 - 1.7m

Weight

800 - 1,350kg

Larger front horn

0.5 - 1.3m

Smaller rear horn

up to 55 cm

Diet

Herbivorous

2000 BC

Rhinos engraved into rocks in Niger

1930s

Population falling fast

1980

Rhinos found in only two countries, 110 in Cameroon and 25 in Chad

1997

10 - 18 individuals remaining

2006

Extensive survey fails to find any rhinos

Early 20th Century



Increased hunting, land clearance for agriculture & conflict due to crop damage. With the exclusion of indigenous people from many areas, and increased trophy hunting, traditional knowledge and ways of life are lost. This leads to poverty and the search for alternative livelihoods.

1950s - now



Increased use of rhino horn in Chinese medicine (thought to cure rheumatism, gout, fever, typhoid and other conditions. There is little evidence for these medical benefits). Poaching is lucrative and a poacher could make more money in a day than he would otherwise earn in a year.

1991

50 in Cameroon and none in Chad

2001

5 confirmed and 3 unconfirmed sightings

2011

Western black rhino officially declared extinct

A look into the future

Although facing many of the same threats which caused extinction of the Western black rhino, all three of the other subspecies still survive in the wild. The numbers are increasing, conservationists are optimistic that with effort and pressure from governments and the public, the remaining black rhinos can be saved.

There are critical questions that still need to be answered. Who owns the rhinos? Should rhinos be protected, harvested for their horns or both? How do we balance the rights of people and rhinos? Is there a role for ecotourism?

Population size estimate (IUCN, 2010)



D.b.bicornis (South-Western)

1920



D.b.michaeli (Eastern)

740



D.b.minor (Southern-Central)

2220

Rohan Chakravarty

the BULL,
the BEAR,
and
the BUMBLEY
BEE!

Words: Matthew Creasey
Illustration: Kalyani Ganapathy



The bull, the bear and the bumbley bee,
Sat in the shade of a Gulmohar tree,
Said one to the two, and two to the three,
What lives do we lead, persecuted or free?



I live in the forest, eat termites and ants,
I sleep in my den through the heat of the day,
But I can be grumpy if woken too early,
Surprised or disturbed and I don't like to play.



Should I be chased for not being cheerful?
Don't you feel the same when woken too soon?
I'm happy to share the forests and grassland,
I'll come out at night, by the light of the moon.



Some of my cousins have freedom to wander,
To graze in green pastures, no shackles, no chains,
One brother I have in the Banni,
Fed on crops grown in sweet summer rains.



How different for those in cities and towns,
More buildings built, more green fields lost,
A cow in town must scavenge on garbage,
The city grows bigger, the cow pays the cost.



You both talk of freedom, of cities, of forests,
Loved or revered, you both have your place,
I live here too, am I not important?
I'm so very small and take up little space.



Without me no honey, no flowers, no blossom,
No food for birds, no flutter-byes bright,
I'm sorry to sting, but when we are threatened,
To defend my sisters I'm willing to fight.



The bee, the bull and the snuffly bear,
Were common but now are increasingly rare,
So ask one another would not it be fair,
To live and let live in the country we share?



A Day in the Life of a Raptor Ecologist: Baby Birds with a Powerful Bite

George Swan, a PhD student at Exeter University, UK, recounts his daily climbing adventures with buzzard chicks!

My research involves climbing up to nests of common buzzards (*Buteo buteo*), to collect data on how often the parents bring food to the chicks, and what sort of prey they prefer. Young birds with big beaks – they give me plenty to think about.



I start my day by going through my calendar and making a list of all the nests I need to visit. I visit nests when the chicks are 18-25 days old and install tiny cameras that film the parents every time they bring food to the chicks.

This age range is the perfect period, when chicks are large enough to control their temperature, but small enough to be handled easily.



I avoid visiting nests in bad weather as I don't want to disturb the chicks when they are already cold. This means that on sunny days in late spring, I have to be super organised! With my target nests selected, I load the truck with all my climbing and camera gear and head out. Once I've reached a nest, it usually takes 45 minutes to complete everything I need to do. I start by firing a weight attached to some string over a strong branch high up in the tree using a huge catapult. When the weight drops down

the other side, I attach my climbing rope and pull it up and over. Then I hoist myself up the rope, climb to the nest, install the camera and assemble a recording box at the base of the tree. I try and climb three nests before lunch, and then another two or three in the afternoon.



Such work can be physically demanding, it is a struggle to climb more than six nests in a day. By dark, I am back at the storeroom where I clean all the gear, check the weather for the next day and get ready to start all over again.

new masters. We learnt that people had caught the dogs by setting out food, petting them and winning their trust and eventually getting them on leashes. The more elusive dogs were caught by the village youth, by baiting them and then catching them, using dog-catching nets. As more and more people showed up at the camp in quick succession, things started to get a little chaotic. But, here again, the Spitian youth, led by the Kaza Pradhan, stepped up to quickly get things in order. They made a list of people who had come in with dogs, regulated the flow of dogs into the operation room and also handed them back safely to their owners. There were no para-veterinarians to help, so Dr. Tenzin gathered a few young volunteers and trained them with some basic instructions to handle dogs. Having handled livestock all their lives meant that most of them found it easy to handle dogs as well. Over the next week the camp saw a continuous flow of animals. The team of four doctors managed to operate close to a hundred dogs. Pups less than seven months and pregnant females, which could not be operated upon, were given shots for rabies and released. This effort, which started in one village, later spread to cover 6 villages. In all, over 275 dogs were sterilised in 6 villages, in a span of three years. That accounts for roughly a third of the valley's dog population, based on an assessment made in 2012.

How did we fare in this exercise? When we started our efforts, setting up a sterilisation camp seemed like an unrealistic target to meet. Therefore, that we have managed to set up a sterilisation camp



Nature Conservation Foundation and Snow Leopard Trust

in an area as remote as Spiti, is very encouraging. More impressive was the fact that the people from the area shouldered a lot of the responsibilities. In addition to catching dogs, villagers helped in every way possible—from helping set up the camp, to feeding the camp staff and volunteers, to managing the efficient running of the camp. The veterinarians also deserve a lot of credit. They toiled hard at each of the camps and ensured that, even with limited resources, the camps were managed professionally. They set important ground rules - no sterilising of pregnant females and ensuring adequate post-operative care - and these were followed strictly. We also learnt several lessons along the way. A key one was that we needed to focus on improving post-operative care of the dogs. We initially relied completely on the community to manage post-operative care, which we realised, was a stiff task. We are now moving towards looking at more proficient ways to manage post-operative care.

Has the work brought any real success? That would depend on what scale one used to measure success. One indirect positive spinoff has been that organising sterilisation camps and initiating the effort for animal birth control has helped Spitians believe that it isn't beyond them to work towards solving their own problems. But in terms of directly meeting our aims, we haven't been very successful. Studies suggest that one would need to sterilise more than 70% of the breeding population, and that the proportion of breeding females may have to be less than 20%, to see a stabilisation of numbers over an extended period. On that count, this effort clearly falls short of ensuring any reduction in the dog population. With no reduction in dog numbers, people have started

Nature Conservation Foundation
and Snow Leopard Trust



questioning the efficacy of these initiatives. Their patience is running out largely because their losses haven't reduced, and the sterilised dogs are still around and continue to kill their livestock.

Several villagers, especially from smaller villages, have even tried to translocate dogs from their villages in to the larger towns— like Kaza—much to the disdain of these towns' residents. Such is the gravity of this problem that anyone caught releasing dogs in Kaza stands to pay a sizeable fine. Despite this, a village elder told us, people from smaller villages get pups at night and dump them in Kaza. But people in the smaller villages understand that it's only a matter of days before new dogs come and take over the newly vacated territories. Wouldn't culling dogs be a more permanent solution, they ask, in reducing dog numbers and cutting their losses? Voices to remove dogs are gathering strength.

Clearly there is a need to better communicate to the community about how sterilisation programmes require sustained long-term effort. There is also space to discuss other options, or even a combination of multiple options. One such option being tried out is to look at improving garbage management. Working jointly with the Forest Department, five villages have now built fenced enclosures to dispose carcasses and organic waste so that they are unavailable to dogs. In Kaza too, the local Panchayat has initiated attempts to collect, segregate and dispose waste. But only time can tell how effective all these measures will be. Even so, a question that often comes up is: if these measures do succeed in reducing resource access for dogs, how would the dogs respond? Would their numbers

dwindle? Or, would they take to killing more livestock and wildlife?

Our experience of the last three years has been a humbling one. From a point where we saw little hope, we managed to collectively make a few interventions. However, we are far from solving the problem. If anything it has only given us a deeper understanding of the problem and the challenges surrounding it, and left us with more questions than answers. So while we continue working our way to solve the problems, there is room for greater participation, especially from animal welfare agencies that have a better understanding of these issues. Without sustained efforts however, the risk of desperate Spitians resorting to the mistreatment, or even culling, of dogs could become a very real one.

Acknowledgements: This work was made possible by funding and support from the Himachal Pradesh Forest Department and Leonard X Bosack and Bette M Kruger Charitable Foundation.

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Ajay Bijoor is a project associate on the High Altitudes programme of the Nature Conservaiton Foundation, ajay@ncf-india.org.

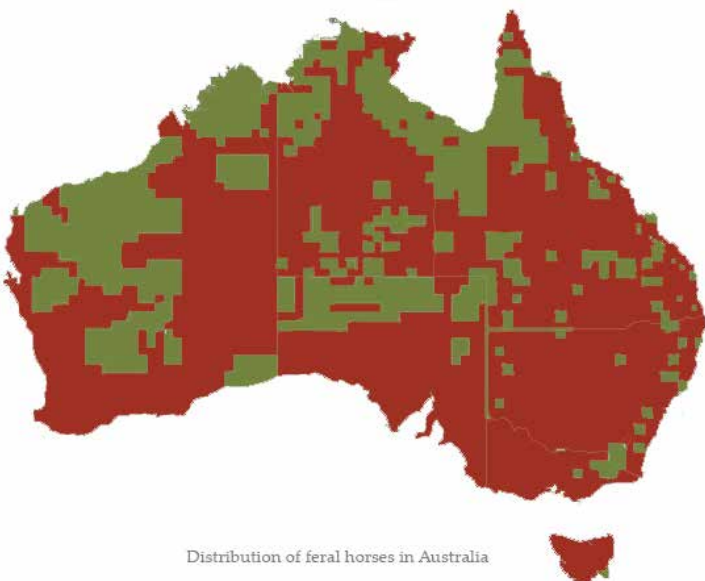


Brumby: Wild at Heart

Australia has the largest wild horse herd in the world. There are, likely, more than 400,000 wild horses (and millions of wild donkeys) spread across nearly all landscape types of the continent, from snow-covered ranges to tropical savanna to desert. These horses are generally known as 'brumbies', and are free-ranging, descended from domesticated horses either escaped or released into the wild by their owners. Horses were imported into Australia with what is known as the 'First Fleet' – the initial group of British colonisers landing in Sydney Cove, in 1788 with orders to establish a British colony. The British brought with them a microcosm of the Old World: animals, plants, social and labour practices, and intellectual structures – all transplanted into the very different context of the ecosystems of the island continent. The first century and a half of settlement was founded on the importance of animals - sheep and cattle pastoralism - with horses essential to these herding activities as stock and draught animals, and bred for strength and endurance in Australia's harsh conditions.

These characteristics were valuable when armies needed cavalry mounts. Hundreds of thousands of Australian horses, known as 'Walers' (from the state New South Wales), were supplied to armies all over the world, from the 1830s to the 1940s. India, too, has a part in this story, as Australian horse breeders sent Walers to the British Indian Army and to allied armies in India, in both the First and Second World Wars. Some sources suggest more than 80,000 Australian horses were sent to India. The import of Australian Walers into British India had negative impacts on India's own horse breeds, particularly the famed Marwari warhorses of the Rathore Rajputs in northwest India. Marwari horses were celebrated for centuries as renowned and revered cavalry mounts, and Marwar lancers fought under the British during the First World War. But the British occupiers preferred other horses, including Walers, and tried to eliminate Marwari and other horses they considered inferior 'native breeds.'

Humans have, at least, a 6000 year association with horses, and there are similar deep cultural connections in many communities and countries



all over the world. The horse's role in Australia's exploration, colonization, pastoralism and warfare, as well as in recreational riding and racing, has given it an iconic position in Australian society. There are over a million horses in Australia, including the brumbies, and the horse racing industry alone is a multi-billion dollar enterprise.

But the wild horse occupies a challenging and problematic position in Australian landscapes: cultural icon of settler, rural and Aboriginal histories, but potentially damaging to ecosystems. A species which joined humans in domestication, but then re-established wild and independent populations (in several countries 'feral' horses are caught and re-domesticated for sale as riding mounts). The horse's cultural charisma is strong: they are daylight animals, form easily understood social groups, and are large and beautiful. They are also often remarkably easy to approach in free-ranging situations, appearing curious and open to human interaction. Many Australians highly value the sight of wild horses galloping across snow-covered mountainsides, but conservation managers contend that these hard-hooved animals have negative impacts on native wildlife and therefore should have no place in local ecosystems.

Like Australia, the United States, Canada and New Zealand too have significant wild horse herds, and



Vartika Sharma

their presence and management is consistently controversial. Ironically, horses are also part of 're-wilding' efforts in other countries, including in Europe, being re-introduced to landscapes that once supported ancestral wild horse breeds.

In contemporary debates about conservation, judgements about 'feral' species are complex. These debates are particularly relevant and difficult in Australia, which is the nation that has lost the highest number of mammal species to extinction in modern times, and also has an enormous number of introduced species, some of which have very significant environmental impacts. Some introduced species in Australia will never be eliminated, and in fact are barely successfully managed. One argument suggests that conservation managers see horses as an easy target, although foxes, cats, pigs and rabbits, have far greater documented impacts on native ecosystems. Out of eight priority 'pest' species in south-east Australia, horses are the ones for which there is least scientific evidence of their ecological impact. Also, the ecological impact of introduced species need not always be negative. The north of Australia has a feral population of Banteng cattle (*Bos javanicus*), which is valuable because its wild population is classified as endangered in its original habitat in south-east Asia. Elimination of the feral Australian population could hasten extinction of the species overall.

People who are supporters of Australia's wild horses include both those who could be classified as animal rights advocates and those who are committed to a cultural understanding of Australia's landscapes. For many of Australia's indigenous Aboriginal people, who historically formed the backbone of the pastoral industry as mounted stock herders, wild horses

represent the families of the horses they rode and loved, and they feel the horses should be left to live their lives undisturbed. Horses, for them, are legitimate members of the ecological and cultural community. Many Aboriginal people are also strongly opposed to 'shooting to waste' - shooting large numbers of horses from helicopters and leaving the carcasses to decay where they fall - a strategy used in landscapes in northern and central Australia.

At its heart, conservation is a social activity underpinned (but not always) by science. Effective conservation in the transformed environments of the twenty first century is a much debated issue. One broad argument suggests that we need more and better of old-school Yellowstone-model protected areas and control of introduced species, to avert a conservation catastrophe. But another emerging strand argues that these 'no analogue ecosystems' and hybridizing populations are the new form of biological diversity, more fit to flourish in a climate-changing world, and our conservation strategies should appropriately embrace this change. How we engage with Australia's wild horses will, no doubt, continue to be contested and uncertain, but an acceptance of this uncertainty and change, as fundamentals of the everyday, might be the basis for developing more environmentally and socially benign relationships between people, animals and landscapes.

Acknowledgements: Thanks to Jen Owens for her work with brumby advocates in this research.

Michael Adams is Associate Professor at the Australian Centre for Cultural Environmental Research and the Indigenous Studies Unit, University of Wollongong, Australia, madams@uow.edu.au.

Studying zoo animals: Why it's worth the effort





Zoos are a contentious issue for some, but for me, they are a necessary part of modern conservation because of their intrinsic value to learning more about the ecology, biology, and behaviour of animals. However, I feel that zoos must be able to justify the species they house, and explain why these species need human management. From both an academic and applied point of view, the living collections that zoos manage should be selected, not for social or historical reasons, but because they are important biologically, and provide an opportunity to conduct valuable scientific research.

There is much that we do not know about the species that need our help, and zoos in the 21st century are being asked more and more frequently to provide homes for threatened, yet poorly understood, species that, in some cases, may not have been placed in a captive setting before. Similar or related species already housed in zoos can help build our knowledge of what is required by these rarer cousins. Likewise, as wild populations of these seemingly common species dwindle, it is important that we continue to tweak and adapt zoo husbandry regimes to ensure that all such species have a secure and viable future.

The modern zoo should no longer be a living stamp collection of weird and wonderful wildlife for humans to gaze upon in awe. Zoo collections must contribute, either directly or indirectly, to conservation work, visitor education, and the attainment of scientific understanding. Species that do not thrive in captivity reduce the value of the animal collection and the *raison d'être* of zoos overall. I am a firm believer that not every species has a place in the zoo, and collection planning must take into account the relevance of a species' actually being in captivity in the first instance.

Zoo-housed species that do well can be used to tell the story of specimens that are much rarer and of real conservation concern, but which are much more difficult to look after in captivity--species that need very specialist care, either in field-based conservation centres or away from humans completely. This "storybook approach" can be very species-specific, for example: The plight of the rare and fragile James' flamingo (*Phoenicoparrus jamesi*) can be explained using the sympatric Chilean flamingo (*Phoenicopterus chilensis*); conservation work to secure the precarious future of the Javan rhinoceros (*Rhinoceros sondaicus*) and Sumatran rhinoceros (*Dicerorhinus*



Kartik Shanker

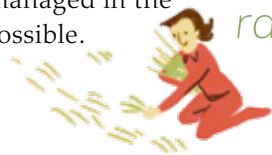
Common as muck, right? Not quite. Giraffe (*Giraffa camelopardalis*) populations have crashed across Africa and this much-loved and very familiar zoo staple is now in real danger. As such, research into best husbandry practices of zoo-housed giraffe is vital to underpin their management to conserve the wider population of this species well into the future.



sumatrensis) rhinoceroses can be promoted to visitors by displaying the equally threatened, but easier to care for, Indian rhino (*Rhinoceros unicornis*); the Madagascar pochard (*Aythya innotata*), the world's rarest duck and possibly even the rarest bird, housed in situ in Madagascar and bred for reintroduction, can be championed by all manner of similar wildfowl that abound in captivity.

This storybook approach can also be much more general. The world's shark populations have taken a nose-dive in recent years and not many aquaria have the space, facilities, or budgets to house large and threatened species, such as the great white shark (*Carcharodon carcharias*). However, sharks in general are aquarium staples, and captivate the imagination of the public. Smaller and easier-to-house species can be excellent ambassadors for those other sharks less suited to life in a tank. The current global amphibian decline ranks second—preceded by coral reefs and followed by large Asian mammals—on the International Union for Conservation of Nature's (IUCN's) priority list of organisms threatened with imminent doom. Zoo involvement with field-based amphibian conservation initiatives is much more accessible to visitors if commonly-kept (zoo) species are displayed in an engaging and relevant manner.

In the UK, at least, zoos have a legal requirement to facilitate and undertake research within their animal collections. As part of the Zoo Licencing Act, which incorporates the EU Zoos Directive from 1999, a specific document termed the Secretary of State's Standards for Modern Zoo Practice describes the need for a research programme to be implemented into the running of the zoological collection. The governing body of UK zoos, BIAZA (The British & Irish Association of Zoos and Aquariums), as well as other regional associations, such as the Europe-wide institution EAZA (the European Association of Zoos and Aquaria), have research committees that help support, evaluate, and critique zoo-based research programmes, to ensure that they generate data that are useful to those working with the animals directly, as well as to those managing the larger population of individuals of a species. Ultimately, these data will have a beneficial impact on captive individuals, ensuring that they are managed in the most biologically appropriate way possible.



We know that the wild does not confer the limitless freedom that it may seem to, and that wild animals are constrained by a variety of stresses and environmental pressures (for example, between- and within-species competition, unpredictable resource access, predation threat, and territorial limits). We also know that we need to replicate these wild interactions within modern zoo enclosures to ensure that species remain healthy and behaviourally normal. However, it is not always possible to reconstruct all elements of the natural habitats of all species. This is where research into individual species' needs can help zoos to determine what types of animal should be maintained on their collection plan.

Research suggests that not all species should be managed in captivity, and that some species are better preserved out in the wild with minimal human influence over what they do. Species that do not do well outside of their range states, but still require a more intense level of management, can be maintained by zoological collections in the countries where the species occur naturally, thereby helping to bolster dwindling free-living populations. Conservation work will be more successful if species' management decisions are based on evidence that keeps populations healthy and viable.



The modern zoo should no longer be a living stamp collection of weird and wonderful wildlife for humans to gaze upon in awe. Zoo collections must contribute, either directly or indirectly, to conservation work, visitor education, and the attainment of scientific understanding. Species that do not thrive in captivity reduce the value of the animal collection and the raison d'être of zoos overall.

Seminal work on carnivores, for instance, has shown that aspects of their behavioural ecology (notably territory or home range size) can predict whether or not the animals will display stereotypic, or abnormal, behaviour patterns in zoos. Some species of cetaceans (whales and dolphins) may experience shortened lifespans in captivity because we cannot recreate all the important facets of their natural habitat—for example, the complexity and size of the marine environment—and, hence, we should use other species that are more easily and healthily managed in zoos, to tell their story for them.

Research tells us that some species do especially well in captivity. There is a reason why meerkats (*Suricata suricatta*) are so popular, for example. We can use measureable indicators of positive welfare, such as the performance of appropriate behaviour patterns or temporal physiological changes, to determine the suitability of a managed environment for a particular species. Research into wild ecology allows the formation of best practice guidelines, which are shared between zoos to ensure species are managed to the highest standard possible. The output of research on wild populations and that conducted in captivity (to evaluate which forms of housing and husbandry work best) are brought together into a management regime known as



The number of flamingoes in a flock will affect the chances of successful breeding. Past research has provided zoos with information on the minimum number of birds for i) overall good welfare and ii) stimulation of nesting behaviours.

“evidence-based husbandry”, which provides the foundation for how an individual species is managed in captivity, regardless of what zoo is keeping it.

For example, information on preferred climatic conditions, optimum dietary formation and nutrient requirements, individual space usage and environmental complexity, social grouping and population structure, and when and how often breeding occurs, enable positive welfare to be maintained across the course of each species’ life stages within a captive setting. The use of non-invasive physiological measurements (i.e., metabolites of reproductive hormones taken from faecal and urine samples) is now used with excellent results to assist in the breeding programmes of numerous highly endangered species, including Asian elephants (*Elephas maximus*) and black rhino (*Diceros bicornis*). Likewise, measurement of glucocorticoids enables evaluation of an individual’s stress response, which can provide information to help support changes to enclosure layout, visitor flow, housing, and husbandry, in order to maintain an overall positive welfare state. It should be remembered, however, that stress can be beneficial and as increases in adrenal glucocorticoids can occur with excitement, zoos need to maintain a dynamic environment that provides physical, physiological and psychological stimuli. Scientific explorations of environmental enrichment methods can help create such variety.

Ultimately, contented animals, with naturalistic behaviour patterns and biological rhythms are more likely to produce healthy and viable youngsters—a necessary outcome for conservation work. The IUCN is working on a new way of managing threatened species that breaks down old boundaries and simultaneously considers both wild (in situ) populations and zoo-based (ex situ) populations in the development of a single metapopulation management strategy; this is termed the One Plan Approach (OPA). The ultimate aim of the OPA is to integrate more closely the work of those in the field and those working with the same species in the zoo, to further evidence on the optimum methods of management and conservation planning, as well as to direct and focus research and knowledge where they are most needed. In an age of climate change and continual anthropogenic pressures, a species’

viability is likely to remain highest when all aspects of its population (captive and free-living) are managed as a whole.

The IUCN is working on a new way of managing threatened species that breaks down old boundaries and simultaneously considers both wild (in situ) populations and zoo-based (ex situ) populations in the development of a single metapopulation management strategy; this is termed the One Plan Approach (OPA).



Fussy eater? It can be difficult to provide the correct diets for proboscis monkeys (*Nasalis larvatus*) outside of their native South-East Asia. Results from dietary studies have shown that this species is best managed by collections that are able to provide these highly-specialised primates with the types of foliage most similar to what they would forage on in the wild.



Just a brown duck? Knowledge of the requirements of similar pochard species that have been maintained in captivity for far longer has helped in the development of husbandry protocols for one of the world’s rarest birds, the Madagascar pochard (*Aythya innotata*)—a species on the brink of extinction that is the focus of multi-zoo, multi-conservation organisation protection work.

Population management is integral to the future security of all species housed in zoos, regardless of how threatened they are. Research using zoo records is particularly important in assessing trends in population growth or determining (and hopefully) halting any population declines. The Zoological Information Management System (ZIMS) contains information on individuals contained in zoo populations around the world, facilitating large-scale research projects on robust and statistically sound datasets. This allows researchers to conduct meta-analyses on topics such as longevity, time to maturity, and lifetime reproductive success, producing results that can be shared with other institutions, in order to facilitate the development of stable captive breeding groups.

European zoos have also been collaborating to further increase access to the output from research projects; these partnerships have resulted in the launch of a new, open-access peer-reviewed publication, the Journal of Zoo & Aquarium Research (www.jzar.org). It is hoped that by encouraging zoo professionals to submit short case studies or husbandry reports to a free-to-read, fast turnaround scientific journal the dissemination of research output will reach a wider audience and generate further interest in the important research work conducted by modern, evidence-based zoological collections.



Lewis Rowden

techniques, to promote conservation breeding, and to conduct worthwhile research on their charges. Zoo keepers, curators, and directors are some of the hardest working individuals that I know, and who regularly volunteer their time for “extra-curricular” responsibilities, with the sole aim of improving the lot of the animals in the collection. Zoo science is ultimately good science, and long may it continue.



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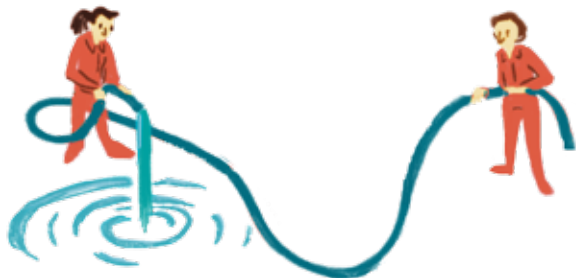
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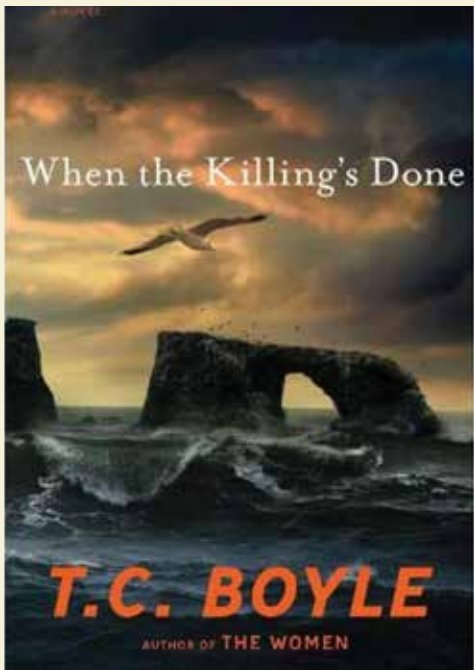
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Paul Rose is a PhD student at the Centre for Research in Animal Behaviour, University of Exeter, UK, p.rose@exeter.ac.uk.



Pecking order in an island fauna



Animal lovers come in different flavours. Consider the conservationist. Her love is targeted at the collective – a species or population that needs protection from extinction. But not all species are equal in her eyes, not all worthy of her attention. She chooses wild over domestic. Rare over common. Native over exotic. Contrast her with the animal rights activist. His attention is focused on the individual animal, his love governed by a single principle – no animal shall be harmed or killed. An all-encompassing love, without exception. At this point, if you are thinking “two sides of the same coin”, think again, for there is no love lost between these animal lovers. Their fault-line is killing. The conservationist will not hesitate to kill one kind of animal to protect another. But killing of any animal is anathema to the activist. And he will do whatever it takes to prevent it.

Take the example of Rob Puddicombe- bus driver and animal rights activist¹. In the early 2000s, the US park service decided to eradicate black rats from Anacapa – an island near Santa Barbara, California – by spraying rat poison from a helicopter. The rats are believed to have colonised the island in 1853, while escaping from a sinking steamer. The park service’s justification for eradication was that the rats were decimating the island’s population of Xantus’ murrelet - a small native seabird - by eating their eggs. But Rob wouldn’t have any of it. To him, rat and murrelet were equal. Along with a friend, he sailed from Santa Barbara to Anacapa and furtively spread food pellets mixed with Vitamin K all over the island. Vitamin K was an antidote to the rat poison. Unfortunately for Rob, he and his friend were spotted, arrested and put on trial - probably the only people ever tried for the crime of rat feeding. Though Rob was found “not guilty” on account of insufficient evidence, his attempt to save the rats failed and Anacapa was soon rat-free.

T.C. Boyle’s 2011 novel “When the Killing’s Done” is inspired by the Anacapa incident and other face-

¹ <http://articles.latimes.com/2003/jul/11/local/me-ratman11>

offs between the park service and activists in the Channel islands. Boyle takes these incidents and constructs a gripping drama around them involving two characters. Alma Boyd Takesue, a biologist with the National Parks service, wants to rid the islands of introduced invasive species – animals and plants both – to help protect the native species, who, she believes, are the islands’ only legitimate residents. Standing in her way, always, is Dave LaJoy (inspired by Rob Puddicombe) – owner of a home entertainment store chain, wealthy and with time on his hand, who has found his life’s calling in the protection of animals. All animals. The story is told in two parts, each centred around a battle between Alma and Dave. The first is based on the Anacapa incident I described earlier. In the second, the action shifts to Santa Cruz, and involves feral pigs, golden eagles, bald eagles, sheep, dwarf foxes and skunks – I will let you read the book to figure out how the fates of these animals are intertwined.

But the book is more than its central plot. Boyle explores the inconsistencies and contradictions that characterise our personal relationships with animals. Take Dave. He is an animal rights activist for whom “the loss of a single animal...is intolerable, inhumane and just plain wrong”. But he is okay with animals killing other animals. And he feeds cat kibble to the rats. He doesn’t wear leather, rescues greyhounds from racetracks, and doesn’t eat “meat”. But he eats

dairy, eggs and fish. And traps raccoons that ruin his newly-laid lawn. But he doesn’t kill them; just moves them elsewhere. Or take Alma. She is convinced that invasive animals need to be eradicated, but it still saddens her to see a dead feral pig, gladdens her to see a pair of rescued racing greyhounds (till she realises they are Dave’s) and is moved to act when she encounters a beached seal pup. Like Dave, she too is a *lacto-ovo-pescatarian*. When her car runs over a grey squirrel, emotional response and ecological knowledge collide in her head – should she stop and help this poor animal in pain, which is common in its range and at no risk of extinction, and risk being late for a meeting that will determine the fate of numerous species? It is these ironic moments that are, for me, the book’s highlights.

In the end, if you are an “animal lover” yourself, you will enjoy the book just for the animals it contains. Here is a sampling to whet your appetite: rat, murrelet, pig, eagle (golden and bald), sheep, fox, skunk, raccoon, snake (rattle- and tree), flying fish, raven, squirrel, sea urchin, shark, scorpion, seal, Angora cat, albatross, aphid, bat, cricket, damselfly, dolphin, frog, gecko, goat, mule, whale, turkey, greyhound, egg, bacon, calamari and sushi.

Hari Sridhar is a postdoctoral fellow at Indian Institute of Science, Bangalore, harisridhar1982@gmail.com.

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