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ZOOQUARIA

SUMMER 2011

ISSUE 74

Seeding the future
AN UPDATE ON THE MILLENNIUM SEED BANK

Classified information
THE ROLE OF TAXONOMY IN CONSERVATION

King of the jungle
HOW TARZAN COULD HELP SAVE THE FORESTS OF AFRICA

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A NEW FOCUS ON THREATENED UNDERWATER ECOSYSTEMS

New hope for sifakas
HOW AN EAZA CAMPAIGN REALLY CAN MAKE A DIFFERENCE

Zooquaria

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From the Director's Chair

Around this time last year EAZA began working with the Irish MEP Nessa Childers on the issue of clear labelling of individual vegetable oils in food products in the EU. Ms Childers had drafted an amendment to the Food Information legislation that was being debated in the EU parliament (known as the Sommer Report). The amendment called for constituent ingredients, for example soya and palm oil, to be clearly identified on food packages to allow EU consumers to make informed ethical and environmental choices about their purchases. EAZA, in the run up to the launch of the Ape Campaign (which is now in full swing at many member zoos), enthusiastically supported this effort, particularly in relation to the destructive impact of unsustainable palm oil: to make sure that what we buy in Europe does not compromise the long-term survival of species such as orangutan; does not lead to increased felling of tropical forest; and does not contribute to even greater release of methane (a powerful greenhouse gas) from the peatlands on which these forests currently stand. We met with MEPs, sent them information and our position statements and also asked you, EAZA members, to write to Members of the European Parliament in your own countries.

The Parliament voted in favour of this amendment and we were pleased to see that the right to make informed choices had been so strongly supported by our elected representatives in Brussels. However, any such legislation then has to go through a second phase where it must be approved at the Council of Ministers, the body representing the political interests of each of the individual member states. At this stage, the vegetable oil amendment, along with many others that would have given citizens more choice, was removed.

This was extremely disappointing as the original text of the legislation did place an emphasis on enabling consumer choice: 'In order to achieve a high level of health protection for consumers and to guarantee their right to information, it should be ensured that consumers are appropriately informed as regards food they consume. Consumers choices can be influenced by, inter alia, health, economic, environmental, social and ethical considerations'.

Nevertheless we now have the opportunity to try again, as the legislation has come back to Parliament for a second reading and MEPs are once again enthusiastically embracing the amendments (two this year) that would allow consumers to know if they are consuming products that contain palm oil. In April the Environment Committee of the European Parliament supported these amendments and the full legislation, which will now be voted on again in Parliament in July. If accepted by Parliament the legislation will then go back to the Council for approval. Will they, if the amendments are included again, remove them? And if so, why? In trying to understand this and in speaking to EU parliamentarians and country officials we have been told that countries are concerned about the potential economic impact on manufacturers due to the additional information requirements and also, if consumer choice does indeed result in more demand for palm oil from more sustainable processes, therefore higher costs for manufacturers. So, it appears to be an economic argument.

We would counter this with two further economic arguments. The TEEB reports (The Economics of Ecosystems and Biodiversity: www.teebweb.org) of the past few years have begun to detail the huge economic consequences for global society if our planetary resources are not sustainably managed – this outweighs the narrow economic interests of manufacturers by several orders of magnitude and it is our right as citizens to express our concern on this issue. And this leads to our second economic argument, though much harder to quantify. What is the 'cost' of the rights of the nearly 500 million citizens of EU Member States to make their own decisions about what they personally eat based on the appropriate information? We therefore call on EAZA member institutions to not only contact their country MEPs in the run up to the vote in July, but also to contact their national governments and highlight the simple message below as an important one in any deliberations on this issue:

We still have time to protect one of our closest relatives from extinction – but that time is quickly running out. Please support mandatory labelling of palm oil in food products in the EU and give EU citizens the right to make up their own minds on this issue.

Please pass this message on to your millions of visitors this summer – they have right to choose to protect their planet through their daily choices and it should not be denied to them.

Dr Lesley Dickie
Executive Director, EAZA

NOTICEBOARD

DIRECTORS' DAY: FROM STRENGTH TO STRENGTH

THE THIRD EAZA DIRECTOR'S DAY, coinciding with the mid-year meeting of the Council, took place in Jerusalem at the start of April. Seventy delegates from 20 countries, most of them directors of their respective institutions, gathered in Israel for three days of seminars, conference presentations, discussions, site visits and, of course, social events. Directors' Day is an opportunity for directors and CEOs to discuss topics of common interest in a way that's not possible at other EAZA events. The programme this year, under the general heading of Managing Expectations, focused on issues relating to staff management and human resources, and also on marketing in challenging situations and environments. There was plenty of lively discussion following each presentation, with delegates sharing experiences, ideas and approaches to common problems.

The day before Directors' Day itself, following a morning tour of the very impressive Jerusalem Zoo, saw a seminar on wildlife conservation in Israel, featuring a number of interesting presentations from leading experts in the region. Delegates were invited to a traditional Jewish Sabbath dinner that same evening, while the following evening they were brought to a nearby Arab village for a festive oriental dinner. Both were unique and enjoyable experiences.

Shai Doron, Director of Jerusalem Zoo, was a generous and hospitable host, ensuring that all delegates and their partners enjoyed a memorable visit to Israel. Many took up the option of a pre-conference daytrip around the Old City of Jerusalem, or the extended post-conference tour of some of the country's most famous sites and landmarks. Those that were not obliged to attend Sunday's Council meeting also had the opportunity to visit Tel Aviv's Ramat Gan Safari Park, another EAZA member.

Directors' Day 2012, hosted by Munich Zoo, will be a special event focusing on the development of EAZA's next four-year strategy. Dates will be announced soon – all EAZA directors and CEOs are encouraged to attend this important (and enjoyable!) event.

SASSON TIRAM

EAZA'S CORPORATE MEMBERS

and where to find them

AB Aqua Medic GmbH	(www.aqua-medic.de)
Base Structures Ltd	(www.basestructures.com)
Brogaarden	(www.brogaarden.eu)
Doublecheck Oy	(www.doublezoo.com)
EKIPA	(www.ekipa.nl)
Fachjan Project Plants	(www.fachjan.nl)
fiNETra	(www.finetra.co.uk)
HMJ Design	(www.hmj-design.dk)
IGUANA Animals Design	(www.animalsdesign.pl)
Instituto Bioclon	(www.bioclon.com.mx)
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KMIT Solutions Europe Ltd.	(www.kmitsolutions.com)
Lazenby Design Associates	(www.lazenbydesign.com)
Mapcards.net	(www.mapcards.net)
Mazuri Zoo Foods	(www.mazuri.eu)
Mimex Brands & Labels	(www.mimex.nl)
Pangea Rocks	(www.pangea.dk)
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TVK ZooDesign	(www.tvkzoodesign.nl)
Zoo-lutions	(www.zoo-lutions.com)
ZOOPROFIS	(www.zooprofis.de)
ZooTrend	(www.zootrend.com)

CREDIT WHERE CREDIT IS DUE

An editorial oversight in issue 73 of *Zooquaria* meant that some important picture credits were omitted. Our colleagues at ARKive provided an interesting introduction to the International Year of Forests, beautifully illustrated with photos from the ARKive collection. The photos should have been credited as follows: sessile oak by David Tipling, naturepl.com; northern muriqui from kevinschafer.com; Brazil-nut tree by Peter Oxford, naturepl.com; Bornean orangutan by Jurgen Freund, naturepl.com; Eurasian lynx by Peter Cairns, naturepl.com. Thanks to all of these photographers for granting permission to use their wonderful photos.

NOTICEBOARD

SIFAKA BIRTH AT BELFAST ZOO

BELFAST ZOO IS DELIGHTED TO announce the birth of a male sifaka. The baby, Echo, was born on 15 January 2011. Echo is the second surviving baby to be born at Belfast and is being reared by his mother Linoa.

Belfast received a 3.1 breeding group from Parc Zoologique de Paris in November 2007. Echo joins his parents, Andry and Linoa, and his brothers Manao and Arthur. Belfast's first birth was Arthur in March 2008, and there has been a total of four births, two of which survived. Andry is a wild born male and is a grand age of 24, while Linoa was born at Paris and is 12.

On one previous occasion, Linoa was unable to rear her baby due to a lack of milk, so this year staff made preparations in case there was a repeat of the situation. Fortunately Linoa has been doing a great job of rearing her baby. Sifaka births are extremely special and the baby was closely monitored during his first few weeks, and regularly weighed until we were satisfied he was gaining weight. Linoa and Echo were separated from the rest of the group for eight weeks, but are now back in with the 'boys' where Echo can be seen climbing on Andry's back and interacting with his brothers.

As there as such small numbers in Europe, a total of 17 sifaka at 6 organisations, any birth is extremely important. The sifaka are popular with both our staff and visitors and we are extremely pleased to be able to keep a group of them here at Belfast.

LINOA AND ECHO

FOSSAS PEEP OUT

Duisburg Zoo is famous for breeding success with the fossa, Madagascar's largest predator, and in February its latest additions went on show to the public for the first time. Four young fossa – two males, two females – had been born to 9 year-old Mantadia, and were the latest in a long line of successes for the zoo. Duisberg has coordinated the European breeding programme for fossa since 1994, and many of the 120 or so currently found in collections around the world originated here.

IFAH-EUROPE VISITS ANTWERP ZOO

IFAH-EUROPE (International Federation for Animal Health-Europe) is the federation representing manufacturers of veterinary medicines, vaccines and other animal health products in Europe, *writes Declan O'Brien, Managing Director, IFAH-Europe*. As a way of gaining greater insight into the use of veterinary medicines in zoos, IFAH-Europe recently organised a visit to Antwerp Zoo, which provided a great understanding of the type of research that is ongoing in the zoo environment.

Minor Use and Minor Species (MUMS) are often referred to and, recognising this issue, a 'cascade' was built into existing legislation. In the zoo environment, this leaves a lot of discretion to the veterinarian to decide what product should be used. The issue of residues and animal produce entering the food chain is a complication the zoo vet does not have to worry about!

IFAH-Europe supports the cascade. It supports the revision of the legislation to provide powers to the authorities to specifically prohibit the use of certain products in certain situations where such use could be problematic. This is especially the case with antimicrobials where inappropriate use, such as use in a species not on the label, could result in the emergence of resistance.

IFAH-Europe and EAZA share membership of the Advisory Committee on the Food Chain and Animal and Plant Health run by DG Sanco (Health and Consumer Directorate General of the European Commission). In a bilateral meeting with EAZA's director Lesley Dickie, the exchange of information between zoos was appreciated as being very important in terms of how to use medicines. We recognise the value in exploring how we can cooperate as we share many common interests in relation to the revision of the veterinary legislation. Whilst the cascade is a case in point, we look forward to more detailed discussions with EAZA as we move towards the revision of the legislation.

EAZA ACADEMY TRAINING NEEDS SURVEY 2011

THANK YOU TO THE 326 PEOPLE across 29 different countries that took part in the survey, *writes Myfanwy Griffith, EAZA Training Officer*. We had replies from all job roles within zoos and aquariums, ranging from directors and curators to keepers, vets, researchers and marketing staff. Initial trends indicate the following topics are most popular for training: design and evaluation of education; nutrition, animal behaviour and training; exhibit design; *in situ* conservation; management of staff; and collection planning. As would be expected there are differences in preference between different jobs, but across all roles there were comments indicating that training involving practical content is most valued.

The highest percentage of respondents selected a combination of distance learning and face-to-face training as their preferred delivery method. Thus, while face-to-face training will continue to dominate, we are in the process of developing online learning systems and would welcome any feedback on positive online learning that readers have experienced.

The ideal course length identified was three days (44%), closely followed by two days (34%). Spring and autumn were the preferred times of year for training, and although the EAZA Academy will aim to have most of its courses at these times some will need to be spread throughout the year to aid delivery.

There was a very slight preference for importance of qualification (57%) over no qualification (43%) linked to courses, but this does not signify a strong enough demand to consider accredited qualification for all courses at this time. Breaking the results down by course area does show higher numbers of 'very important to have a qualification' responses for courses linked to general management, sustainability and education. The largest barrier identified to attending trading was the cost of the course (48%), with comments indicating that it was not just the cost of the actual course but also factors such as cost of travel and accommodation that would impact on attendance. This means that the EAZA Academy will, in addition to keeping course fees as low as possible, also be investigating the location and accessibility of any new potential training venues.

Thirty-eight people added comments at the end of the survey, including many positive comments in support of the EAZA Academy. Other comments focused around offers to teach and the desire to have regionally based courses if possible. As the survey was anonymous, if you did offer to teach, especially in any of the popular course areas indicated above, please contact me directly (myfanwy.griffith@eaza.net) as I'd be keen to hear from you.

All the factors discussed will be taken into account when developing new courses for the EAZA Academy, however we will continue to explore other course areas should an obvious need arise. With the encouraging responses received it is evident that the EAZA Academy is well supported and new courses keenly anticipated. Email me to join the EAZA Academy e-group, or keep an eye on the EAZA Academy pages on the website (www.eaza.net) for information on new courses.

Welcome to the two new EAZA members approved by Council in Jerusalem on 3 April 2011.

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Izmir's first zoo opened its gates in 1937. It was a very small zoo, forming part of the 'Kulturpark' in the town centre. In 2000 the municipality decided to build a new zoo (45ha) 20km from the city centre on a former farm. The main farm buildings have been transformed into an educational building, restaurant and offices. In 2008 the old zoo closed and on 1 December 2008 the new zoo opened to the public. There is potential to expand the zoo by another 45ha. The zoo also functions as a rehabilitation centre for native species and a rescue centre for exotic species.

Founded: 1937 (re-opened 1 Dec 2008)
Size: 45ha
Staff: 70 permanent + 30 seasonal
Number of species: 127
Number of visitors:
630,395 in 2009; 482,589 in 2010
Organisational type: Zoological Park (governing authority: Municipal Government)

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Shortname: TORINO

ZOOM Torino opened in June 2009 on a 20ha area in the city of Cumiana, 25km south-west of Turin, with the first completed enclosures housing an Amur tiger and black-footed penguins. ZOOM Torino's main focus is on keeping animals from Africa and Asia, creating facilities with a primary focus on terrestrial mammals. Apart from the tiger and penguin enclosures the zoo currently also displays various birds of prey through free flight shows and a farm area holding animals such as camels, llamas and goats. In July 2010 meerkats were added to the collection and the new enclosure was built next to the entrance to attract visitors. Future plans include an African savannah, Asia island and a Madagascar themed area.

Founded: 1969 and opened to the public in 2010
Size: 18ha
Staff: 19.5 (part-time positions are counted as 0.5)
Number of species: unknown
Number of visitors: 50,000 paying visitors in 2009; 100,000 in 2010
Organisational type: Zoological Park organised for profit

Additionally, Parc Zoologique Fort-Mardyck Dunkerque Grand Littoral and Reserve Zoologique de Calviac, both in France, and Hai Park in Israel, were upgraded to Full membership. The latter was previously an Associate member and the two French zoos were Temporary members.

NOTICEBOARD

ASPINALL TRIPLE BILL

January was a remarkable month at the two Aspinall Foundation zoos in Kent, UK. First, on 17 January, keepers at Howletts Wild Animal Park welcomed the arrival of a European bison calf. The young female was born to mother Izelda and father Bransk, and has been named Izabella.

European bison, or Wisent, were once widespread across Europe and parts of Northern Asia but by 1900 hunting for skins, horns and sport had driven them to virtual extinction in the wild. The species was limited to just two populations in the Bialowieza Forest in Poland and the Caucasus in Russia. Both of these populations were then wiped out during World War I and the Russian Revolution. Luckily a few survived in zoos elsewhere, and the species was saved by a successful captive-breeding programme. There are more than 3,000 alive today, and several herds have been re-established in semi-wild conditions in Russia and Eastern Europe. The European bison is the heaviest surviving land animal in Europe.

The arrival of the calf is therefore good news for both the Howletts and this vulnerable species, but it could have been a very different story as head hoofstock keeper, Joel Bunce, explains: 'The calf's mother Izelda has given birth to 6 calves previously and is now 15 years old. At the beginning of 2010, Izelda was so ill we were within 48hrs of euthanizing her, but she suddenly showed drastic improvement and now seems in extremely good health. Howletts has cared for bison for around 30 years and Izabella is most welcome addition to our breeding programme.'

CHARLOTTE JONES

Then, just eight days later on 25 January, Howletts Wild Animal Park welcomed a new addition to its African elephant herd. He has now made his debut to press and public, enjoying the sunny spell in his outside enclosure with mother Masa. Unusually, the as yet unnamed male was one of a pair of twins but unfortunately the other calf did not survive. Howletts believes that the birth of African elephant twins in captivity is a first in the northern hemisphere.

'We are delighted to welcome this new arrival into our successful herd and feel particularly blessed that both Masa and one of the calves survived a potentially fatal birth,' says animal director Neil Spooner. 'Twins are incredibly rare so it was certainly a surprise to us all.'

Howletts cares for the largest herd of African elephants in the UK and has had more births than all other UK zoos combined. The calf joins sister Jamma who was born five years ago.

Finally came a story of a different type at Howletts' sister zoo, Port Lympne Wild Animal Park, when Ambam the gorilla became an overnight internet sensation. The 20-year-old silverback western lowland gorilla wowed the world by walking upright like a human, and once a YouTube clip went viral, Ambam was thrust into global superstardom.

'We were totally unprepared for the response as Ambam has been exhibiting this behaviour his whole life,' says head gorilla keeper Phil Ridges. 'Just days after uploading the clip the phones were ringing off the hook with people wanting to know about Ambam and we were inundated with requests from around the world for interviews and information.

'We have had a lot of speculation that it is a man in a gorilla suit or that he has been trained to do this, but Ambam has not been trained in any way, it is just something he chooses and is able to do. We are hoping his fame will have the more serious affect of highlighting the plight of the Critically Endangered western lowland gorilla. The charity that runs our parks, The Aspinall Foundation, is well known for its work with gorillas both at Howletts and Port Lympne and overseas where we protect over 1 million acres and reintroduce captive gorillas back to protected areas of the wild.'

EXTENDING ACCREDITATION TO ALL EAZA MEMBERS

SIMON TONGE, EAZA CHAIRMAN

I recently attended the EAZA mid-year Council meeting and Directors' Day hosted by Jerusalem Zoo and what an extraordinary few days it was. Shai Doron and his team did a fantastic job organising a complex set of meetings, visits and seminars and I was delighted that so many EAZA directors were able to see at first hand what a brilliant zoo he's running. I can't think of another EAZA member that so clearly fills its remit as a place for all sections of society to meet peacefully and on an equal footing in an atmosphere of fun and learning combined. When you overlay that with the deep integration between the zoo's field conservation activities and those of the nature conservation authorities in Israel you have a real exemplar of what a modern zoo should be; so thanks and well done to our hosts.

The major news from the Council meeting is that your Council voted to accept the principle that EAZA will have an accreditation scheme that covers all members. For many years now we have accepted that all new members should be subject to inspection before they join, and most other national and regional associations have inspection or accreditation schemes for their members. Nevertheless, there was opposition to the proposal in some parts of our association and it was not a unanimous decision by Council, so I wanted to let members know what has been agreed and what some of the concerns have been. I think opposition boiled down to three areas: bureaucracy, cost and control.

Most of the countries and regional associations within EAZA, and elsewhere in the world, have some sort of licensing system though they vary enormously in scope, frequency and quality. There was a feeling that imposing another layer of inspection on members was unnecessarily onerous. The problem with that is the lack of uniformity and quality in the inspection systems used. Some applicants with local licences and association membership have still failed their EAZA accreditation inspection. EAZA, rightly in my view, needs to ask for high standards from its members. The lowest common denominator will not do.

If we need to have an independent way of accrediting our members on a regular basis, and at least every 10 years is the default position, then it will come with a cost. The Executive Office simply does not have the manpower to run such a scheme at present. A new member of staff will have to be employed and that cost will have to be recouped via the membership fees. But the cost of one new staff member spread across 300 or so members can hardly be regarded as excessive! Yes, there could be additional costs, for travel and accommodation for screeners, but once every 10 years does not seem like a huge commitment to me.

Finally, control. There is a feeling in some quarters that implementing an accreditation scheme somehow fundamentally changes the relationship between the association and its members, that it gives the association control of its members rather than being controlled by them. My view is that it does not do so, that actually it strengthens the relationship between the association and its members. If the association has to respond to criticism of zoos, eg at the European Parliament or in support of national associations or even individual members, it can better do so if it is absolutely confident of the standards and ethics of its members. Currently that is not the case: we can recall recent issues that have led to EAZA members resigning or even having their membership terminated. Perhaps a good accreditation system would have dealt with those issues much earlier.

An important point to remember is that the new accreditation scheme will be run by you, the members. You will be the inspectors; the office will simply do the 'donkey work' organising the inspections and ensuring that they are carried out fairly and consistently. Members will have the right to object to individual inspectors if they feel the appointee has a conflict of interest and they will have the right of appeal against the findings of an inspection. Inspectors will make recommendations to the Membership & Ethics Committee and they will make the formal recommendation to Council. Ultimately everything is controlled by your Council and that is a body elected every three years. Democracy rules in our association!

Swinging along

EAZA'S APE CAMPAIGN IS BREAKING NEW GROUND FOR FUNDRAISING ACROSS ALL OF EUROPE

Bryan Carroll, chair of the EAZA Ape Campaign and Director of Bristol Zoo

The EAZA Ape Campaign is now well and truly established. At Easter, zoos across the continent celebrated Ape Week by running a host of innovative events, entertainments, and fundraising initiatives, and it's encouraging that it looks like we're already more than two-fifths of the way towards our overall target of €1 million. Pledges so far stand at over €400,000... but there's some way to go.

If you're already one of the 141 EAZA zoos to have signed up to the campaign, then do visit www.apecampaign.org where we're continually updating our news pages and ideas for fundraising. And if you're not one of the 141 – seriously, what are you waiting for? Ape week alone had children climbing through trees at Zoo Lyon, face-painting at Chester Zoo, drawing orangutans at Neunkirchen Zoological Garden, and a whole range of coordinated activities across Dutch EAZA member zoos, to mention just a few. Apes have such resonance with the public that not only are participants able to raise great funds for the campaign, but their visitors are coming back for more. This is a charismatic campaign, and although it's great to see so many already signed up (there are also 18 non-EAZA participants, too), there's still time to come on board.

If you are still wondering whether to join the Ape Campaign, then your mind will quickly be made up once you visit www.apecampaign.org. It's absolutely crammed with news, resources, information on projects and shared ideas on fundraising - you won't want to miss out.

And neither will the apes. Our campaign objectives can make a significant and lasting contribution to the continued survival of apes and their habitats:

- To increase habitat protection and reduce habitat loss.
- To reduce hunting and trade of apes, both live and dead.
- To change consumer behaviour to reduce pressure on apes and their habitats.
- To raise €1 million to establish a lasting fund providing ongoing financial support to ape conservation.

Do come and join us.

Tarzan swings into action

The publishing world is playing its part, too. A new series of Tarzan books, reinventing the hero of the jungle as an eco-warrior for the 21st century, is being published this year, with the author – Andy Briggs – and the publishers – Faber & Faber – each donating a percentage of their royalties and sales to EAZA's Ape Campaign.

This link with Andy and Faber really is incredible. We're really grateful for their support and generosity, and everyone who meets Andy is immediately struck by his great enthusiasm. You can find out more about him in the interview opposite. Tarzan is immensely popular, and his portrayal in the book as an eco-warrior is a message that we would all sympathise with. The book really is a good read and will appeal to its target audience of teens and young adults.

Tarzan will be released in June with an official launch in July at Bristol Zoo, and Andy will be available to do signings and help promote the book to zoo visitors. I really do urge as many zoos as possible to carry this book. Thanks to the arrangement being offered by Faber there is no risk to any zoos ordering the books, as they're being offered on a sale or return basis, and it means any zoo can support the campaign, even if they are unable to fundraise direct from visitors.

This is a unique way of raising money for the EAZA Ape Conservation Fund: let's make this a successful model for raising conservation funding.

Andy Briggs

Position: Author and Screenwriter • **Hobbies:** Travelling
Last book read: Stephen Fry's *The Fry Chronicles*
Last movie seen: *Rango* • **Last concert attended:** Ellie Golding
Last trip made abroad: Los Angeles

QUESTIONS:

Your new take on the Tarzan story is being published by Faber and Faber this year, with a percentage of profits going to EAZA's Ape Campaign. What inspired you to make this generous move?
The decision was the result of many factors. I had originally spoken to the Edgar Rice Burroughs estate about Tarzan, pointing out that he was the world's first eco-warrior, and I thought there was an opportunity to use such a worldwide brand to draw attention to environmental causes. Dr Carroll and his team at Bristol Zoo were so accommodating in my research on Tarzan they opened my eyes further to the dangers gorillas face. I was more than happy to donate a share of my royalties to the campaign as a thankyou and a chance to open the world's eyes to the plight of apes using the little fame that comes with being an author. Faber were superb, instantly offering an additional donation to the campaign from every book sold.

The books will have more of an ecological edge to them than the originals. What was the thinking behind this?
Next year Tarzan is 100 years old. Edgar Rice Burroughs wrote them in an age when nobody really cared about the environment, yet his iconic hero did. Now, Tarzan is more relevant than ever – there couldn't be a more perfect time to reintroduce him to the world. The increased environmental edge in my book comes from our better understanding of the world than in Burroughs' day, and I have been lucky enough to travel to Africa and experience its wonders first hand – something Burroughs could never do. I would also like to point out that while I wrote this book to bring Tarzan to life to a whole new generation, I feel confident that adults will enjoy it just as much!

How important is it to get this ecological message across to children?
Every environmental campaign in the world is a pointless act if today's children are not engaged in the message we are trying to send. Luckily, children are more aware of ecological pressures than when I was in school, but there is no harm in pushing this interest further through whatever channels we can. For me, Tarzan was the Saturday morning action adventure film I would watch as a child. Thrills and spills aside, it opened my eyes to a world so different to my own. I have tried to capture that Saturday morning magic in my book and rather than force any eco-message, I have incorporated it as a major element into the story.

Where do your interests in natural history lie?
Aside from spaceman, my childhood dream was always to be an explorer. At an early age I devoured Ladybird books, beautifully illustrated with fantastic animals I had never seen before. I watched endless adventure films, set in exotic locations far from any hint of civilization. From that moment I was hooked and natural history never failed to fascinate me. Like everybody else, I was horrified to discover just how badly mankind had mismanaged our planet – but, again like so many, I did little about it other than recycle. As I grew older I decided that I don't want to live in a world where my children could only see gorillas or tigers in museums. That's why I hope Tarzan will make up for that lost time when I should have been doing constructive conservation work!

What role can a writer play in helping to protect the biodiversity of life?
On the whole, writers tend not to be wildly famous, but what little fame we have can be used to stand up and remind the public what a fragile and wondrous planet we live on. For my part I am ensuring that in every literary festival and school author visit I do, I bring awareness not only to the EAZA Ape Campaign, but all the good work done by zoos around the world. I'm lucky enough to also write movies, which means I can sneak my own beliefs into those stories. They may be small points, but everything we writers can do to raise public awareness has to be worthwhile.

If there was another classic tale you could reinvent with an ecological message, what would it be?
I think every tale could be reworked that way. James Cameron showed that science fiction could easily carry a strong eco-message with his epic movie, Avatar. For my part I don't know about reinventing another classic, but I would love to see a sequel to George Orwell's 1984, set a little ahead of us now. I think the Orwellian 'Big Brother' message has a huge environmental disaster looming behind it; but an avoidable disaster – and that's something that we can all take heed from.

NO LAUGHING MATTER

THE BLUE-CROWNED LAUGHINGTHRUSH HAS A COMPLICATED HERITAGE, AND WITH OVER HALF THE KNOWN GLOBAL POPULATION OF 200 CURRENTLY IN CAPTIVITY, ZOOS MAY WELL HOLD THE KEY TO ITS SALVATION

Roger Wilkinson, Head of Field Conservation & Research, Chester Zoo and Laura Gardner, Curator of Birds & Blue-crowned laughingthrush ESB keeper, Leeds Castle Aviary, England.

Blue-crowned laughingthrushes (*Garrulax courtoisi* – see box) first appeared in the bird trade in Europe in 1988. This was particularly remarkable as, at that point, these birds were previously only known from five museum specimens – two (*G. c. courtoisi*) taken in Wuyuan County, SE China in 1919 and three collected at Shithoushan near Simao, SW China, in 1956 and subsequently described as a new subspecies *simaoensis*. These birds were considered to be subspecies of the yellow–throated laughingthrush (*Dryonastes galbanus*) which as a species was then considered globally near-threatened. For many years no subsequent sightings of either subspecies were recorded by either Chinese or visiting ornithologists. Other than that the two Chinese subspecies were rare, their conservation status remained unknown. Hence the surprise when they appeared in the bird trade.

APPEARANCES IN WUYUAN COUNTY

In March 1994 our colleague Prof He Fen-qi of Academia Sinica, Beijing, found recent evidence of *courtoisi* in a photograph of a recently collected skin in Wuyuan, SE China. After a further six years of searching, he discovered blue-crowned laughingthrushes breeding at two different sites in the same vicinity. It was the start of what is now a very important conservation initiative for the only known extant populations of this bird in Wuyuan County, Jiangxi Province.

Following on from this rediscovery ZGAP supported the initiation of Small Protected Areas to preserve important breeding habitats. Since 2000 Chester Zoo and Leeds Castle, Kent, have helped with financial support, and in 2001 they were joined by CEPA as a consortium of four funding partners. A Memorandum of Agreement, negotiated through Prof He, with the Wuyuan Forestry Bureau supports the field conservation.

Since 2000 a number of further breeding locations have been discovered by Fen-qi and his colleagues. Most of the breeding sites lie in lowland areas and are close to human habitation. Although new sites have been found we know of three sites that have been abandoned over this period and one was recently re-occupied. In 2010 the total number of laughingthrushes at the known breeding sites was estimated to be over 200 birds.

Blue-crowned laughingthrushes are protected in some of their breeding areas in Wuyuan (through their local designation as Small Protected Areas) but their wintering areas remain

unknown and outside the breeding areas the birds receive no protection. In addition, several breeding sites have been subject to urban development and disturbance as a result of which at least one has been abandoned by these birds.

SEARCHES IN SW CHINA

From 1956 until 2002 there had been no further reports of blue-crowned laughingthrushes from Yunnan. In April 2002 Professor He and colleagues made their first visit to Simao, Yunnan, to search for these birds. No trees remained around any of the villages or hills in the area around Shithoushan and no birds were seen. A second visit was made in May 2004, but again no joy. Consistent reports from local people indicated that birds may have been quite common in this area but had not been seen for approximately 20 years.

Between 2005 and 2009 eight more surveys were undertaken by Prof He in Yunnan and Guangxi Provinces. Bird trappers in W Guangxi confirmed that the bird was previously trapped there and also in areas of E Yunnan. Most birds were apparently destined for export to Europe via Hong Kong. The bird catchers encouraged by higher prices focused on these birds and moved to different areas after they wiped out local populations. Prof He Fen-qi learnt from the local bird dealers that birds were still being caught up until 1998 and that since then the bird export ban had made this trade unprofitable. We believe that remnant populations may still occur in SW China and a continued search for these may enable a local protection and conservation strategy to be developed.

ZOO BREEDING PROGRAMMES

A total of 116 captive blue-crowned laughingthrushes were listed on the ISIS international inventory for 26 January 2011, with 88 in Europe and 28 in the US. This inventory notes 17 birds hatched in Europe and one in the US over the previous 12 months. An additional 25 birds listed on ISIS as yellow-throated laughingthrushes are likely instead to be blue-crowned, as yellow-throated remains unknown in captivity in Europe and North America. Accurate listing is of course very important to prevent data conflict issues with ISIS.

The European studbook for the species was initiated in 2003. The ESB population has grown steadily from that time and now numbers 117 individuals from 17 collections. Although the population is steadily increasing and birds are relatively long-lived, there are some management issues which are being focused on in the ESB. These include high chick mortality and genetic management. Some holders keep their birds in small colonies with several breeding pairs and this has led to uncertainty over parentage. There is also a suggestion that colony management for this species may predispose birds to or make eradication of health problems, including A-toxoplasmosis, more challenging. In order to better manage this population it is important to know parentage. Accordingly, geneticists at Edinburgh Zoo have offered to assist with research to assist parentage determination. We expect shortly to be contacting ESB participants on this and look forward to their further co-operation and support.

The number of captive birds is approximately half the total known in the wild, and as such these deserve and require continued and co-ordinated management. Any collections that are interested in working with the Blue-crowned laughingthrush ESB are asked to please contact Laura Gardner at lauragardner@leeds-castle.co.uk.

The authors would like to thank Roland Wirth for alerting the zoo community to this opportunity for ex situ *conservation and linking this with* in situ *support for research in China that led to the current field conservation project.*

Year and number of blue-crowned laughingthrushes (number breeding sites)

2000	2002	2004	2006	2008	2010
95-110 (2)	140-155 (4)	130-135 (4)	180-190 (5)	230 + (5)	200 + (6)

CURRENT CONSERVATION AND TAXONOMIC STATUS

The ESB and ISIS both follow the recent re-classification of the blue-crowned laughingthrush as *Dryonastes courtoisi* whereas IUCN and Birdlife International continue to list this as *Garrulax courtoisi*. No subspecies are recognised with *simaoensis* being considered synonymous with *courtoisi*. The 2010 IUCN red list treats the blue-crowned laughingthrush as Critically Endangered. The China Species Red List recognises two subspecies (*courtoisi* from Wuyan and *simaoensis* from Simao, SW China) of blue-crowned laughingthrush and considers both as Endangered. Recent taxonomic changes may have led to confusion regarding how zoos accession their birds but if there is any doubt please contact Laura Gardner at Leeds Castle at lauragardner@leeds-castle.co.uk.

HE SHU-HUI

FOREST CONNECTIONS

THANKS TO THE MADAGASCAR CAMPAIGN, EAZA HAS BEEN ABLE TO SUPPORT A VITAL ACTION PLAN FOR AN ENDANGERED SPECIES OF LEMUR

Delphine Roullet, Coordinator of the Crowned sifaka EEP, Parc Zoologique de Paris, Muséum national d'Histoire naturelle; Josia Razafindramanana, GERP and The Aspinall Foundation

The crowned sifaka (*Propithecus coronatus*) is one of the most endangered sifaka species in Madagascar. It was once thought that its distribution was limited to the northwest of the country, however a discovery in 2009, of a new group in the central highlands of Madagascar, has changed that thinking. It suggests that the species was historically widely distributed but has gone extinct across the majority of its former range due to the almost complete destruction of forests throughout most of the interior of the country. Since this discovery, a small number of surveys conducted in the central highlands led to the discovery of previously unknown small populations of this species at various sites, which has been a great help in better defining the limits of the species distribution.

The crowned sifaka is very sensitive to habitat loss and food scarcity. There doesn't appear to be a large population of the species outside its known distribution range, which just leaves a number of threatened small populations in patchy fragmented forests at various sites stretching from the central highlands to the northwest of the island.

A conservation project has already been established in partnership between GERP and the The Aspinall Foundation at the Dabolava site where the first group of crowned sifaka was discovered outside the species' previously known range. This project is funded by four members of the EEP: The Cotswold Wildlife Park, The Muséum de Besançon, The Parc Zoologique de Paris and the Belfast Zoological Gardens. The SECAS (Société d'Encouragement pour la Conservation des Animaux Sauvages), a French friend association of Paris zoo, is also part of the funders' team. However, saving isolated groups in such a small fragment of habitat with no corridors to others and to the remainder of the sifaka's range raises key issues, not least the problems of genetic diversity and sustainability, the animals being 'imprisoned' in their forest, sensitive to environmental fluctuations and food availability.

During the second Crowned sifaka EEP Species Committee meeting which took place at Burford in June 2010, and which was partly dedicated to the *in situ* conservation of the species, the metapopulation management approach to crowned sifaka conservation was discussed for the first time. The metapopulation theory considers populations to be linked by migration, which is no longer the case for these small populations in isolated forest fragments. The objective of the metapopulation conservation project, including the captive population as part of it, is to ensure the connectivity of the fragments through animals' movement using the expertise of EAZA zoos and in accordance with IUCN guidelines.

This is a multidisciplinary project including:

- Populations and habitats studies: inventory of the population in each forest fragment and sustainability study.
- Genetic study: significant colour variations, in form of stain, in the new discovered populations and status still under discussions (species-subspecies).
- Conservation activities for the newly discovered populations in each site by involving local communities.
- Environmental education.
- *Ex situ* conservation, involving the EEP.

In November 2010, the project was awarded the amount of €17,801 from the EAZA Madagascar Campaign funds, to cover conservation activities and the organisation of a technical workshop on crowned sifaka conservation, focusing on the metapopulation management project. The workshop, was supported by MEF (Ministère de l'Environnement et des Forêts de Madagascar), and took place at Antananarivo in February, organised by Josia Razafindramanana and her colleagues at GERP and The Aspinall Foundation, which has been involved in the project since the beginning. The project also received a financial contribution from the 'Projet pilote bioculturel d'Antrema'. At the end of the workshop, a lunch was organised at Lemurs Park, the only institution outside the EEP to keep this species in captivity (two males in a free-ranging exhibit), followed by a tour visit of the park attended by the Minister.

A total of 36 people attended the two-day workshop: representatives of national and local authorities, the EEP, associations and foundations working on this species, universities, and two Malagasy zoos, came to share their experiences and to find a common strategy for its conservation.

Although the workshop helped all involved to take stock of the current knowledge on the crowned sifaka (*in* and *ex situ*), which will be published in a special volume of Primate Conservation Journal, the lack of data meant that we still don't know the density of the wild population. More surveys will be needed at each site to determine the number of groups and their composition.

The metapopulation conservation project was approved by the participants who defined a list of common actions to achieve the objectives of this ambitious project. One of the priorities identified is the development of the captive population through:

- The management of animals from very isolated fragments subject to exponential human pressure, that will need emergency rescue.
- The collaboration between Lemurs Park and the EEP for the rescue of the most endangered and isolated groups and for the implementation of a breeding captive population in Madagascar (included in the EEP).
- The Mahorogo project, which concerns the rehabilitation of a forestry station near Majunga which once housed a zoological and botanical park. This place can be then used for the development of a long-term breeding programme in Madagascar (included in the EEP) and can be a useful tool for the metapopulation conservation project when moving wild and/or captive animals.

This original project in which the *in* and *ex situ* actions are complementary may serve as a model for the implementation of metapopulation management for endangered species in isolated forest fragments in Madagascar.

Fruit bat enclosure,
Bristol Zoo Gardens, UK

EGYPTIAN TORTOISE HATCHING

Slowly on the up

A HISTORY OF THE EUROPEAN ENDANGERED SPECIES PROGRAMME FOR THE EGYPTIAN TORTOISE

Henk Zwartepoorte, Curator of reptiles and amphibians, Rotterdam Zoo, Coordinator of the Egyptian tortoise EEP

Back in the 1990s, the studbook and breeding programme for the Egyptian tortoise (*Testudo kleinmanni*) was managed by Esther Wenman at ZSL London Zoo. A few dozen specimens were registered and the species was kept by just a handful of institutions. Reproduction was poor, but the breeding successes at, for example, Edinburgh, London, Bristol and Jersey were promising. Indeed, a number of those individuals are still represented in the current EEP. Via the exchange and transfer of offspring to other UK institutions, a self-sustaining population was established.

On the European mainland, however, the species was barely kept at all. At the EAZA Reptile TAG meeting in September 1999 it was agreed that a proposal for a joint EEP for this highly endangered tortoise species be handled at London (Esther Wenman) and Rotterdam Zoo (Henk Zwartepoorte). The proposal was accepted by the EEP committee and the first initiatives were carried out in 2000. Within a few years, that work became concentrated at Rotterdam.

The UK captive population was the basis for the new EEP studbook, and before long, additional participants on mainland Europe were joining the programme. The international trade in specimens imported, in particular, from Egypt was still at a high level, despite the fact that the species was already internationally protected by CITES: from 1977 to 1995 on CITES 2 and thereafter on CITES 1. On the IUCN Red List the species was listed as Endangered in 2000, and upgraded to Critically Endangered in 2003.

Other than international trade from Egypt and Libya to western countries, other causes of decline are destruction of habitat by overgrazing by cattle, and development for agriculture and tourism. Since the populations in Egypt have became more and more scarce, export of Libyan tortoises has been taking place due to the poorly controlled border between the two countries. The population in Israel also suffers from agricultural development as well as use of the habitat for military use.

LOSING GROUND

In fact, since the early 1990s the species has become effectively extinct within Egypt. Baha El Din (1994) surveyed the whole former range of the Egyptian tortoise in Egypt and concluded that the species disappeared completely within a period of approximately 10 to 20 years (between the early 1970s and the early 1990s).

Since Libya opened its borders for foreign trade and tourism, the species has been seen more and more at Libyan markets for local sale as a pet for local people as well as an item for the tourism trade. More recently, many tortoises have been offered on the internet and, with Egyptian populations virtually destroyed, these animals must have been originated from Libya.

RETURN TO EGYPT

Recently, a project for *in situ* work on the species in Egypt has been launched. Key players in this project are Sheriff Baha El Din who published several papers on the Egyptian tortoise, and Omar Attum of the Purdue University in the US.

A so called 'soft release project' began in the Zaranik area and involved local Bedouin people of the Sweirki tribe. The 1,400 members of this tribe live within the reserve subsist by raising cattle and agriculture, but they once collected tortoises destined for the pet trade. By training some of them to become rangers and involving local people, the project benefits from local management. The ranger jobs provide income and people have the opportunity to become involved in wildife conservation. Since 2003, within a fenced area of about 250 km^2, a limited number of confiscated tortoises has been released and, with help of radio tracking, their movements were assessed. Later on, rangers became involved, with each ranger tracking and following one tortoise for 10 days a month. Information on movement and activity patterns, nutrition and breeding behaviour are observed and gathered, and the tortoises are measured and weighed. All the data is entered stored digitally, and the rangers develop a sense of responsibility for 'their' tortoises.

Funding for this project is mainly coordinated by the Purdue university. The Dutch/Belgium Turtle and Tortoise Society (NBSV) and the European Studbook Foundation (ESF) set a target of €10,000 to be raised during 2007 and 2008. From this amount a significant part will be used for funding the *in situ* project as well as other *ex situ* activities.

OMAR ATTUM

HENK ZWARTEPOORTE

FEMALE

By the beginning of 2011, the total amount had topped €11,000.

Along with the *in situ* project the *ex situ* captive population in Europe has increased enormously, and within five years the EAZA EEP population has quadrupled in size. By April 2011 the total reported studbook population contained 504 individuals, a total that might be even higher as not all EEP participants have submitted their ARKS 2010 data at time of writing. At the start of the EEP studbook in 2000, 40 specimens were already recorded as captive-born between 1990 and 2000; between 2000 and 2011 at 10 EAZA institutions 33.16.88 (137) births have been reported.

Another matter of significance is the high mortality of wild caught specimens. Of the initial starting group of 96 wild caught adults, 51 died over the years and from the 137 captive-bred tortoises, 74 died between 2000 and 2011 – a high mortality in offspring and juveniles. The survival rate of the offspring of the last few years is much higher than before 2000 due to improvement of husbandry.

During 2009 and 2010 the total living studbook population increased significantly. In October 2005 272 tortoises were confiscated in Italy. Between October 2005 and January 1 2010, 36 of them died at the Bioparco Zoo in Rome. Of the remaining 236 animals, 146 were offered to the TSA (Turtle Survival Alliance). CITES Italy had stipulated that they should be housed at EAZA institutions that have bred the animal or have skills in keeping Testudo species - a total of seven EAZA zoos were selected in the end. The former EAZA EEP stock of 85 unknown animals from these seven zoos were transferred to other EAZA EEP collections, but the majority of 57 specimens went to carefully selected private locations within the studbook managed by the European Studbook Foundation.

The physical condition of the Libyan tortoises seems to be good at the time of transfer to EAZA and the two privately managed turtle centres. However, directly after import a few individuals died and during the first three months after arrival another eight were lost. In some cases, mycoplasma bacteria and herpes have been detected. Further research and evaluation of post mortem reports still have to be carried out.

The current ESF living studbook population has increased enormously to 345 specimens as at April 2011. Through both improved husbandry within both the EAZA and ESF collections and the arrival of 146 Libyan specimens the total *ex situ* reported European captive registered population increased to 850.

The improvement of both the *ex situ* and *in situ* programmes has been of great importance for survival of this species. Cooperation of both the *in situ* and *ex situ* components might form a basis for future reintroduction of captive born tortoises and the recovery of the species in the wild.

Conservation and the species dilemma

ARE OUR BREEDING PROGRAMMES BEING HAMPERED BY OUR RIGID ADHERENCE TO THE CONCEPT OF WHAT A SPECIES ACTUALLY IS?

Gordon McGregor Reid, Director Emeritus, Chester Zoo; Professor of Conservation Science, University of Liverpool; Research Associate, Natural History Museum, London.

People who work in zoos in the field of animal and plant conservation are naturally focused on saving species from extinction. Species 'obviously' exist in natural habitats and are to us intensely real. Ask any enthusiastic birdwatcher anywhere in the world and they will, with great certainty, reel off a list of all the bird species that they have seen and recorded in the wild. Species represent the countless different kinds of living organisms collectively recognised as 'biodiversity'. One of the most important tasks in modern zoos is to develop sustainable populations of rare and threatened species for the long term. However, we know from recent member collection surveys conducted by EAZA and AZA that the number of sustainably managed breeding populations for species is remarkably low - numbering a few dozen, rather than in the hundreds. I suggest that a part of this problem is that the zoo community has not yet properly got to grips with the precise nature of the biodiversity that we seek to conserve. Taxonomic, geographical and genetic confusion is attached to very many breeding programmes for species.

Even so, species are the mainstay of educational interpretation in zoos and botanical gardens everywhere. Identification labels typically show an illustration of the animal or plant, the common name and Latinised scientific name and a map of its geographical distribution. The current two-name (or binomial) scientific system for recognising, describing, naming and classifying species was established by the distinguished Swedish naturalist Carolus Linnaeus (1707-1778) in his *Systema Naturae* (1758). Linnaeus worked with both preserved and living specimens and had a personal menagerie including exotic creatures such as an orangutan. In the 19th and 20th centuries, Linnaean and many other preserved specimens collected by others were incorporated as 'types' in museum and university collections in Europe and elsewhere. These specimens still constitute material evidence for the existence of particular species and their biology. They are the formal 'name-bearers' for them and are somehow representative of the species as a whole. Nevertheless, zoo curators do not usually refer to such material or to the original published descriptions to check on identification, even when they are setting up breeding programmes that may run for many decades and be very costly in terms of funding and other resources.

> Named species are the 'building blocks' for all the vitally important work that we do *ex situ* and *in situ*

In any event, named species have become the most important verbal currency in practically any contemporary dialogue on issues in zoo animal management, biology and conservation. Indeed, the concept is essential in compiling data for the International Species Information System (ISIS-ZIMS), for the Convention on International Trade in Endangered Species (CITES) and for the IUCN Red List of Threatened Species. Species names act, at different levels of generality, as descriptors, designators and scientific hypothesis in systematic and general biology; and as legal entities in conservation and environmental law. Named species are the 'building blocks' for all the vitally important work that we do *ex situ* and *in situ*. It is, therefore, worthwhile to continuously re-evaluate the fundamentals upon which our activities depend.

WHAT IS A SPECIES?

Matters are certainly not quite as simple and straightforward as first appears regarding the term 'species' and its use in the above contexts. I first became interested in the species concept when I was a research student at the British Museum of Natural History in London. I studied the anatomy, taxonomy and evolutionary relationships (phylogeny) of fishes. In my thesis (1978) I argued that the general notion that species exist as objective entities is not self-evidently true, nor a universal proposition, nor a necessary assumption in evolutionary biology or even for comparative purposes. I argued that subspecies, species, genera, families and other taxonomic categories are more-or-less arbitrary designations. These are, in my view, superimposed on continuous morphological and genetic variation in space and time between and within natural populations. My examiners did not agree with me and gave me a severe mauling on this point – but I was and still remain an unrepentant heretic.

I moved from the museum to the zoo world but now, in my mature years, I again return to the research questions that haunted me in my youth. Leaning on the fence to a paddock full of hoof stock in Chester Zoo, I often ask students what they see. 'Zebra, *Equus grevyi*', they might swiftly reply. When pressed, they may grudgingly admit that they only see individual animals forming a group going under that name, but that they cannot actually observe a 'species' as such. Of course having a name for what one sees and interacts with provides a strong emotional and intellectual reassurance. That is why challenging the basic notion of species often produces a bemused, or antagonistic, or even hostile response from colleagues! In *The Meaning of Culture* (1929) the philosopher John Cowper Powys argues that 'Each planet, each plant, each butterfly, each moth, each beetle becomes doubly real to you when you know its name. This is no superficial pedantry. Deep in the oldest traditions of the human race dwells the secret of the magical power of names'.

Be that as it may, emotions, traditions, secrecy and magic do not constitute science. Emotionally, we all feel compelled to give names to the more charismatic individual zoo animals and to pets at home. This is 'anthropocentrism' - placing animals in an artificial framework understandable in human terms. We anthropomorphise all the more when animals become extinct - hence 'Martha', a passenger pigeon who died in the Cincinnati Zoo on 1 September 1914, and 'Benjamin', a Tasmanian wolf who died at the Hobart (formerly Beaumaris) Zoo on 7 September 1936. Both are enshrined as the last representatives of their kind. While perhaps a convenient label and tool for communication, no one assumes that calling individual animals 'Martha' or 'Benjamin' is scientifically meaningful. In the same vein, any idea of species as a real, objective collective entity must be evidence-based and testable if it is to be accepted into the realm of science; and also be employed in practical animal management programmes. We must distinguish between names, concepts and hypotheses. Here are some pertinent scientific questions: Do species of, say, viruses, bacteria, plants, snails, fishes, reptiles, birds and elephants share some specific universal property, which renders them as the same basic and equivalent entity? If so, what is that property?; Exactly how much genetic or other biological differentiation separates one putative species from another? Is it always the same amount?; Are all contemporary species immutable or irreducible units?; What precisely are the supposed key differences between genera, species, subspecies and geographical populations? Can we establish tight, mutually exclusive definitions?

LEADING QUESTIONS

This leads to considerations of the most conservation-appropriate founder material to be used to establish long-term sustainable populations of species in zoos. Also up for discussion is the question of whether zoos should discontinue breeding programmes for the many hybrid taxa of unknown geographical provenance from populations of, say, giraffe, jaguar or chimpanzee; or of white (albinistic) taxa including tiger, moose and python. I argue that hybrids can never serve a useful long-term conservation purpose in terms of reintroductions and they occupy valuable space better devoted to taxonomically and genetically representative biodiversity. Similarly, albinos (which may well be popular with zoo visitors) do not exist in nature other than as rare genetic variants and so are not truly representative of natural biodiversity.

Carolus Linnaeus worked with both preserved and living specimens

To begin to address some of these thorny questions, more than 30 delegates attended an international Species Definition Workshop in January 2011, kindly organised by IUCN-CBSG and hosted by the Saint Louis Zoo. Zoo professionals engaged with a broad range of taxonomists, geneticists and field conservationists. A core concern was the difficulty in conserving that which we cannot adequately define. It emerged from presentations and discussions that at least 24 different species concepts have been employed, at least historically! Among these, only a few were deemed to be useful to consider in the context of modern zoo breeding programmes. There were, in addition, a number of concepts for grouping within species including elusive contemporary ideas of subspecies, of 'evolutionarily significant units' (ESUs) and of 'minimally diagnosable units' (MSUs). A large and crucially important debate has only just begun in the zoo and wider community which should eventually lead to crisp scientific guidelines and positive practical conservation action. Certainly, there is a need for international consensus to move forward rationally in breeding programmes, in documentation, in educational interpretation and in outreach work.

Great expectations

VALUABLE INSIGHTS INTO THE KEEPING AND BREEDING OF THE MIGHTY GREEN ANACONDA

Kristian Soerensen, keeper, Randers Regnskov Pictures: Brian Rasmussen, Randers Regnskov

The green anaconda (*Eunectes murinus*) is often considered a mythical creature. The stories about it are legion, although few are true. They vary from descriptions of up to 40m long monsters to situations in which anacondas have eaten several people. Some Amazon Indian tribes believe giant anacondas created the rivers throughout the Amazon, the massive serpents slithering their way through the forest leaving their tracks behind which later turned into rivers. Even the Spanish word for anaconda, *matatoro*, means bull killer. Yet, the fact is there has never been a documented green anaconda longer than 9m and weighing more than 180kg.

That's certainly not large enough to kill a bull or create rivers, but these snakes do make for extremely impressive exhibits, nonetheless. At Randers Regnskov in Denmark, we currently house 2.2 adult green anacondas that we received as babies in 1999 and 2002. They were born to two different wild caught females, and in the early years we kept them separately in enclosures behind the scenes. As neonates they where housed in boxes or small terrariums, whereas today the males are kept in large plastic custom cages and the females are housed in a large exhibit. The enclosure is arranged so that two-thirds of it is dry and the remaining third contains water. A hide box is also available in each terrarium, these latter being maintained at a temperature of 27-29°C with a local heat spot at 35°C.

> The chance of successful copulation increases significantly when more than one male is present

To begin with, the four anacondas were not particularly stable eaters. We offered them many different prey items, including day-old chicks, rats, guinea pigs, and fish, all both pre-killed and live. To help overcome their reluctance to eat, we had to force feed them a few times, and by the time they were 2-3 years old, they had settled into a stable feeding routine.

MAKING ROOM

In 2009 we made a new enclosure for them: 10 sq m of dry space, and 10 sq m of water with a depth of 90cm and consistent temperature of 26-28°C. The dry areas have three heating spots with a temperature of 36-38°C. The remaining space in the enclosure is heated to 26-30°C. The two females moved in on 13 June 2009, at which point they weighed 38 and 44kg. Neither of them ate for three months after the move, with most of their time spent in the water, but when they started eating once more, we fed them with rabbits, large guinea pigs, and small goats.

In January 2010 the two males joined the females in the enclosure. They weighed approximately 15kg each at the time, and they immediately started showing great interest in the females. On average, anaconda males reach sexual maturity when they weigh about 10kg while the females have to be closer to 40kg. A good indication of male sexual maturity is when sperm is found in the water.

For the first month in the new enclosure, the males exhibited daily mating behaviour. For most of this time both males concentrated on the same female, and whenever she moved around the enclosure the males were quick to follow by her side. This is the type of behaviour seen in the wild, where in some cases up to 25 male anacondas can try to breed with the same female in a process known as a breeding ball. I believe the chance of successful copulation increases significantly when more than one male is present. At Randers Regnskov, every time the anacondas bred or tried to breed the activity took place in the water, and over the next couple of months the males' interest would change from female to female. On 6 May 2010 the males were taken out of the enclosure because they no longer showed interest in either female. Furthermore, the males had been fasting since January, when they where put in the enclosure.

The females continued to eat after



the males were removed. It is normal for gravid females to stop feeding, and because of this I was not certain if either was pregnant. They were only eating once or twice a month, but by the beginning of September 2010 one of them had really put on a lot of bodyweight. Both females started spending lots of time on the heating spots, and at this point we still thought only one of them was pregnant. I estimated that the bigger female gained around 20kg, although we did not weigh her for fear of creating too much stress. The exact conception date was unknown so we were really excited about the anticipated birth. Depending on its location, in the wild a female can be pregnant from between six to eight months.

Then came the day. On 2 November 2010 Randers Regnskov staff found the enclosure full of small baby anacondas. In total there were 36 babies, one stillborn, and one slug. Anacondas often give birth during the night and the mothers are known to eat stillborn babies and slugs. For this reason there may have originally been even more babies than we found. The 36 that survived showed very aggressive behaviour from their first breath. Their average length was 79cm and average weight was 217g, with a sex ratio of 21.15. The mother that gave birth was in very good condition, which I believe helped her to achieve such a high number of offspring. Previous research suggests that anacondas in captivity can have clutches ranging from 5-80 young.

The mother was much larger than the other female so I did not suspect the latter to be pregnant: it turned out I was wrong. Just over a month later, on 6 December, a second litter of 16 young appeared in the enclosure, this time with an average length of 80cm, average weight of 245g, and sex ratio of 9.7. There were no slugs or stillborns.

All the babies were placed in individual plastic containers, where they are kept at a temperature of 28°C with a local heating spot at 32°C. Each baby has a water bowl where they spend the majority of their time, either inside or hiding underneath.

The babies shed their skin for the first time after just two weeks. The following week they were fed live mice, which were left in the cage for 30 minutes, but they showed no interest in this prey. A couple of days later a fully grown dead mouse was placed in each container. Eight of the youngsters ate their mouse during the night. It took some of the babies six weeks to start eating, and the slow starters were given an option of fish, although with no success. Today, however, all the baby anacondas are eating a mouse every fifth day.

After reading this article I hope that other European zoos will start working with this spectacular species. Some zoos have already received babies from us but with 52 to begin with, we still have many left. As opposed to the wild caught anacondas which are often heavily affected by parasites and difficult to acclimatise, captive borns are an ease to work with.

This year we have decided to give the females a break to gain more weight. At 50 kg this enormous snake already puts on a great show – and I can only imagine the reactions from visitors when they reach 100 kg.

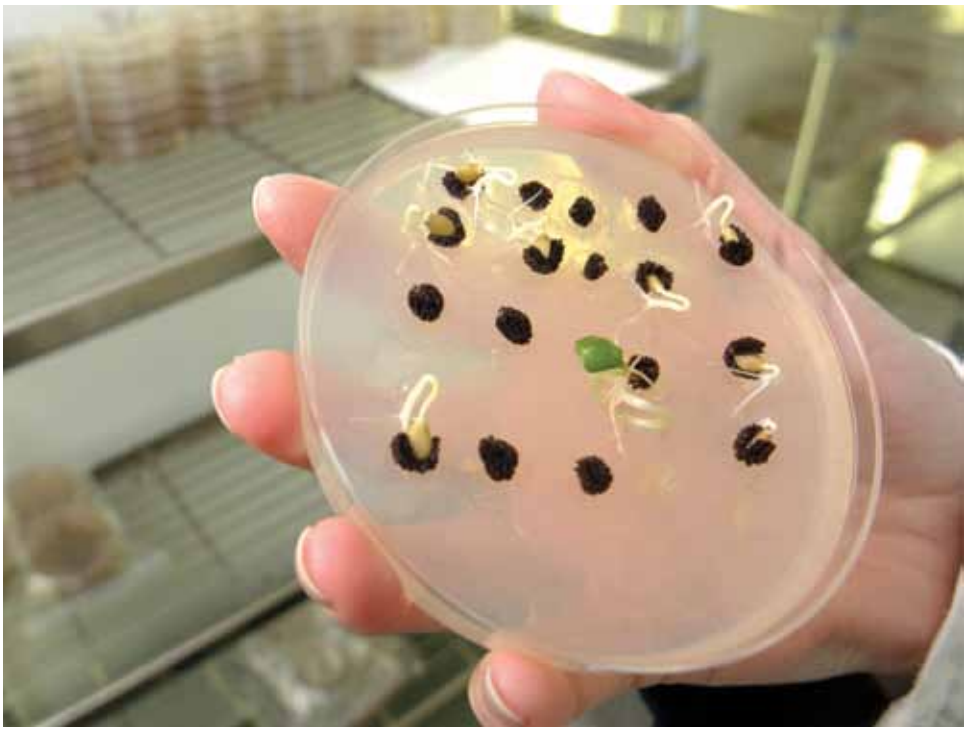
For further information, contact Kristian at ks@regnskoven.dk

On 2 November staff found the enclosure full of baby anacondas

Plant conservation: a global asset

OPENED IN 2000, THE MILLENNIUM SEED BANK, MANAGED BY THE ROYAL BOTANIC GARDENS, KEW, IS THE LARGEST SEED BANK DEDICATED TO WILD PLANT SPECIES IN THE WORLD. IT HAS BUILT A GLOBAL NETWORK – THE MILLENNIUM SEED BANK PARTNERSHIP – FOR THE CONSERVATION OF SEED FROM WILD PLANT SPECIES

Jonas V Müller, International Co-ordinator, Royal Botanic Gardens, Kew



Plants form the basis of all life on earth – from the important job of producing food and habitats for all wildlife across the world, to absorbing carbon dioxide in the face of climate change. They are essential for ecosystem services and hence for human well-being.

However, according to the UN Millennium Ecosystem Assessment, changes in biodiversity due to human activities have been more rapid in the past 50 years than at any time in human history. The most important direct drivers of plant or more generally biodiversity loss and ecosystem service changes are habitat change, climate change, invasive alien species, overexploitation, and pollution. The global number of plant species is projected to be reduced by 10 to 15% as a result of habitat loss alone over the period 1970 to 2050, and other factors will further exacerbate the rate of extinction. The Intergovernmental Panel on Climate Change predicts temperature increases of at least 1.8°C by 2100 which would put 20 to 30% of all plant species at increased risk of extinction.

We need to protect and preserve the diversity of plant species across the globe. With the effects of climate change, it is clear that protection of plants *in situ* for example in forest reserves and national parks will no longer be sufficient. Other strategies which complement *in situ* conservation are required.

WHY SEED BANKING?

Seed banking is a preferred method for the long-term *ex situ* conservation of plants. It takes advantage of the ability that seeds from the vast majority of plant species have to tolerate desiccation ('orthodox seeds'). The process of seed banking is straightforward. Seeds are collected from the wild using sampling methods designed to capture maximum genetic diversity. When the seeds arrive at the seed banks they are dried at 15% relative humidity, cleaned, counted, and then stored in freezers at sub-zero temperatures according to internationally agreed standards. Once carefully dried and frozen, there is potential for some seeds to stay alive for hundreds or even thousands of years. For those species whose seeds are not orthodox ('recalcitrant seeds') and would be killed if dried and frozen, alternative methods exist (eg embryo extraction and storage in liquid nitrogen).
Storing seed in seed banks is relatively inexpensive. The average cost to conserve a plant species at the Millennium Seed Bank (MSB) is £2,000. Furthermore, seed banking does not take up much space. The total potential cold storage floor area in the MSB vault is 450 sq m – sufficient to store up to 50% of the world's seed-bearing species.

Seed bank managers need to ensure that they know how to germinate seeds in order to monitor quality and to allow regeneration. At the MSB, viability tests are carried out on every collection in the MSB shortly after banking and every 10 years thereafter. Research studies are ongoing in order to improve seed conservation, for example, research on molecular markers for seed longevity or dormancy breaking mechanisms.

ACHIEVEMENTS SO FAR

The international phase of the Millennium Seed Bank was set up in the year 2000, with the target to collect, bank and conserve seeds from 10% of the world's seed-bearing flora (estimated at that time to be 242,000 species) by 2010. In October 2009, the MSB and its partners celebrated the achievement of this target. By April 2011, seeds from 27,650 species had been collected and safely stored in *ex situ* conservation both in their country of origin and in the underground vaults of the MSB. These collections represent 341 plant families and come from 135 different countries.

Almost half of the collections come from species that are endemic, endangered or of economic importance. Seeds of at least 12 species that are considered extinct in the wild are held in the bank. Partner organisations decide on the priority species for collecting in their country: currently, the MSB has partnership agreements with 130 partner organisations from 57 countries.

EXPANSION OF ACTIVITIES AND GOALS UNTIL 2020

Seed banking does not stop once the seeds are stored in deep freezers in underground vaults, it is actually the beginning. The current phase of the Millennium Seed Bank Partnership will run until 2020 and will focus on threats to human wellbeing – food security, sustainable energy, loss of biodiversity and climate change – by safeguarding wild plant diversity and enabling its use. There are two main targets:

1. The collection programme will conserve a further 15% of the world's plant species by 2020, storing a total of 25% of known flowering plant life (75,000 species); eventually, the MSB will hold the seeds of at least half of all known plants.
2. Seeds, scientific information and expertise will be available to organisations involved in researching and delivering the sustainable use of plants and the restoration of damaged vegetation. Restoration efforts will help combat the deforestation of temperate and tropical forests that currently accounts for 20% of global carbon emissions.

Subject to the terms of acquisition, most of the current seed collections are available for distribution on request. The MSB alone has sent out over 4,600 seed collections over the past five years to researchers throughout the world to enable research into drought tolerant fruit trees, photosynthetically efficient staple carbohydrates, or biofuels that can be grown in saline environments. Through the global partnership, the MSB introduced 420 plant species back into the wild.

Although threat to plant diversity is always going to be a driver of seed conservation, if seed banks are going to demonstrate their maximum worth to wider society, it is no longer reasonable to hope that users may find something of value in the collections. At least some collections must be targeted with direct use in mind. The collections in the MSB are part of man's biological inheritance to be passed on to future generations. Curated and supplemented shrewdly they will help enable human innovation, adaptation and resilience, and will have huge economic benefits by underpinning the primary industries of agriculture, horticulture and forestry.

CLOCKWISE FROM TOP LEFT: SEEDS IN EX SITU STORAGE AT -20 DEGREES CENTIGRADE IN THE MILLENNIUM SEED BANK; SELECTION OF STORAGE CONTAINERS USED FOR EX SITU SEED STORAGE IN THE MILLENNIUM SEED BANK; AS PART OF SEED BANKING GERMINATION TESTS ARE CARRIED OUT TO CHECK SEED VIABILITY AND ENSURE THE MATERIAL CAN BE UTILISED IN THE FUTURE; SEEDS IN EX SITU STORAGE AT -20 DEGREES CENTIGRADE IN THE MILLENNIUM SEED BANK. - ALL FOUR IMAGES © BOARD OF TRUSTEES, RBG KEW; WELCOME TRUST MILLENNIUM SEED BANK BUILDING AT WAKEHURST PLACE, UNITED KINGDOM – © WOLFGANG STUPPY

Extinct in the wild – and doomed in zoos?

SHOULD 'ZOOLOGICAL NEGLECT' BE ADDED TO 'POACHING' AND 'HABITAT DESTRUCTION' AS ONE OF THE THREATS FACED BY LESS FASHIONABLE SPECIES? IT'S TIME THAT MORE ZOOS STARTED CATERING FOR THE UNDERDOGS

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Once in a while you come across information about one of the last quaggas, Caspian tigers, thylacines or passenger pigeons in a zoo. Perhaps you think to yourself: 'If these taxa would only have survived a couple of decades longer, zoos would not have allowed them to vanish from the surface of the earth. In the era of studbooks, SSPs, EEPs and the like we would surely have done everything possible and saved them in zoos until the time will be ripe for a re-introduction programme'.

But would we really have done so? Perhaps, yes, we would have succeeded in the case of the Caspian tiger. But how about the passenger pigeon? Perhaps we can judge the outcome based on the case of the Socorro dove, one of its relatives. Gone from the wild like the passenger pigeon, but happily still surviving in aviaries thanks to the efforts of a handful of private aviculturists and zoos, it sits in the IUCN Red List category Extinct in the Wild.

Now, some of our most prestigious species, representing some of our best-selling success stories, have made it through this IUCN Red List category before being successfully returned to the wild – such as Californian condor, black-footed ferret and Arabian oryx. Yet the case of the Socorro dove is different. Despite the fact that it is actually quite a pretty bird, the species is what some bird watchers call a LBB ('little brown bird'): its bad luck really is that it is 'out of fashion' in zoos.

Alternatively, perhaps it's the case that the type of enclosures needed to breed species such as the Socorro dove (smaller aviaries, and not one but several) are out of fashion in many zoos. Hence, despite the best efforts of the EEP programme, the population of the Socorro dove, that already has gone

SOCORRO DOVE

through several bottlenecks during its captive history, is much smaller than it should be, hovering around fewer than 100 birds, losing yet more genetic diversity each generation.

Reintroduction of Socorro doves is likely to happen sometime in the future, but at present is hampered by bureaucracy in Mexico. By the time those who work on the reintroduction plan have achieved their goal and cleared the bureaucratic obstacles, we may simply not have a viable population any more. At the very least, the population will have lost a lot more genetic diversity than would be the case if more zoos would take their role more seriously and provide space for one of the 'ultimate zoo species' – one that is extinct in the wild.

Edwards's pheasant is a similar story. Although at the time of writing it is neither listed as Critically Endangered nor Extinct in the Wild by the IUCN, Jonathan Eames, Head of the BirdLife Indochina programme has expressed concern over the total absence of recent records from the wild (see http://birdlifeindochina.org/sites/default/files/Babbler%2035.pdf). Others (Brickle *et al* 2008; Biodiversity and Conservation 17: 1393–1497) have argued that not enough survey effort has been made so far to assess the status of Edwards's pheasant properly, and the species might even turn out to be better off than reflected by its current Endangered category. A survey is about to start, for just this reason. Yet, at this point the outcome is still unknown, and we should look after the captive stock of Edwards's pheasant as well as possible, based on the precautionary principle.

In reality, captive Edwards's pheasants have, like Socorro doves, gone through a series of genetic bottlenecks and long periods of neglect. This neglect continues in all regions with zoo associations, except in Europe, where an EEP programme initiated by co-author Alain Hennache from Clères began to recover the population. However, the widespread recent demolition of pheasantries and decreasing interest in galliforms in zoos in general threatens the survival of Edwards's pheasants in captivity as much as its survival prospects are unclear in the wild.

VIABLE POPULATION

Another Vietnamese endemic, just like the Edwards's pheasant, is the Vietnamese sika deer, which is, beyond doubt, extinct in the wild. An increasing captive population in Vietnam, kept for commercial purposes, might be largely hybridized and as such is probably of no value to the survival of the taxon. Fortunately, a fairly large and still increasing population (around 400) exists in EAZA zoos. This is the only potentially viable captive population anywhere in the world. A small population in North American zoos, originally derived from imports from Europe, is on its way out due to a present lack of interest by many in the US zoo community in deer species, raising alarm bells as to how quickly a change in fashion or retirement of a 'champion' for a particular species can nullify decades of conservation efforts in zoos.


EDWARDS'S PHEASANT

Although Vietnamese sika deer are presently doing better in European zoos than Socorro doves or Edwards's pheasants, their future is by no means secured. It is not clear whether re-introduction might be possible anywhere within its former range or if there exists enough interest in the taxon among ourselves (and, who else would do it otherwise?) to initiate a repatriation programme and raise the funds for it.

The red-necked pond turtle is one of at least half a dozen Asian turtles assumed to be extinct in the wild. While listed as Endangered and currently proposed to be upgraded to Critically Endangered in the IUCN Red List, most turtle specialists treat it as 'extinct in the wild'. The dilemma is that the categories 'Extinct' and 'Extinct in the Wild' are only applied by The IUCN Red List of Threatened Species when there is no reasonable doubt that the species is so. Thus, for 'non-charismatic species', the lack of suitably intensive enough surveys to make such a firm statement means that many linger as Endangered, Critically Endangered, or even Data Deficient for years or decades. Thus, the zoo populations of poorly-known Endangered, Critically Endangered, or Data Deficient species should be taken to be also 'ultimate zoo species' pending evidence to the contrary.

A significant founder population of the red-necked pond turtle exists at Allwetterzoo Münster, and captive management of this species is not too challenging, yet very little interest in this species has been shown by zoos. Only three institutions have indicated their willingness to take offspring of the red-necked pond turtle from Münster so far, and so, as of now, breeding of the species is on (hopefully) temporary hold in Münster, although with fewer than 40 animals in zoos the population is far too small to ensure its survival.

POLITICAL ISSUES

More examples could be added. Captive recovery of some species may fail because no founder populations exist in zoos or bureaucracy makes it next to impossible to move animals into captivity – this is beyond our control. However, what excuse have we to let species slip away or allow their gene pools to erode unnecessarily, as has happened, which we know how to breed and which are not even particularly costly to keep? Should we add 'neglect' as a new category of threat next to poaching and habitat destruction?

Next year's EAZA campaign on on threatened large animals in Southeast Asia will highlight numerous seriously neglected species on the brink of extinction, which are at risk of disappearing forever with hardly anybody noticing. As the cut-off point for 'large' in the context of this campaign is one kilogram, two of the taxa mentioned here, Vietnamese Sika deer and Edwards's pheasant, fit the campaign theme.

Although some of the species at greatest risk are not held captive anywhere, in the interest of those species already in zoos and 'Extinct in the Wild' or nearly so, let us challenge marketing departments to not make choices on what seems to attract the public's interest anyway, but to sell the conservation issues that need attention. Surely, with the right story told a Socorro dove or Edwards's pheasant should be no less exciting to a zoo visitor than a gorilla or elephant. Indeed, vital evidence for this comes from a recent study of zoo visitor behaviour, where some species commanding the most attention were not the standard fare of giant, brightly-coloured, dangerous animals already well known to the zoo-going public, but included species such as the fossa. While this is Madagascar's largest carnivore it is in global terms small and, moreover, brown all over. Well-designed communication materials hold the public's attention for any species, because every species has something fascinating to be told.


VIETNAMESE SIKA

Coral reefs on the EDGE

THE EDGE CORAL REEFS PROJECT, DEVELOPED BY ZSL, IS A NEW CONSERVATION INITIATIVE WITH A DIFFERENCE – AND OTHER EAZA MEMBERS CAN GET INVOLVED

Catherine Head, Rachel Jones, Heather Koldewey, Zoological Society of London

Tropical coral reefs are the most diverse marine ecosystem on the planet, and hard coral species are the foundation of this ecosystem. Some 75% of the world's coral reefs are currently threatened by a combination of local pressures and global climate change, whilst one third of all known reef-building coral species are threatened with extinction.

The EDGE of Existence programme (www.edgeofexistence.org) focuses on species that represent a disproportionate amount of unique biological heritage and are also threatened. Species are ranked according to a score which combines their relative threat or Global Endangerment (GE; based on IUCN Red List categories) with Evolutionary Distinctiveness (ED; based on a phylogenetic supertree). The highest ranking Evolutionarily Distinct and Globally Endangered (EDGE) species have few or no close relatives and are often extremely unusual in the way they look, live and behave. They are also on the verge of extinction and not receiving conservation attention: If they disappear, there will be nothing like them left on the planet. To date, the EDGE programme has been established for mammals and amphibians, with corals the newest initiative.

As a complete phylogenetic supertree does not yet exist for hard corals (*Scleractinia*), ten focal EDGE hard coral species were identified and prioritised for conservation action at an international workshop last year, using a combination of expert opinion and current phylogenies (Table 1). The list includes corals from a range of geographical locations, many of which would not be prioritised by conventional criteria such as functionality.

THREE EDGE SPECIES IN TRADE

Three of the priority EDGE coral species – mushroom coral (*Heliofungia actiniformis*), bubble coral (*Physogyra lichensteini*) and elegance coral (*Catalaphyllia jardinei*) – are particularly impacted by the live aquarium trade for corals. *H. actiniformis* is probably the most hospitable reef coral, with over 16 associated species, including a host-specific pipefish and at least five shrimp species. *P. lichensteini* is a favoured food source for the Critically Endangered hawksbill turtle and *C. jardenei* has been reported as host for certain fish species.

The trade in live corals for the marine ornamental industry is a large and lucrative one. CITES export licences for 2010 reveal that the large majority of traded coral are exported from Indonesia, almost three quarters of a million individual colonies in that year alone. There are more than

LEFT: HELIOFUNGIA PIPEFISH, TEGUH TIRTAPUTRA
OPPOSITE: HELIOFUNGIA POPCORN WOLFGANG KRUTZ, WWW.WATERWORXSBALI.COM

CASE STUDY: *HELIOFUNGIA* IN THE SPERMONDE ARCHIPELAGO

Work in 2009 (Knittweis *et al*) studied the population dynamics of *Heliofungia actiniformis* within the Spermonde archipelago in Indonesia. The research showed that the average size the colonies were collected at was between 4-11cm, but the size at which they became sexually mature was at least 10cm. Overexploitation was thus in time a likely outcome with recruitment rates reduced yearly. Using methods for establishing sustainability, the minimum harvest size was estimated to be 12-13cm corresponding with an age of about 20 years.

This work showed that detailed biological data need to be factored into the quota-setting process. It also showed that relatively simple changes to the management of a resource (such as setting minimum harvest sizes) could in theory quite quickly improve its sustainability.

L. Knittweis, J. Jompa, C. Richter and M. Wolff (2009). Population dynamics of the mushroom coral Heliofungia actiniformis in the Spermonde Archipelago, South Sulawesi, Indonesia. Coral reefs. Volume 28, Number 3, 793-804

50 genera commonly traded but there are a few perennial favourites that are always in demand. Coral species that have large spectacular polyps, are open during the day, and have bright colours, are always popular for reef tanks and the three EDGE species *P. lichtensteini*, *C. jardenei*, *H. actiniformis* are always on the list (Table 2).

The reasons for the continued high demand for these three EDGE species is partially because they are attractive corals but also because their mortality rates in captivity are relatively high, particularly for *C. jardenei* and *H. actiniformis*. The large fleshy polyps of these species are particularly vulnerable to physical damage when they are moved or handled. Transit times can be two days or more door-to-door and many corals arrive at their ultimate destination already damaged and vulnerable to bacterial infection. In the weeks and months after arrival many more that survived the initial journey will succumb to infections that are extremely hard to identify and treat. Husbandry of these two species is challenging even for the most experienced aquarist. While the occasional specimen will thrive long-term, on average colonies do not survive for more than one to two years. The demand for new colonies as replacements drives much of the demand for these species.

The role of CITES as implemented by national border authorities is vital to monitor and manage the trade in live coral. Constant vigilance by these agencies is required to fully enforce restrictions and cross-check CITES paperwork to prevent illegal trade. This is resource intensive and offers many challenges, particularly in species identification. A number of European aquariums (eg ZSL London Zoo, UK; Burgers' Zoo, Netherlands) are working closely with customs agencies to support identification and providing housing for seized corals.

RESEARCH TO SUPPORT CONSERVATION

Despite its many challenges, sustainable exploitation of reef

resources can be a valuable source of income for coastal communities while protecting habitats and species in the long term. However, there is still some way to go in understanding trade species and the effects of the trade upon them before we can call their exploitation sustainable.

There is very little known about the basic biology and ecology of most of the priority EDGE coral species. For the three EDGE species in trade, it is particularly important to understand how this trade is impacting wild populations. How many colonies of each coral species are taken and at what size/stage in their life history? How are the corals collected? Are destructive fishing practices used and if so can they be minimised or avoided? Where are the populations and how are they linked to each other? Can we identify 'source' reefs that can be excluded from exploitation due to their value to down-stream 'sink' reefs? What are the mortality rates at each stage in the shipping chain and up to 12 months after their final sale? Is there any evidence of sustained *ex situ* propagation either asexual or sexual?

The EDGE programme aims to better understand the trade and its sustainability or otherwise

The EDGE programme aims to gather data to answer questions like these to better understand the trade and its sustainability or otherwise. This is achieved by training and supporting in-country early-career conservation scientists, called EDGE Fellows, to carry out research on focal EDGE coral species to inform their conservation. Through the EDGE Fellowships we also help to address a global need to increase local coral reef conservation capacity. The EDGE species also act as flagships for coral reefs, as conservation actions facilitated by the EDGE Fellows for the priority species will also benefit the wider coral reef ecosystem.

We are very grateful for the financial support from the European Union of Aquarium Curators (EUAC) and Riverbanks Zoo and Gardens which is helping to fund the programme's first training course, held in Indonesia this summer. This course will provide EDGE Fellows from Indonesia, the Philippines and Malaysia with the skills they need to carry out this work, including international-level dive training, underwater survey methods and conservation management planning. We welcome the involvement and support of other zoos and aquariums, particularly to support the EDGE Fellows in facilitating conservation actions for each EDGE coral species.

For more information or to support the EDGE of Existence programme please visit our website www.edgeofexistence.org or contact the project co-ordinator at catherine.head@zsl.org.

BELOW: REEF MONITORING SURVEYS; **BOTTOM**: PHYSOGYRA LICHTENSTEINI , DAVID OBURA

Table 1: The ten focal EDGE coral species and their distribution

Species	Distribution
Crisp pillow coral *Anomastrea irregularis*	West Indian Ocean
Pillar coral *Dendrogyra cyclindrus*	Western Atlantic Ocean
Mushroom coral *Heliofungia actiniformis*	Central Indo-Pacific
Horastrea coral *Horastrea indica*	West Indian Ocean
Parasimplastrea coral *Parasimplastrea sheppardi*	West Indian Ocean
Elegance coral *Catalaphyllia jardinei*	Indian and West Pacific Ocean
Elliptical star coral *Dichocoenia stokesii*	West Atlantic Ocean
Pearl bubble coral *Physogyra lichtensteini*	Indian and West Pacific Ocean
Ctenella coral *Ctenella chagius*	Central Indian Ocean
Elkhorn coral *Acropora palmata*	West Atlantic Ocean

Table 2: The number of colonies of three EDGE species licensed by CITES for the trade in 2010 from Indonesia.

Physogyra lichtensteini	11,000
Catalaphyllia jardenei	25,000
Heliofungia actiniformis	44,650
All species	722,455

Educators educating educators

PLENTY OF IDEAS AND EXPERIENCES WERE SHARED DURING THE EAZA EZE CONFERENCE 2011

Anouchka Jacquier, Executive Coordinator, EAZA Executive Office

Two years had passed since the previous EAZA European Zoo Educators (EZE) Conference when, in March this year, Valencia, the city of arts and sciences, welcomed over 100 participants from EAZA and non-EAZA institutions. The Oceanogràfic of Valencia kindly hosted the event in the very heart of its superb marine park, offering us a unique environment in which to work, brainstorm and relax.

The main goal of the meeting was to bring together educators from all over Europe, working in zoological institutions, NGOs and conservation-based associations, in order to exchange useful advice and information about education and to share ideas on how to improve existing educational programmes run in our European zoos. The first day of the conference was divided into four different sessions representing the main working groups of the EAZA Education and Exhibit Design Committee, namely Education, Conservation, Climate Change and Sustainability, and Visitor Studies. The presentations given during these sessions provided useful and beneficial information about the activities of these working groups. During the section dedicated to conservation, there was a specific focus on Southeast Asian animals and the threats they currently face. Will Duckworth of the IUCN Species Survival Committee provided an alarming overview of the species' status in that part of the world and reinforced the urgency of acting rapidly to address this decreasing biodiversity. As the next EAZA Conservation Campaign 2012 – jointly run with the IUCN SSC – will focus on large Southeast Asian animals, this session provided a good basis on which to brainstorm ways to develop educational tools for EAZA's conservation campaigns.

Some useful examples of how to run visitor studies were given during the session on that topic. However, Constanze Mager's working group did not stop there: they organised a complete Visitor Studies Seminar the day after the conference – more on that below. In addition there were various presentations that related

to the mission areas addressed by the Education Committee. A captivating description of the educational programme at Valencia's Oceanogràfic, for example, provided an inspiring and constructive example of how to integrate messages about conservation and marine biodiversity loss into education and to address these important topics in an amusing, practical, but still pedagogical way.

During the morning of the second day, the brain cells, imagination and ideas of everyone were called upon in the practical workshops. The topics ranged from how to design a survey and avoid common pitfalls, to how to develop educational material for an EAZA Campaign, and from finding educational solutions (in a case study focused on the problem of human-elephant conflict in Zambia) to imagining small sustainable actions that everyone can do each day to act together against climate change, pollution and loss of biodiversity.

POLITICAL ISSUES

After a full morning of reflection, delegates took a well-deserved break with a visit to Valencia city centre. As the annual festival of the mascletà was being celebrated at the time, we had the opportunity to experience the daily attraction of that month-long festival: surprising, mind-(and ear!)-blowing daytime pyrotechnics which illuminated and deafened the city square and its surroundings for 15 minutes, followed by loud cheers and traditional songs and dances!

The final day of the conference was dedicated to the outcomes of the previous day's workshops, during which each working group was given the chance to present its results in a convivial and entertaining manner. The Open Podium session that followed in the afternoon and closed the conference was mainly designed as a sharing session in which every participant could deliver, on a voluntary basis, a short presentation about various themes. Talks covered topics such as the educational materials used within their own institution, the pedagogical programmes developed and run in their zoos, and the results of the visitor-led studies and research conducted inside their park.

Throughout the entire conference, the staff from the Oceanogràfic, and especially its education department led by David Nacher, took care of everything and made sure everyone could make the most of the event. We'd like to thank them for their organisation and for making sure our stay in Valencia was both productive and enjoyable. We also spent some quality time visiting both the public and off-show areas of this fascinating marine park and enjoyed a delicious Mediterranean meal, followed by an unconventional Balkan disco in the midst of the aquarium! We also thank all the speakers who dedicated their time and energy to presenting their work and sharing their experiences. And finally, thanks to all the participants for supporting this EAZA conference and for their useful feedback, which will be of great assistance in the organisation of our next EAZA EZE Conference in 2013.

See you in two years!

Community service

A NEW STUDY REVEALS THAT ZOOS AND AQUARIUMS ARE OF GREAT BENEFIT TO THE EUROPEAN ECONOMY

René Kim, Steward Redqueen

To most people, zoos and aquariums offer a nice option for a day out with the children. A second thought might be that they contribute to animal conservation and some may see them as educators by bringing visitors in touch with wildlife. But the socio-economic impact of zoos on their local economy is not often considered.

In times of scarce resources, austerity and bail-out packages, subsidies given to organisations tend to be reconsidered and the evaluation of the impact of public spending becomes increasingly desirable. Would it not be nice therefore to understand the economic role that local zoos and aquariums play? Last year consultancy Steward Redqueen was asked by EAZA to do exactly that by conducting a socio-economic impact assessment (SEIA). The SEIA intended to reveal EAZA members' contributions to job creation and income generation throughout the European economy. The study was carried out using established economic tools that allowed for the quantification of economic impacts of all members institutions based on a member survey and a detailed study of a limited number of individual members.

The starting point for the study were the total €1.6 billion in revenues of the 322 EAZA members, (excluding those located in the Middle East), which came from around 130 million visitors in 2009. These revenues can be considered as an injection into the European economy. Using so-called 'input-output analysis', this money was traced throughout the economy as it was being spent and re-spent on salaries, expenditures, taxes, etc. This is a well-established method that enables the quantification of the 'ripple effect' stemming from EAZA members' original spending in terms of economic value added (eg employee salaries, government taxes and company profits) and employment.

steward redqueen

For example, when an aquarium procures animal feed, it also generates employment in, in this case, the fisheries sector. Both the aquarium and the animal feed company (and its suppliers) pay their employees who will partly spend this money in the economy again. All of these economic actors also pay taxes. One can easily see that there exists a myriad of economic relationships. This entire complex of relationships can be mapped and, provided one has sufficient official macro-economic data, quantified in terms of its overall impacts on employment, household incomes and tax revenues.

It was found that zoos and aquariums jointly employ 32,000 European citizens directly and another 11,000 indirectly (ie through suppliers). Net of subsidies, a total of €2.5 billion in economic value added is created by zoos and aquariums, their suppliers and the spending by their visitors outside the zoos themselves. In other words, for every euro spent by a visitor one and a half euro is being generated in value added. EAZA members furthermore formally educate about 5 million people (mostly children) on the importance of animals and ecosystems. And EAZA members spend over €100 million on wildlife conservation and €30 million on research.

In short, there's quite a bit more than meets the visitor's eye when it comes to the socio-economic impact of zoos and aquariums.

PROMOTE *YOUR* IMPACT

The graphic opposite highlights some of the key findings of the EAZA SEIA. A similar flyer was circulated to all Members of the European Parliament (MEPs) earlier this year. The EAZA office will be printing a limited number of poster-sized versions of this graphic. If you are interested in obtaining one or more, please contact info@eaza.net. For those that wish to translate the text into other languages, the source artwork can also be made available.

GOOD FOR ANIMALS; GOOD FOR PEOPLE

21st CENTURY ZOOS AND AQUARIUMS

THE LEADING, PROGRESSIVE ZOOS AND AQUARIUMS OF EUROPE ARE MEMBERS OF EAZA, THE EUROPEAN ASSOCIATION OF ZOOS AND AQUARIA. EAZA REPRESENTS 322 MEMBERS FROM 36 COUNTRIES, OF WHICH 280 ARE LOCATED WITHIN THE EUROPEAN UNION.

The Socio-Economic Impact* of EAZA Zoos and Aquariums for the EU

- EAZA members welcome **130-140 million visitors** per year, from right across the social spectrum
- EAZA members collectively contribute **€2.5 billion per annum** to the European economy
- EAZA members **directly employ 32,000 European citizens** and create further employment for an additional 11,000 citizens that supply goods and services to our zoos and aquariums
- EAZA members support hundreds of conservation projects in the wild and annually **contribute more than €100 million to biodiversity conservation**
- EAZA members **formally teach 5 million children each year** about biodiversity, animal welfare and conservation; tens of millions more receive informal education
- EAZA members conduct and fund **biodiversity and welfare research amounting to €30 million invested annually**
- EAZA's **annual conservation campaigns** have, since 2000, reached millions of Europeans, raising awareness and funding for a range of species and habitats, including most recently a two-year campaign focusing on European carnivores

*Source: EAZA Socio-Economic Impact Assessment 2010

www.eaza.net

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EAZA CORPORATE MEMBER

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Flamingo Maintenance
Lori Nectar
Ostrich Breeder
Ostrich Grower/Maintenance
Ostrich Starter
Parrot (Zoo A)
Pheasant Breeder
Pheasant Maintenance
Pheasant Starter
Poultry Breeder
Poultry Grower
Poultry Starter
Sea Duck
Sunbird Nectar
Waterfowl Breeder
Waterfowl Maintenance
Waterfowl Starter

RODENTS

Guinea Pig
Rabbit Breeder
Rabbit Maintenance
Rodent Breeder
Rodent Maintenance

PRIMATES

Leaf Eater Primate
Marmoset Gum
Marmoset Jelly
Marmoset (Mini Marex)
Mazuri Primate
NW Primate Gluten Free
Old World Monkey
OWM Chunks (Banana)
Tamarin Cake
Trio Munch Range

CARNIVORES

Canine (D3)
Carnivore Meat Feline
Carnivore Supplement
Feline
Feline High Vit A Supplement
Feline Supplement
Omnicarnivore Supplement
Polar Bear Supplement
Zoo Diet A

GRAZERS AND BROWSERS

Browser Breeder
Browser Maintenance
Camel
EL-E-VITE
Exotic Grazer
Grazer
Herbivore Concentrate
Macropod
Moose
Pig
Reindeer
Sheep (Locush)
Vitamin E Cubes
White Rhino Concentrate
Zebra

AQUATICS

Aquatic Diets 3 and 4
Fish Eater Tablets
Aquatic Gels (Herbivore and Omnivore)

MILK REPLACERS

Flamingo Crop Milk Replacer
Milk Replacers
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