

A-level GENERAL STUDIES (SPECIFICATION A)

Unit 4 A2 Science and Society

June 2016

Case Study Source Material

To be opened and issued to candidates on or after **1 March 2016**

For use with **Section A**

- This pre-release material consists of five sources (A, B, C, D and E) on the subject of **Humans and the Natural World**.
- These extracts are being given to you in advance of the Unit 4 examination to enable you to study the content and approach of each extract, and to consider issues which they raise, in preparation for the questions based on this material in Section A.
- A further Section A source (F) will be provided in the examination paper.
- Your teachers **are** permitted to discuss the material with you before the examination.
- You may write notes in this copy of the Source Material, but you will **not** be allowed to bring this copy, or any other notes you may have made, into the examination room. You will be provided with a clean copy of the Source Material at the start of the Unit 4 examination.
- You are not required to carry out any further study of the material than is necessary for you to gain an understanding of the detail that it contains and to consider the issues that are raised. It is suggested that three hours' detailed study is required for this purpose.
- In the examination room you are advised to spend approximately one hour and fifteen minutes reading a previously unseen extract and answering a range of Section A questions based on all the source material.

The Preliminary Material is to be seen by teachers and candidates only, for use during preparation for the examination on Wednesday 15 June 2016. It cannot be used by anyone else for any other purpose, other than that stated in the instructions issued, until after the examination date has passed. It must not be provided to third parties.

Humans and the Natural World

Source A: Figures 1–5

Figure 1 – Earth has lost half of its wildlife in the past 40 years, says World Wildlife Fund (WWF)



The number of wild animals on Earth has halved in the past 40 years, according to a new analysis. Research scientists at WWF and the Zoological Society of London have found that creatures across land, rivers and the seas are being severely reduced as humans kill animals for food in unsustainable numbers, while also polluting or destroying animal habitats.

“We have lost one half of the animal population. This is clearly a call to arms and we must act now” said Mike Barratt, director of science and policy, at WWF. He said more of the Earth must be protected from development and deforestation, while food and energy had to be produced sustainably.

The steep decline of animal, fish and bird numbers was calculated by analysing 10 000 different populations, covering 3000 species in total. This data was then, for the first time, used to create a representative “Living Planet Index” (LPI), reflecting the state of all 45 000 known vertebrates.

Source: The Guardian, September 2014

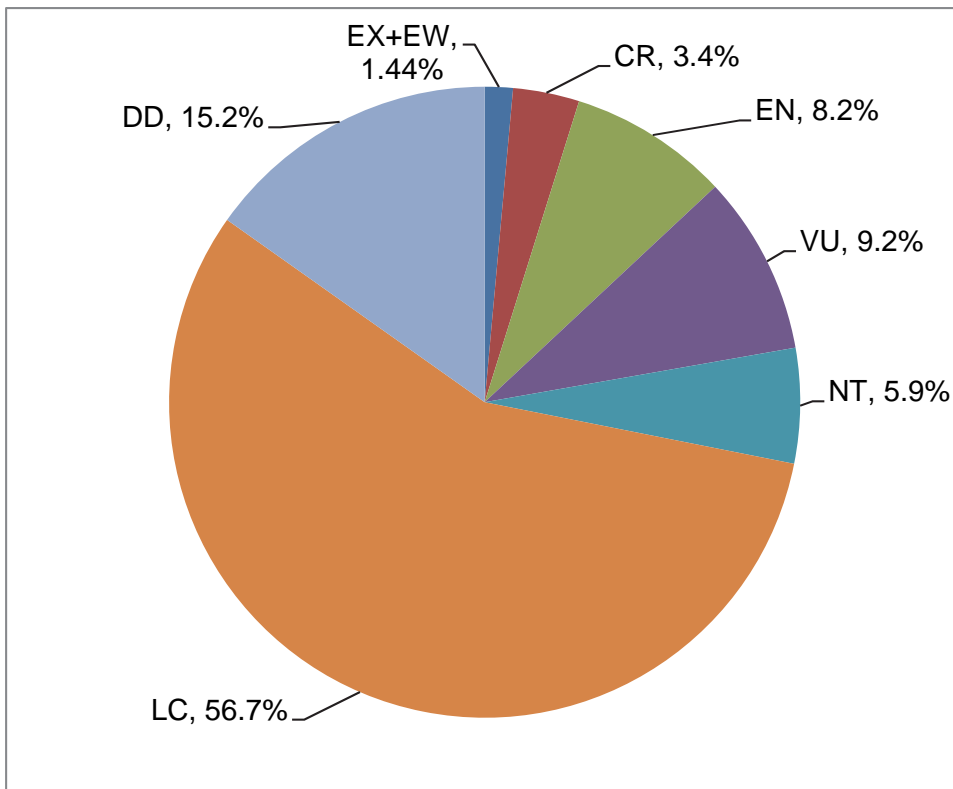
Figure 2 – International Union for Conservation of Nature (IUCN) Red List Status

All known mammal species have been assessed using the IUCN Red List categories and criteria. These categories provide an explicit framework for determining a species' conservation status, with an emphasis on identifying those at highest risk of global extinction.

In this context, the term “Threatened” refers to those species classified under the IUCN Red List categories of Vulnerable, Endangered, or Critically Endangered. Of the 5487 mammal species assessed, nearly one-quarter of species (22.2%) are globally threatened or extinct, representing 1219 species.

IUCN Red List category for the 5487 mammal species assessed

Red List Category	Number of species	Percentage (rounded) in category
Extinct (EX)	76	1.4
Extinct in the Wild (EW)	2	0.04
Critically Endangered (CR)	188	3.4
Endangered (EN)	448	8.2
Vulnerable (VU)	505	9.2
Near Threatened (NT)	323	5.9
Least Concern (LC)	3109	56.7
Data Deficient (DD)	836	15.2
TOTAL	5487	



Source: IUCN, 2015

Figure 3.1 – Human population growth, 1950–2100 (projected)

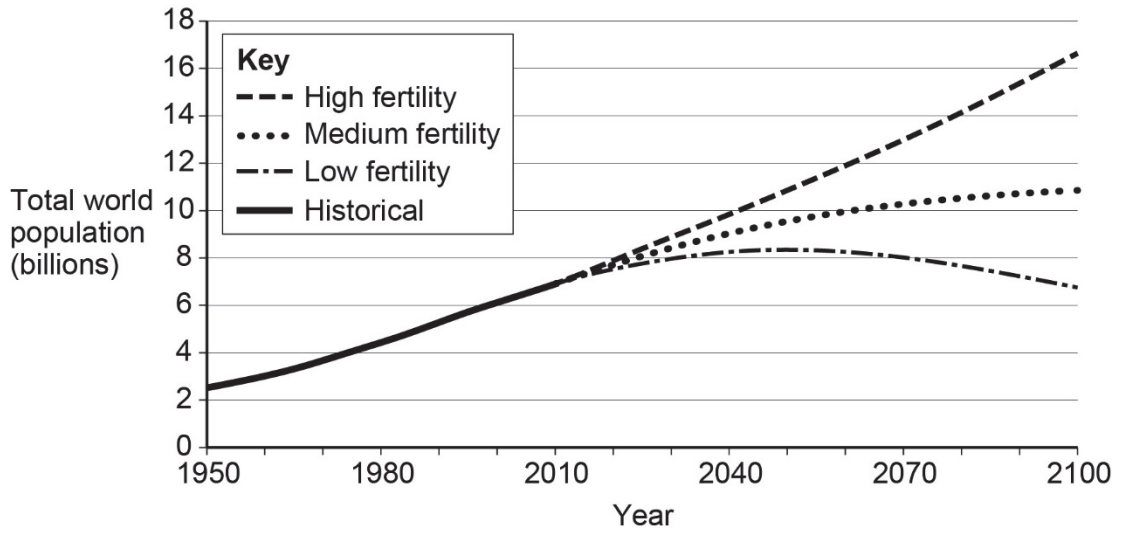


Figure 3.2 – Human population growth by region, 1750–2050 (projected)

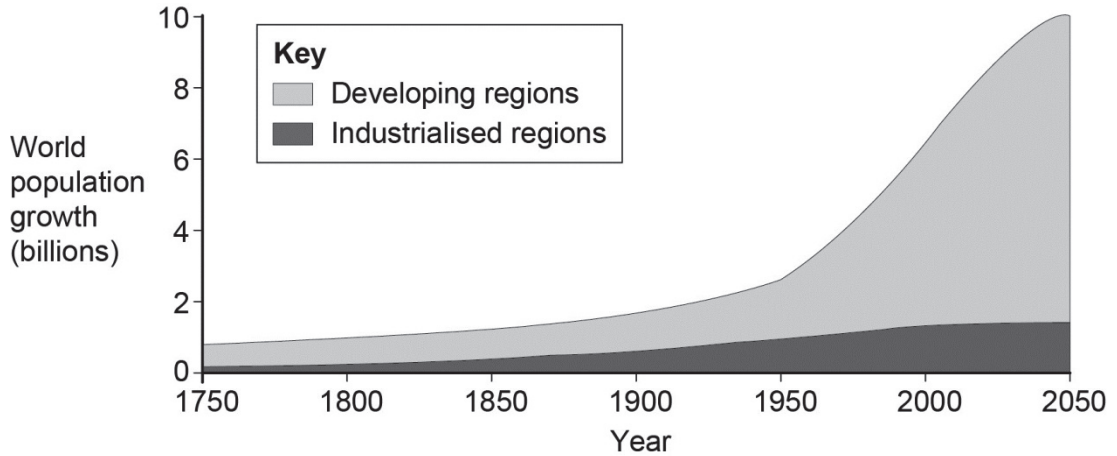
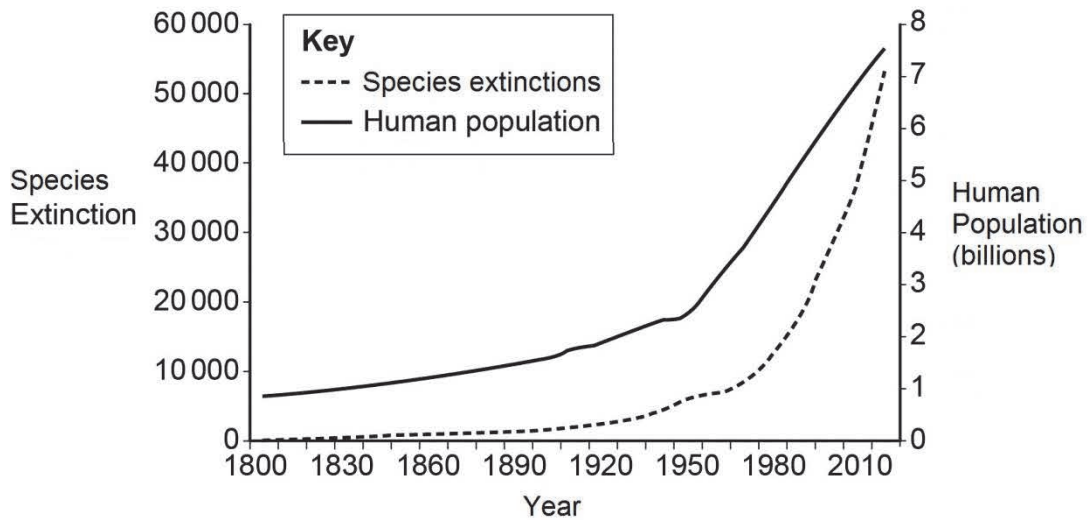


Figure 3.3 – Species extinction and human population, 1800–2015



Source: Figure 3.1 & 3.2, data from United Nations
Figure 3.3, data from USGS

Figure 4 – Facts about endangered species

1. In January 2013, the US Fish and Wildlife Services reported 2054 species worldwide that are endangered or threatened.

2. Freshwater ecosystems are home to more than 100 000 known species of plants and animals, and are now one of the most endangered habitats in the world as a result of human development, pollution, and climate change.

3. An estimated 50% of all endangered species live in the rainforest. The planet's largest rainforest – the Amazon – lost more than 17% of its forest cover in the last century due to human activity.

4. About 90% of primates – the group that contains monkeys, lemurs, lorises and apes – live in tropical forests, which are fast disappearing. The IUCN estimates that almost 50% of the world's primate species are at risk of extinction.

5. Globally, 21% of the total known reptiles in the world are deemed endangered or vulnerable to extinction according to the IUCN – 594 species – while in the United States, 32 reptile species are at risk, about 9% of the total.

6. In the past 500 years, we know of many species that have gone extinct – from the woodland bison of West Virginia and Arizona's Merriam's elk to the Rocky Mountain grasshopper, passenger pigeon and Puerto Rico's Culebra parrot – but this doesn't account for thousands of species that disappeared before scientists had a chance to describe them.

7. Scientists estimate that a third or more of all the roughly 6300 known species of amphibians are at risk of extinction.

8. Globally, 'BirdLife International' estimates that 12% of the known 9865 bird species are now considered threatened, with 192 species, or 2%, facing an "extremely high risk" of extinction in the wild – two more species than in 2008. Habitat loss and degradation have caused most of the bird declines, but the impacts of invasive species and capture by collectors play a big role too.

Sources: Center for Biological Diversity 'The Extinction Crisis' & DoSomething.org

Figure 5 – From hedgehogs to otters, our wildlife winners and losers: 60% of species decline... as others thrive.

Almost two-thirds of our wildlife has declined in the past 50 years, leaving hundreds of species on the brink of extinction. Sixty per cent of the animals, plants and insects studied in the first ever national report on the state of Britain's natural world have fallen in number, including hedgehogs, red squirrels and turtle doves.

Scientists examined data on 3148 of Britain's 67 500 species to produce a snapshot view of the country's wildlife. Of these, they found more than one in ten could soon disappear from our shores unless action is taken to reverse their decline. European eels, natterjack toads and garden tiger moths are among those under threat.

The state of Britain's natural world

Winners	Losers
 <p>Red Kite: six-fold increase in numbers since 1995</p>	 <p>Turtle doves: numbers have dropped by 93% since 1970</p>
 <p>Bittern: wetland conservation efforts have helped numbers soar five-fold in two decades</p>	 <p>Water Vole: the species suffered a decline of 88% between 1989 and 1998</p>
 <p>Red Deer: population has doubled in 20 years</p>	 <p>Small Tortoiseshell Butterfly: population has fallen by more than 75% in the past 10 years</p>
 <p>Common Pipistrelle Bat: after a dramatic fall in numbers, Britain's most common bat population has increased by 8% since 1998</p>	 <p>Skylarks: population has more than halved since 1970</p>
 <p>Otter: now present in all English counties after disappearing from lowland rivers in the 1960s</p>	 <p>Hedgehogs: numbers down by a third in just over a decade</p>
 <p>Danish Scurvy Grass: once only found on the coast, it has become the fastest spreading plant due to its tolerance of the salt spread by gritters on roads</p>	 <p>Harbour Seals: the number found in Scottish waters has reduced by 31% since 1998</p>

Since 1950 more than 28 species have become extinct, including the burbot – also known as the freshwater cod – which died out as a result of pollution. But the report, launched by David Attenborough, also identified some success stories. Bitterns, red kites and otters are among the species making a comeback following conservation work. The report was compiled by 25 wildlife organisations, including the RSPB, Buglife and Kew Gardens. It concluded that the main causes of decline were the destruction of valuable habitat, and damage done to the natural resources which remain.

Source: Daily Mail, May 2013

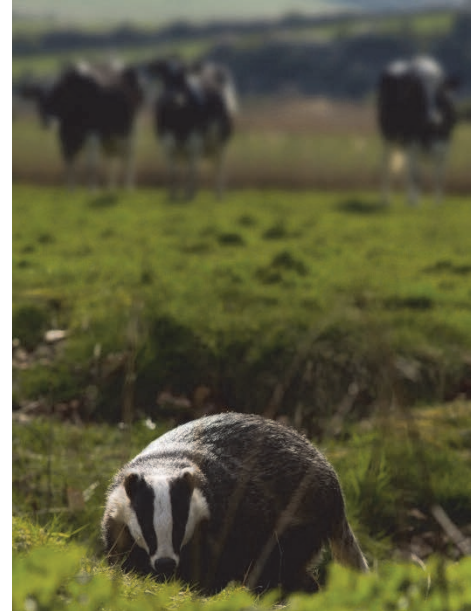
Source B: Badger cubs to be shot in latest cull plan

Badger cull will be moved to summer when cubs are numerous and easily shot, after autumn culls missed minimum kill targets.

Badger cubs will be shot under plans to shift the controversial cull to early summer in 2015. The badger culls, aimed at curbing tuberculosis (TB) in cattle, have so far taken place in the autumn and have repeatedly missed minimum kill targets. Cubs are easier to catch and shoot and are more numerous in early summer, making it more likely an earlier cull will hit its target.

But scientists have warned killing cubs rather than adults has less effect on cutting TB, while animal campaigners condemned the plan as “appallingly crude and desperate”.

The National Farmers Union (NFU), which speaks for the culling companies, said government licences permit culling to begin any time from June. The Department for Environment, Food and Rural Affairs (Defra) said the timing of the culls was a decision for the culling companies. Badger cubs are born underground in February and first emerge in April. While the cubs and their parents legally cannot be culled until the start of June, it is legal to shoot them under licence afterwards.



However, leading badger expert Professor Rosie Woodroffe, at the Zoological Society of London, said “They may well catch more badgers if they cull in June, because young cubs are naïve and easy to trap. But many cubs die in their first year, especially in dry summers. So killing 100 badgers in June wouldn’t reduce the badger population as much as killing 100 badgers in November. Also, cubs are much less likely to have TB, so killing cubs would not have the same effect on reducing disease as killing adults.”

Woodroffe was a key member of an earlier landmark and decade-long culling trial which found that TB in cattle could actually be made worse if the badger population was not heavily reduced, as surviving but disturbed badgers spread the disease more widely. “An earlier cull would seem to be more about trying to achieve a target number of badgers killed, rather than controlling TB. It’s more like meeting the letter of the law, rather than the spirit” said Woodroffe. She believes the cull pilots in Somerset and Gloucestershire, judged in April not to be effective or humane, should stop immediately.

The NFU disagrees. “The NFU remains convinced the current pilot culls will help deliver a reduction of TB in cattle and it is vital that they are allowed to be successfully completed so they can achieve the maximum benefit. We also remain committed to seeing badger culling rolled out to other areas where TB is endemic to help control and eradicate this terrible disease, which continues to devastate the lives of farming families.”

Claire Bass, executive director of the Humane Society International/UK said, “If true, an earlier cull would be an appallingly crude and desperate tactic to boost the number of badgers killed to create a veneer of success in an otherwise failed and discredited badger cull policy. Not only is it a moral outrage to allow marksmen to take pot shots at baby badgers simply to provide a larger body count, but it makes even less scientific sense than the current strategy, as the likelihood of cubs carrying the disease is even lower than adults.”

The earlier landmark culling trial found 12% of adult badgers had TB but only 8% of cubs.

Source: The Guardian, December 2014

Source C: We shed a tear for Crusoe, the lonely baboon, then blithely destroy a species

If you want a break from the grim world news, spare a thought for Robinson Crusoe, the lonely baboon who is stranded on an island in the Zambezi River in Zimbabwe. It is a deeply human, faintly hilarious story. The intrepid baboon seems to have gone to explore the island during an unusually dry spell.

When the water rose, in a river infested with crocodiles, he couldn't swim back. For three years, he has eked out a pitiful living on birds' eggs and grass, with not even a tree to climb, calling out to his family on the far bank to relieve his loneliness.

The response to his plight gives an uplifting glimpse into the human psyche. Concerned tourists have pleaded with the Mana Pools national park to mount a rescue mission for Robinson. Someone tried mooring a boat full of enticing bananas on the island, but he was too scared to approach it. Thoughtful park rangers have earnestly debated whether it would be wrong for them to interfere with the course of nature.



All this for one monkey. Our society is enthralled by anthropomorphic stories to which we can relate. Only last week zoo keepers asked for pilots not to fly low over Edinburgh Zoo in case the giant panda Tian Tian should miscarry her cub (the request was turned down). Moreover, if that cub is born safely there will be a national outbreak of cooing over the photographs.

Yet here is what bothers me. We can work ourselves up into a paroxysm of sentimentality over one single creature, but be blind to the devastating impacts we have on whole species. I wonder if the supporters of Tian Tian or Robinson ever ask themselves whether their own actions might be contributing to the shrinking of habitats for baboons, pandas and other furry creatures. I would be surprised if they know what their coffee table is made of, for example, or their new wooden floor. I doubt they know whether their shaving gel, shampoo or margarine contains palm oil, the secret ingredient that has boosted the profits of multinationals at the expense of swathes of tropical rainforest in Indonesia and Malaysia.

With so much green legislation these days, we perhaps assume that anything we buy has already passed some kind of decency test. Only this month an investigation by the charity WWF found that Europe is swamped with wood and paper products made from illegal logging that causes half of the deforestation in Central Africa, southeast Asia and the Amazon. The World Bank says that an area of forest the size of a football pitch is being cleared somewhere on the globe every two seconds. We should not be contributing to destruction when we do not need to.

We worry about Robinson, marooned on his island, but not about the serried ranks of his fellow primates marooned on a shrinking Earth. We seem to have become fatally disconnected from the natural world on which we ultimately rely.

Perhaps we have become desensitised through our crazy rates of consumption and our incessant desire for convenience – rather as people who play violent video games are believed to become desensitised to violence. Certainly, the disconnect seems to grow as we prosper. That is one finding of an annual survey by National Geographic of consumer behaviour in 17 countries. The survey suggests that people in the richest countries, despite treading most heavily on the planet, feel far less concern about their impact on nature than those in poorer

regions. Citizens of India, China and Brazil seem to be more conscious about nature than people in Australia, Germany, the United States and Britain.

Our exploitation of nature on an industrial scale, and the risks we are running, deserve more attention. But we turn away. Perhaps we cannot bear the psychological burden of acknowledging we have become our own worst enemy. Perhaps we cannot contemplate the sheer scale of what is under way and feel that anything we do will be dwarfed by the stark fact of an exploding population. Yet it is still possible for each of us to consider the small choices we make in our daily lives.

If we can care about one baboon or one panda, we should be capable of asking ourselves some hard questions about what might be happening to their relatives and what we can do about it.

Source: The Times, August 2014

Source D: De-Extinction: Reincarnation of the Past

This item has been removed for third-party copyright reasons

Source: Liberty Voice, October 2014

Source E: Why zoos are good**The days of the Victorian menagerie are over, but modern zoos are much more than a collection of animals and more important than ever.**

I am a lifelong fan of good zoos and have visited dozens of zoos, safari parks and aquaria around the world. I also spent a number of years working as a volunteer keeper at two zoos in the UK and my own interests now span to the history of zoological collections and their design, architecture and research, so it is probably fair to say I'm firmly in the pro-zoo camp.

However, I am perfectly willing to recognise that there are bad zoos and bad individual exhibits. Not all animals are kept perfectly, much as I wish it were otherwise, and even in the best examples, there is still room for improvement. It merely means we need to pay more attention to the bad, and improve them or close them. In either case, zoos (at least in the UK and most of the western world) are generally a poor target for criticism in terms of animal welfare – they have to keep the public onside or go bust, and they have to stand up to rigorous inspections or be closed down.

If you are against animals in captivity – full stop – then there is perhaps little scope for discussion, but even so I'd maintain that some of the following arguments (not least the threat of extinction) can outweigh arguments against captivity. Moreover, I don't think anyone would consider putting down a 10 000 km long fence around the Masai Mara to really equate to captivity, even if it restricts the movement of animals across that barrier. But at what point does that become captivity? A 10 000 m fence? 1000 m fence? What if veterinary care is provided or extra food, as in many reserves or as part of conservation projects? I'm not pretending that an animal in a zoo is not in captivity, but clearly there is a continuum from zoos and wildlife parks, to game reserves, national parks and protected areas.

A good zoo will provide great care and protection to animals in their care. These are good things for the individuals concerned, but what do zoos actually bring to the table for the visitors and the wider world? This is, naturally, what I want to focus on, but it is, I hope, worth having dealt with the more obvious objections and misapprehensions.



One of only a few hundred Sumatran tigers left in the world, this individual is part of a captive breeding programme that is linked to conservation efforts – protecting wild areas and reintroducing animals to them.

Conservation – reservoir and return. It's not an exaggeration to say that colossal numbers of species are going extinct across the world, and many more are increasingly threatened and risk extinction. Moreover, some of these collapses have been sudden, dramatic and unexpected or were simply discovered very late in the day. Zoos protect against a species going extinct. A species protected in captivity provides a reservoir population against a population crash or extinction in the wild. Here they are relatively safe and can be bred up to provide foundation populations. A good number of species only exist in captivity and still more only exist in the wild because they have been reintroduced from zoos, or the wild populations have been boosted by captive-bred animals.

Education. Many children and adults, especially those in cities, will never see a wild animal beyond a fox or pigeon, let alone a lion or giraffe. Sure, television documentaries get ever more detailed and impressive, and lots of natural history specimens are on display in museums, but that really does pale next to seeing a living creature in the flesh, hearing it, smelling it, watching what it does and having the time to absorb details. That alone will bring a greater understanding and perspective to many, and hopefully give them a greater appreciation for wildlife, conservation efforts and how they can contribute. All of that comes before the actual direct education that can take place through signs, talks and the like that can directly communicate information about the animals they are seeing and their place in the world. Many zoos also work directly to educate conservation workers in foreign countries or send keepers abroad to contribute their knowledge and skills to zoos and preserves helping to improve conditions and reintroductions all over the world.

Research. If we are to save many wild species and restore and repair ecosystems we need to know about how key species live, act and react. Being able to study animals in zoos, where there is less risk and fewer variables, means real changes can be effected on wild populations with far fewer problems.

All in all, with the on-going global threats to the environment, it's hard for me to see zoos as anything other than being essential to the long-term survival of numerous species. Without them, the world would be, and would increasingly become, a much poorer place.

Source: The Guardian, August 2014

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