Gerald Durrell Lecture 2002

Durrell Wildlife Conservation Trust at the Salters Institute on 10 April 2002

‘No room in the ark? Extinction and hope in a changing world’
Professor John Lawton, Chief Executive of the Natural Environment Research Council

in the presence of Her Royal Highness The Princess Royal

Your Royal Highness, Your Excellency, my Lords, Ladies and Gentlemen, colleagues, friends and family, Master, I am honoured to be asked by the Durrell Wildlife Conservation Trust and the Salters’ Institute to deliver the Gerald Durrell Lecture for 2002, and I thank you for the opportunity .

I didn’t know Gerald Durrell, but by my early teens I had read all his early books, and books that come from personal commitment and enthusiasm – as his most certainly do – make you feel that perhaps you do, somehow, know a little of the person behind the name. I hope he would have approved of my title and subject today:
‘No room in the ark? Extinction and hope in a changing world’.

I want to talk about the only true ark, as far as we know, in the entire universe – planet Earth; about the extinction crisis gripping life on Earth; and what we might do about it.

In his opening words, the Master of the Salters’ Company described the Salters’ approach of making science accessible and relevant. In that spirit, and because the audience is very mixed, the lecture is pitched at interested non-scientists. I am not going to show you any graphs or tables. The data, are, however taken from the most reliable scientific sources.

Life on a little-known planet

It may come as shock to discover that there is a lot we do not know about life on Earth. There are 1.7m species described by science. It is estimated that there are at least 12m, possibly more species in all.

Some taxa (the technical term for groups of related organisms) such as birds, are almost exhaustively known, others hardly at all. The species that feature predominantly in conservation and the minds of public are a tiny fraction of the whole. Of the 1.7m known species:

- birds make up just 0.5% (half of one percent)
- all animals with backbones – vertebrates (birds, mammals, fish, lizards, frogs etc) 2.7%
- insects make up a staggering 56%
- beetles alone account for 24%
- higher plants 14%

Most of the unknown species are various kinds of creepy-crawlies – unsung, unloved, but beavering away (or beetling away) in their own little worlds. To repeat those numbers with estimates (based on sensible samples) of proportions of species:

• of the possible 12m species, birds would be 0.08% (less than a tenth of 1%)
• all vertebrates 2.7%
• nematode worms 4% (50 times more species than birds)
• fungi 8% (100 times more species than birds)
• insects weigh in at a whopping estimated 64% (8 million species).

To a first approximation, every species on earth is an insect. If there was a creator, she is truly the God of little things.

There are two consequences of this:

1. This doesn't mean we don't know what's happening to life on Earth. Samples of what we do know about tell us what's happening with sufficient accuracy. It is not necessary to know and count every species to figure out what is happening to life on Earth, just as it is not necessary to interview every adult in the UK to know about consumer spending patterns, or voter aspirations.

2. A species-by-species approach to conservation is impossible. There will never be a Royal Society for the Protection of Slugs (quite apart from fact people don't love them, there are just too many!). And even, as I will endeavour to show, if we focus just on birds and other high-profile taxa, a species-by-species approach will *also* be overwhelmed. A tiny proportion of fortunate endangered species will get the Gerald Durrell luxury treatment. Most won't. The only way, ultimately, to hang on to a significant proportion of the 12m species on Earth is to conserve habitats – big ones.

We do know that there is an extinction crisis.

There is nothing particularly original in saying this. Gerald Durrell realised it fifty years ago, and many people denied it then, just as they deny it now, in the teeth of the evidence.

Let me give you the headline figures.

• In the long run it is the fate of all species to go extinct, or to evolve into something else.

• Living (extant) species may be roughly 2 to 4% of all those that have ever lived.

• The estimated background (natural) rate of extinction for current life on Earth, derived from the fossil record, is roughly 1 to 2 species a year.

• Human impacts on Earth are now pushing that up with alarming speed.

• There have been previous 'mass extinctions' – five of them. For instance, at the end of the Permian, roughly 95% of all marine species were exterminated, and took many millions of years to recover. These extinctions were caused by events such as meteorite impacts.

• The current extinction crisis is unique because it is driven by the dominance of one species – us. We occupy a great deal of the ark.

So what are the current projected rates, and how do we know?

The following information is based on:
• well-known groups such as birds;
• very sound empirical relationships between rates of habitat destruction and species loss;
• other, independent methods of calculating (such as the rate at which species enter and climb up the World Conservation Union *Red Data* list of categories : safe, vulnerable, endangered, critical, and ultimately extinct).

Current rates of extinction are now 10 to 100 times higher than what would be natural. About 10% (over 1000 from 10,000) of all bird species are currently endangered. If we lose all of them in next 100 years, that's 10 species a year, or 10 times the background rate. As more species accumulate on the Red Lists, inexorably, this depressing rate will rise.

Over next hundred years, under business as usual, it is hard to avoid the conclusion that rates could rise to at least 1000 times natural rates. All this is orders of magnitude faster than the evolution of new species; evolution doesn't help in realistic time-scales.

Put it another way, over next 100 years, we stand to lose at least 15 to 20% of species in many familiar vertebrate groups.

Think of these numbers in very rough, round terms. There are crudely 50 thousand known species of animals with backbones (2.7% of 1.7m = 45,900) known to science. 20% of these is 9180 species, or in round numbers 10 thousand threatened with extinction within my grandchildrens' lifetimes. These are the animals we care most about. The special recovery programmes that will be necessary for all these in a species-by-species conservation programme could overwhelm us. It is not impossible, and some (charismatic like lemurs, or quirky like Montserrat Chickens – big frogs to most of you) will be fortunate enough to be picked up by the Durrell Wildlife Conservation Trust and similar organisations. But a habitat-focussed conservation programme may make a lot more sense, carrying many species in secure habitats, without having to worry about each one.

Unless we get this right, our grandchildren's children stand to inherit a seriously impoverished Earth.

Why care?

Gerald Durrell was confronted with the same question fifty years ago, and his answers are as relevant today as they were then – more so in fact. He did not articulate all the reasons, but he clearly stated many of them. There are five main arguments. None will convince a cynic.

1. Ethical/moral reasons: 'all forms of life have as much right to exist as we have' and the equally compelling – 'anybody who has got pleasure at all from living should try to put something back'. We now call this stewardship.

2. 'Multiple canaries in coal mines argument' (I will explain this later, but it indicates that we are not using our planet sustainably.)

3. Enrichment of our lives (living things enrich our lives as do mediaeval cathedrals and Mozart concertos). Gerald Durrell celebrated this in spades – he called it a 'magical world' as indeed it is.

4. Utility or useful genes and products: ‘It is stupid to destroy such things as rainforests before we know how they function and what is in them, especially because in these great webs of life may be embedded secrets of incalculable value to the human race’.

5. Life-support systems: it’s the little things that are the life support system which make the planet work.

Why the crisis of extinction?

We all know broadly why human population growth and human economic growth are together driving extinction:
• habitat fragmentation, degradation and destruction
• hunting
• introduction of alien species
• pollution.

Species in trouble enter an extinction vortex, in which two or more of these problems combine and cause each other to increase. An example is the bushmeat problem highlighted by the Durrell Wildlife Conservation Trust. Rising human populations hunt animals because they have no other sources of meat and, paradoxically, growing economic affluence in some receiving markets also creates demand. This threatens species already made vulnerable by habitat fragmentation and destruction.

The scale of the problem

This is all very well, but it is hard from this perspective to get hold of the sheer scale of the problem – the scale of the human enterprise and why, increasingly, there is no room in the ark.

We may not know most of the species on Earth, but we do know a very great deal about the major impacts of humans on our planet, by satellite observation, land-use inventories, and clever scientific detective work.

• Human beings now take for our own use, every year, 4% of all terrestrial plant growth for our food, our domestic animals’ food, for wood and fibre. This is not a big number, but to get at that we take about 40% of all plant growth (think about wheat versus stalks, timber versus leaves branches and roots). We cannot have the 4% without taking nearly half of everything that grows on the planet each year.

• 90% of the world’s oceans are a biological desert. From the remaining 10% we take between one-third and one-half of all annual production. One in every two diatoms (little single-celled planktonic plants which fuel marine production) end up in a fish caught by people. Virtually all the world’s fisheries are in serious trouble, and are unsustainable at current fishing rates. There are no more fish in the sea.

• We consume 60% of all accessible fresh water every year.

• Crudely, and in round numbers, half of all the useful, renewable stuff on the planet is taken by people. (OK, some gets left to be used by other creatures, but we get first call on it.) The ark is half the size it was in the Garden of Eden, and shrinking rapidly.

All other organisms on the planet have to get by, crudely, with half the world's resources. That's why we have an extinction crisis, and why it tells us that we are not using the planet sustainably. If you find this hard to believe, think how the world has changed since Gerald Durrell was a schoolboy on Corfu sixty years ago. The pace of change is staggering

For the financially-minded, what we are currently doing is treating the Earth's natural capital as income. It is a crazy way to run a business, never mind a planet. We are not as rich as we think we are. We run the planet on an accounting system that makes Enron look like a paragon of virtue.

AND THESE NUMBERS ARE GROWING EXPONENTIALLY. Ignoring many details and complications, but to get a feel for the scale of the problem, the human population (and broadly the human enterprise) doubles every 30 to 50 years. Let's be optimistic. Growth is slowing, so say 50. If we take half now, we take all of it in 50 years. We won't of course. Things will change. But the magnitude of the required change is huge if we are to deliver a sustainable future, and we would be wise to start now.

Climate change

For conservationists, determined to carry some of the ark safely through to the end of this new century and beyond, these are bleak enough figures. Climate change just makes our job more difficult, and is another manifestation of our unsustainable use of the planet.

It is happening. There are still uncertainties about future magnitude and rates, but not about its existence. Many people are in denial – there is an analogy here between smokers and lung cancer.

The main cause of climate change is the rising atmospheric concentrations of carbon dioxide – a greenhouse gas – produced by burning fossil fuel (coal, oil and gas). These concentrations have risen in the atmosphere by 30% since the Industrial Revolution.

Atmospheric concentrations of carbon dioxide now lie outside the limits of anything seen on Earth for several millions of years, and are rising at a rate unprecedented in the last half-million years.

The 1990s were the warmest decade in the northern hemisphere for the past 1000 years , the time-span where we can reconstruct the temperature with reasonable confidence.

Climate change is not just about warming. Sea-levels rise. There are changes in rainfall, which doesn't sound too good. Climate change is rapid, not smooth, and accompanied by extreme events.

But take just warming. The best estimates are that warming in the northern hemisphere will be ten times faster than at the end of the last glaciation.

To survive, species will have to migrate or die, across what are now highly fragmented landscapes. Species associations will be torn apart. Nature reserves will be in the wrong places.

Climate change has the potential to add a vicious twist to projected extinction rates.

How are we going to react? Take a simple problem. Most of the Earth's 12 million species will have to look after themselves – we cannot intervene to help all to move, except by providing wildlife corridors. But what about the few lucky ones we feel able to help? Do we move and reintroduce them outside their current geographic range?

• What will the Durrell Wildlife Conservation Trust (and others) do if potential habitats for reintroduction are destroyed by climate change?
• How bold will we be if the only suitable habitats reform and regroup on the wrong continent?
• Is reintroduction there better than eternal life in the zoo?

I don't know the answers, but we had better start asking the questions.
I will return to this theme later, in a different, more immediate context.

Hope

All that is profoundly depressing. It's meant to be. These are serious issues demanding serious attention. But we can do better. First, let me stick to conservation biology, before sketching a bolder canvas.

The cost of endangered species recovery

We know that we can reverse the process of decline with various combinations of habitat protection, recreation, creation, captive breeding, and reintroduction.

Recent United States figures are instructive [TREE April 2002].

• There are more than 3000 endangered species in US (many plants, the inevitable vertebrates, but quite a few creepy-crawlies) with more than 1000 granted legal protection under US Endangered Species Act. (I told you the ark was shrinking.)

• Recent work shows that biologists struggling to protect these species on average receive about 20% of the funds they say they need to deliver effective conservation.

• They would say that wouldn't they, but in fact the status of species improved steadily the bigger the proportion of requested funds actually received, that is, more money helps.

• So one can work out what the cost would be if all US species recovery programmes were fully funded. It would be US$650 million a year. This is peanuts compared with the total US budget.

It is often political will, not cost, that prevents effective conservation in the developed world.

The United States, of course, is an incredibly rich country, and as I have made clear, a species-by-species recovery programme in most individual countries and certainly globally is unrealistic, and unsustainable. But a global, protected-area network approach, in areas big enough for most species to look after themselves, is very far from unrealistic. It will probably cost the same as a few small to middle-sized wars.

How much land should we set aside in reserves, national parks and other protected areas?

We don't want to conserve species only on reserves – islands of richness in a sea of destruction. But they will play a key role.

There is a species–area relationship. This is powerful, very general, well understood, and one of ways we can work out extinction rates without knowing the names of all the species. Increasing the area ten-fold approximately doubles the number of species. Decreasing the area ten-fold halves the number of species. So, to get a feel for the scale of the argument, if we could set aside just 10% of each habitat on Earth, in viable (that is large) reserves, we could carry half of all species into the future.

Of course, some habitats now much less than that or gone completely.

Richness is not distributed uniformly. There are 'hot-spots' of unusual richness, Gerald Durrell's beloved Madagascar among them. Differentially placing reserves and conservation efforts in global hot-spots would carry significantly more than half the world's species safely into next century.

Further thoughts on habitat destruction

Unlike climate change, habitat destruction is now. Many habitats are already essentially gone, leaving species conserved in zoos with nowhere to go back to.

The stated aim of far-sighted conservation organisations like the Durrell Wildlife Conservation Trust is 'ultimately to be able to return captive-bred animals to their natural home under safe and secure conditions'.

BUT what do we do when the habitats are no longer there?

We will be able to restore some habitats, as is happening on parts of Mauritius now, and where Gerald Durrell himself saw the habitat devastation wrought by introduced species and human forest clearance. But not others. Take just one example from many. The Durrell Wildlife Conservation Trust has an excellent captive breeding programme for pied tamarins, whose wild populations are being submerged under the concrete of an expanding city of Manaus. Where are the tamarins to go when the last remnants of their natural habitat are destroyed?

Gerald Durrell clearly recognised that 'zoological parks and gardens … will probably be the last refuge of vast numbers of species'. Is that it? Again, will we be bold and break biogeographical taboos to get them back into the wild? Is eternity in a zoo more natural or desirable than establishing wild populations well outside their former natural range? After all, the geographical ranges of all species have shifted, often dramatically, over millennia with natural climate change. How far should we be willing to push this? Is swapping continents an option? To state the matter starkly, is Texas a more secure place to conserve wild rhinos than Tanzania? This is a deliberately provocative example, but you get my point.

The purists will hate it. But do they see zoos as the only future?

The bigger picture

Ensuring some room in the ark requires conservation biologists to recognise a bigger picture. In a time-capsule buried in Jersey Zoo, Gerald Durrell recognised that poverty and social injustice on the one hand, and human greed on the other, were often at the root of environmental problems. In the time capsule he wrote:

'All political and religious differences that at present slow down, entangle and strangle progress in the world will have to be resolved in a civilised manner.'

What this means is that, in the end, more effective conservation of the Earth's biological riches will not happen without sustainable development and social justice for all nations, developed and developing, in a fairer, less greedy world.

If that sounds hopelessly optimistic, then there is no real hope.
If it sounds naïve, then I would rather be naïve than hopeless.

Sustainable solutions to environmental problems are not a bunny-hugging luxury. Global climate change (if nothing else) demands action now. A huge potential to deliver already exists without the lights going out. All it needs is political will and courage. And conservation biologists need to be at the forefront of the political argument underpinning this imperative – because we can see the multiple canaries dying.

I am not naïve enough, of course, to believe that Saddam Hussein will ever be interested in conserving beetles, or that there will ever be a world free of corruption and greed. But we have to work with the good guys, or give up. I'm for working with the good guys.

I can illustrate what I mean by a personal example.

Gerald Durrell's first collecting trip was to the British Cameroons. By coincidence, the longest and happiest times I have spent in the tropics have also been in what is now Cameroon, albeit in the French-speaking south of the country. In Cameroon I have an extended, adopted family. The heads of this family, Alex and Mark, are highly intelligent young men who can speak five languages.

The only way that Alex and Mark can support their children and other dependants is by practising slash-and-burn agriculture, clearing forest at an alarming rate. This is the only way they can grow food. They have no money to buy fertiliser. (Of course, slash and burn agriculture threatens huge areas of tropical forest, not least precious forests on Madagascar, with animals including the truly bizarre and wonderful Aye-aye, which has a breeding population at the Jersey Zoo. Most victims will not be so lucky.)

Alex and Mark cannot get out of this vicious cycle of poverty for the simple reason that they cannot borrow money to start a business, or to buy fertiliser to grow cash crops. For God's sake why not? Better health care, education, training, and sustainable economic opportunities would transform their lives, and the lives of millions like them and, with these improvements, the potential for more effective conservation in a more sustainable future.

We are miserly with aid for developing nations, and in seeking to create a fairer world. But without a fairer world, conservation efforts will often simply fail.

It will be too expensive you say. But Gordon Brown wants the UK to double its overseas aid – to 0.6% of Gross Domestic Product (GDP). US aid is currently 0.1% of GDP – a

derisory sum. The recent summit in Monterrey Mexico made trivial progress in increasing these numbers.

Yet, if you believe the tabloid press, as a nation we live in fear of being overwhelmed by refugees and asylum-seekers. Is it any wonder, in a planet in which half of all the useful stuff is already taken, and there are huge inequalities in the proportions taken by different nations?

Conservation biologists can see the bigger picture. To deliver our mission, we need to embrace the bigger picture, and fight for a fairer, less greedy world. Easy to say, hard to do, but I have no doubt that Gerald Durrell would be telling you the same thing now, were he still with us.

If we do not succeed, then Durrell's most fervent hope: *'that there will always be an extraordinary variety of creatures sharing the planet with us to enchant us and to enrich our lives'* will become a distant memory. That's the challenge, and the hope, for the future of this extraordinary ark.