

G'day everyone. I'm Dave Watson, Associate Professor in Ecology at Charles Sturt University. I'm an environmental scientist and I wanted to give you an update on a few things scientists have been working on lately. With the climate undergoing major changes and introduced plants and animals dominating entire ecosystems, we're being called on to solve all sorts of problems facing society. Various people act as advocates for biodiversity and the environment, but most use the information we generate through our research. So, I'd like to talk to you directly, to present you with some of the insights I've learned and explain how and why scientists go about doing their work. My talk is called eight truths. As scientists, we rely on numbers. That's how we distil down the complexities of nature into things that we can measure and compare. Scientists rarely use the word 'truth', as there's rarely a single right answer for many of these questions we tackle; there are generally many, equally valid truths.

My first truth relates to motivation. Greed is one of the more obvious motivations we see around us—many people strive to acquire more stuff, more toys, more perceived status. Scientists are just as greedy—we're greedy for knowledge. This is the main motivation that inspires me and all my colleagues. We want to know stuff, we want to discover the way things work. Biologists are also motivated by a fascination in the amazing variety of life forms and different ways of making a living. Ed Wilson, the scientist who coined the term biodiversity, came up with a word to describe this—biophilia, love of life.

The second truth is about self interest. Sure, you just want to find things out, but what about all those massive grants? It's worth noting that Australia spends less on basic research than most developed countries. Of the 9.4 billion allocated to research by the Australian Government (1.6% of GDP), around 20% of is available through competitive grants, and around one in ten of these grants are awarded to biologists and environmental scientists. This equates to around half of an F-35 Lightning, the new version of the joint strike fighter, of which the Australian Government has committed to buy 100 in the next three years. A few years ago, my brother in law (a high school economics teacher) congratulated me on receiving a major grant, and asked if I got a bonus or a raise. I explained to him that we never see a single dollar—any grants we receive pay for fieldwork, salaries of technical officers or equipment. And, this is all on top of the teaching, administration and other research projects. So, receiving a grant actually means more work, but allows us to keep finding out new things.

Enough about the way we do science, time to talk about what I've actually found out. My third truth relates to mistletoe, specifically, the influence of mistletoe on biodiversity. This has been a focus of my research for ten years: I'm the world expert on this particular topic. And I've found that in forests and woodlands worldwide, areas with more mistletoe support more biodiversity. Most of this influence is due to the ways these parasitic plants modify nutrient cycles, intercepting and concentrating nutrients bound up in long-lived trees and then shedding them as leaf litter, effectively fertilizing and mulching little patches of the understorey. That statement is the outcome of seven years work on eight different projects. This stuff is complicated, and it takes us a while to work things out.

Sticking with nutrients, the fourth truth relates to eucalypt woodlands in southern Australia, a system I've been studying since the mid 90's. Less than 5% of this woodland remains, and most of what's left is on the rocky ridges and low-productivity hilltops unfit for profitable agriculture. With all the productive country now growing food and fibre, and introduced plants and animals dominating what's left, it's little wonder that our woodland plants and animals have undergone such dramatic declines. If we don't

preserve the habitat that's left, restore regional scale linkages and give landholders meaningful incentives to reduced grazing pressure, many of these populations will die out. This is not scare-mongering—this is the considered view of all the scientists who've been working in these habitats.

The fifth truth relates to extinction. Those twelve animals and one mistletoe featured in these paintings all went extinct in the last 200 years. As Richard Leakey observed, we are now living through the sixth mass extinction event—the last one occurred 65 million years ago, when the dinosaurs died out. This current episode began around 50,000 years ago, when humans left Africa and began spreading out across the globe. Everywhere we went, all of the biggest animals died out, and this process continues today. Last year I was at a friend's 50<sup>th</sup> birthday in Perth, chatting with Bob Mather, an engineer who worked on the Lake Pedder dam. He recounted his visit to Hobart Zoo as a school boy and seeing this animal—the last living Thylacine that died in 1936. In the last 500 years, more than 500 plants and animals are known to have gone extinct, and almost 4,000 more are in critical danger of joining them.

My sixth truth relates to the word sustainability. There have been various estimates of how many people can live on the planet without reducing the quality of life for future generations, ranging from three million to four billion. All of these estimates are well below the current population of 7 billion. So, although it's a useful concept, scientists rarely use 'sustainability' any more—it's now been co-opted by people trying to sell you something. 'Minimal impact' is a far better term that better reflects what each individual can strive to do to maximise the opportunities for future generations—of humans and every other kind of organism. Whether it's choosing organic flour at the supermarket, eating kangaroo instead of lamb, planting native trees in your garden—all have a more immediate effect on biodiversity at local and regional scales than using recycled paper or switching from halogen to LED lights.

Seventh truth relates to the use of the word "theory". There are two theories that are often in the media that relate to my profession. Human Induced Climate Change Theory and the Theory of Evolution by Natural Selection. Both are formal scientific theories that are almost universally accepted by scientists, motivating a great deal of research with direct benefit to humans. The word theory is used a little differently by scientists than by other people. You may have a theory that red cars go faster, or that it rains when you hang out the washing. A scientific theory is a set of principles that explain and predict phenomena. What's usually referred to as continental drift is actually called the theory of plate tectonics, a theory that was first proposed by a meteorologist (Wegener) and became widely accepted in the 60's.

My final truth is about discovery. We know a lot, but we know there a whole lot that we don't know. These last six photographs show species that were discovered in the last five years—completely new to science. Scientists around the world are well aware of the big questions that need urgent answers, and we're working around the clock to come up with meaningful answers and practical solutions. Anyone can give you their opinion—scientists tell you the facts.