WHAT IS BIODIVERSITY?

What is biodiversity? It's one of those concepts that most people think they know what it means, but if you ask different people you will get really quite different definitions of what biodiversity actually is. Part of the reason for this is that it is quite an abstract concept. It means approximately the variety of life, but of course this can be interpreted in a whole range of different ways. It is quite useful to have a look at some official definitions and the US Congress of Technology Assessment is perhaps the most widely used. It's certainly a very influential definition of biodiversity, and that is the variety and variability among living organisms and the ecological complexes in which they occur. So it is actually a very broad definition. It's more or less saying, the whole complexity of life. And if we adopt such a broad definition we are in danger of equating biodiversity with the whole of biology. If we do this, then the concept is not very useful to us, so it is a good idea to apply some limits to the concept.

Most definitions limit the concept of biodiversity by defining entities. If we take a simple definition or a simple operational definition of biodiversity, the number of species in a given area. Here we are defining entities and we are defining species, that is entities in another entity, that is in another area of land.

Most definitions of biodiversity also implicitly embrace processes that go on, functions that the entities perform, ecosystems as a component of biodiversity.

Staying with biodiversity as a concept, there are 3 types of idea that are common, or 3 types of level that are common when looking at the variety of life concept. The most common one is looking at diversity of organisms, taxonomic diversity, and usually species richness or species diversity are the most common measures of this. But we can look at a finer level. Diversity stems from the genes that are in all living organisms and so it makes sense to go to one extreme and look at the genetic diversity. This can be done within species or between species. Or we can go the other way to nearer to another extreme and looking at ecosystem diversity, sometimes known as ecological diversity, diversity of habitats and so on. But whatever the scheme, there is usually some emphasis on the hierarchy, this sort of hierarchy from ecosystems down to the constituent species and the constituent genes of those species.

It is quite instructive to trace the formation of the term, the derivation of the term biodiversity. It's actually, it seems strange now, but it's actually a very recent term. 1986 seems to be the first use of the word biodiversity and that was in a Forum that was organised by Ed Wilson, the same as the MacArthur and Wilson, Wilson. And in that

case, they just put the terms biological and diversity together and maintained a capital D, but that soon dropped out. And since then, very, very rapidly the term became common, came into common usage and these days it is one of the most common terms that people talk about when talking about biogeographical things.

Thinking about the social and political elements of the term biodiversity, as David Bowman pointed out biodiversity is often actually seen as a synonym for nature conservation. As scientists we tend not to do this, we tend to try to have clear definitions of biodiversity that are meaningful and measurable and reasonably neutral but it is important to realise that in society more widely the term biodiversity is often not a neutral scientific concept.

Given the great public interest in biodiversity as conservation, it is an important area of academic study within the field of biogeography. But if we are going to be able to study it scientifically, then we need to be able to measure biodiversity. And if we are trying to measure biodiversity, it is important to distinguish between two concepts or ideas. The first one is that biodiversity itself can be quantified and the second one is that different facets or dimensions of biodiversity can be quantified, but the whole concept of biodiversity itself cannot, in a single measure. It is probably more useful to think in terms of the latter case that to measure biodiversity you have to

choose one or more different elements of biodiversity to measure, and the choice of which of these measures to adopt depends on the use that you are going to put it to. In other words it depends on the question, the scientific question that you are trying to ask.

Thinking more broadly about the study of biodiversity, it is a very inter-disciplinary area of study. It crosses over all sorts of traditional fields of study. It includes looking at species, habitats, ecosystems, biological, economic, social areas of study and so on, particularly when you are looking at conservation of biodiversity, you really do have to melt all these different things together. The very broad nature of biodiversity as a concept, the socio-political elements of it, the difficulty of measuring it, the difficulty in pinning it down to simple concepts, mean that there are really quite inadequate and inconsistent definitions due to a really wide range of view points. And so there is a lot of confusion about what biodiversity actually is and coming back to a point I made earlier, this is in part because most people assume that they know what biodiversity is and that everyone shares the same intuitive definition. But actually because there are so many different viewpoints and so many different perspectives that people approach biodiversity from, we actually find that people's viewpoints on what biodiversity actually is tend to differ considerably.

While on the subject of what biodiversity is, it is useful to think about why biodiversity is important. And there is a lot of fuzzy talk about this. A lot of arguments put forward for the importance of biodiversity and for its conservation, but as Bill Coonan and John Lawton, two very influential ecologists pointed out in 1996, the arguments for the conservation of biodiversity essentially reduce to 3 basic points. The first one is that some species which are threatened with extinction are valuable to us. They might contain cures for cancer, or they might be very good to eat, or something like that. Similarly some species could be of great value to us but we don't yet know it because we don't know the species, or we don't know the species well enough. So there is a lot of potential value in species and if they go extinct, then you will never know and you never realise that value. And the third point is that the diversity of life is intrinsically valuable and intrinsically interesting and we see this not just in Western cultures, but in a variety of other cultures. We see a reverence for nature and for the diversity of life.