**Topic 2c - Biodiversity and conservation (part 2) - pressures and threats**

So you can track the state of biological diversity from space, at least some component of it. But importantly, you can also track the pressures, the things that affect that state of biological diversity.

Typical example-- fire. Fire can play a role in the distribution of biological diversity, and is actually quite important to define the function of ecosystems. Thanks to optical satellite data, we have now a pretty good ability to monitor fire, and fire extents and duration, using satellite information.

Another example of a pressure to the biological diversity is land conversion. So with over seven billion of us on Earth right now and growing, there's a huge need to build houses and to feed people, which means that we keep on clearing and converting land. Typically, deforestation is a type of land conversion.

Thanks to Matt Hansen, we have been able now to compile over 40 years of information at the global scale on patterns in deforestation. And that's thanks to satellite data. So basically using optical satellite data to map deforestation everywhere in the world, and that for the past 40 years. And that helps us understand the rate at which things are occurring, and where to target conservation efforts.

Another type of threat to our environment is what's called invasive species. Now, invasive species are generally defined as alien species that are having a negative affect on the health and functioning of ecosystems.

Those species can be animal or plants. And in the case of the plant species, we can actually use optical information from space to detect the distribution of those invasive species, specifically because those plants and trees have a unique spectral signature that can be captured by hyperspectral sensors on board satellites.

Maybe another type of pressure that is starting to worry a lot of people are linked to the change in the availability of water. So water, in many environments, and specifically in arid environments, plays a major role in ensuring the viability of many species throughout the year. An interesting development, in term of monitoring pressure from space, comes from the Joint Research Centre, which recently combined over 40 years of information to track changes in the distribution of water bodies.

Now, why do water bodies matter for conservation? In many ecosystems, a lot of plants and animals heavily rely on the distribution of those water bodies, especially during the dry season. Think about arid environment. Now, with changes in our climatic condition, which have been particularly rapid for the past decade, those water bodies are changing, in terms of when and where they appear. And having this kind of information for the whole world over the past 40 years is definitely helping us think about what kind of threat is predominantly affecting a local ecosystem, which is heavily dependent on their own water for its good functioning.

Satellite can tell you something about the state of biological diversity. It can also tell you something about the constrains that shape the distribution of biological diversity. But importantly, it can also inform responses, that is, the effectiveness of the management action we take to try to protect, or retain, this biological diversity.

Two examples come in mind. The first one, protected areas. Now, protected areas is this network of location that is the cornerstone of conservation action. Those are the landscapes that we have decided, as a community, to protect.

Optical satellite data can provide you information about how biodiversity is doing in those protected areas, and whether or not it's under stress. Specifically, you would be able to track illegal deforestation using optical satellite data, or land conversion, or encroachment from agriculture. All of this will let you know, will give you information, about whether protection on the ground is effective or not.

A second example has to do with reintroduction. As you know, species population are disappearing from many locations around the world. And in some cases, a lot of institutions put time and effort into trying to bring back those species in those environments. Now, for those reintroduction to succeed, you need to bring them back in an environment that can sustain them. And how do you assess that?

Well, that's how you can use optical satellite data. By looking at ecosystem distribution in that area, ecosystem health, looking, for example, at phonology, and whether how things happen and when it's comparable to when that species was then in there.

It doesn't systematically happen. Sometimes, we don't have the satellite information relative to when the species was in that area. But for some situations, we actually can get good information from optical satellite data about the condition of the area, and whether or not a reintroduction is a good move for that species in that environment.