



Ecosystems: living communities

Humans enter the equation

Mike Gillman:

Understanding ecosystems is all about understanding the interactions that are going on within each system. Looking at the types of interaction helps us to set up a system's boundaries. ...energy and nutrients within the system helps us understand how it works. Key to this is measuring what happens to the energy that enters the system from the sun. The total energy trapped by photosynthesis in an ecosystem is called the gross primary production. The energy left after some has been used to maintain the plants themselves is called the net primary production, and that is key. The more net production an ecosystem has the more energy there is available for transfer within the system. So what happens if the amount of net production changes and what could make that happen? Yes – you guessed it. Like it or not we have an impact on our environment and in turn affect carefully balanced ecosystems around the world. Humans aren't the only factor but it's worth looking at the effects we are having. In 1975 it was estimated that there was approximately two thousand four hundred and fifty million hectares of rainforest on the planet, divided between Africa, Asia and South America. In 1997 satellite data shows there is one thousand, one hundred and sixteen million hectares of rainforest. That's a fall of fifty per cent in just twenty-two years. And most of that loss is due to human activity.

Vince Gauci:

"The problem with unintended consequences are that they are unintended and unforeseen. And while you could be manipulating the ecosystem like a rainforest by taking away the vegetation, what's quite clear is you are removing habitat. But what perhaps isn't so clear is that you are going to have knock on effects on earth's climate in the long term."

Mike Gillman:

These knock on effects could be very small but even tiny changes can be significant. Just how significant depends on what happens to the lost rainforest. Some ecosystems are more secure than others. They hold a better hand as it were. But a few bad cards and a rainforest system could quickly change. If the land is farmed the ecosystem will change dramatically. Where many trees are felled, rainforests can turn quickly into grassland. But even subtle influences over a longer time period can have a big effect.

Vince Gauci:

"If you have a loss of species from an ecosystem you really don't know what the effects will be. In some respects we are going through a natural experiment right now where we are losing species so by tracking what's going on in the earth's ecosystems we might be able to get a handle on this. An alternative approach is to actually set up our own experiments to investigate this question."

Mike Gillman:

So humans do have an effect and it can be significant but it all depends on which part of the system is being affected by human activity. Take that most civilised of human activities – international air travel. Imagine that this luxury airliner is an ecosystem. For that first class experience every bit of the 'plane is vital. But if we stop serving free champagne it will still fly. Take away the peanuts and the in-flight movie and it's still airborne. It will even fly if one of its engines is on the blink. But there is a limit to how much we can remove before it all goes wrong. And we can think of ecosystems in exactly the same way. Some elements are crucial but are there some additional extras the system could survive without? One system that's pretty much everything included is the system of pollination. But we could argue that we could do without the personal touch that these provide. Many species are pollinated in other ways and in truth we don't know what would happen if we took these out of the equation. Let's take another example – peat bogs.

Vince Gauci

“If you start chipping away at an individual component of an ecosystem you can have all sorts of unintended consequences now one good example could be an upland peat bog. These humble ecosystems actually have been mined for years for their carbon. It's a form of fossil fuel. So in mining this apparently abiotic component of the ecosystem there are consequences to that action because this peat bog actually functions as a great big sponge. So when you have large rainfall events that big sponge soaks up the rainfall and it prevents that rainfall from disappearing down the rivers too fast. So you remove that sponge and all of a sudden you will get flashier, more intense, flooding events.”

Mike Gillman

So ecosystems are not fixed. They are carefully balanced, fragile and subject to change through natural disturbance and through human impact.