Hello. I'm Dr Alex Lathbridge and this is Bitesize Biology.

This is the third episode in a series on Ecology and in this episode, we're going to talk about The Carbon Cycle.

Let's start this chat with a little bit of philosophy.

There's a quote I like. It is relevant to this subject I promise.

"You cannot step into the same river twice, for other waters are continually flowing on."

You take that quote lots of ways. To me, it says that things are both the same and not the same over time, even if they appear to be.

Because even if the river looks the same, the water, the dirt, and the life within are constantly in motion under your feet as the seconds pass.

I like this quote because it's because this quote is about life, philosophically and biologically.

Why? Well, inside of you right now, there are about 7 billion billion billion atoms.

And about 99% of you is made of just six elements: oxygen, hydrogen, calcium, nitrogen, phosphorus, and carbon.

Those atoms were around long before you were born and will be around long after you go.

You do not own them. You, well, your cells, are merely a temporary vessel for atoms that have been in deep oceans, mighty volcanoes, part of other organisms, and yes, even part of other humans.

They are constantly recycled again and again and again, moving in and out of you as you breathe, eat, touch, sleep, cry, go to the bathroom, and generally live your day-to-day life.

Just like that, materials in our environment are constantly being recycled, changing to produce the key building blocks that make new organisms.

There's always enough material to make new organisms when old organisms die.

Living things are made up of materials they take from their environment, and then these materials are recycled back to the environment when they die.

Plants use oxygen, carbon, hydrogen from the soil and air and convert them into biomass, that is passed along the food chain.

These same materials are then recycled back to the environment as waste and when organisms die.

Decomposers, like bacteria and fungi, break down dead matter. Minerals and nutrients released from this dead matter are recycled back into the environment within the soil, which can then be used by other plants to help them grow and start that cycle again.

So, with all of that in mind, let's focus on what we're going to chat about today: how carbon moves between different parts of the environment, the carbon cycle, so grab a pen and write this down.

Carbon is an essential element for life and is used by plants and animals for important processes.

Carbon is constantly cycled between the environment and organisms.

Atoms of carbon can exist as part of different compounds at different points of the carbon cycle.

So, you need to know four stages of the carbon cycle and the processes that happen at each stage:

It might help you to draw this out so you have a little diagram, or you could look at the bitesize website while you listen. And remember you can always pause this podcast if that helps while you make any notes.

It's a cycle, so you can start anywhere, but to make it easier, I'm going to start with carbon dioxide.

Stage One. Carbon enters the atmosphere as carbon dioxide.

This happens through respiration of animals, algae, plants, and microorganisms.

Combustion is the process of burning wood and fossil fuels and it also releases carbon dioxide into the atmosphere. (It's important to remember what fossil fuels are made of: decayed animals and plants.)

Stage Two. Carbon in the form of carbon dioxide, is taken out of the atmosphere.

This happens via photosynthesis, where green plants and algae absorb it from the air, and that carbon gets converted into glucose.

Stage Three. Carbon moves through the food chain.

Animals feed on these plants, passing the carbon compounds along the food chain. The carbon becomes part of the fats and proteins of animals when plants are eaten.

Most of the carbon they consume is exhaled as carbon dioxide during respiration. The animals and plants in these food chains eventually die.

Stage Four. Carbon returns to the atmosphere through decomposition.

Dead organisms are broken down by decomposers, and the carbon in their bodies is returned to the atmosphere as carbon dioxide when they respire.

Ok that's important so a quick recap:

1. Carbon enters the atmosphere by respiration and combustion.

2. It is taken out of the atmosphere by photosynthesis.

3. It moves along food chains and then decomposition of dead animals and plants, means carbon is

taken in by decomposers.

4. Carbon will then be respired out into the atmosphere again as carbon dioxide.

If you want to look at it from a different angle, let's break the cycle down into the processes involved and what happens to the carbon at each stage:

In respiration, carbon starts in the form of glucose, and during the process it is turned into carbon dioxide.

In combustion, carbon starts as a fuel such as methane or wood, and during the burning process it turns into carbon dioxide.

In photosynthesis in plants and algae, carbon starts as carbon dioxide, and during the process it turns into glucose.

So before we go, let's do one final turn around the carbon cycle wheel

It starts with carbon dioxide entering the atmosphere through respiration and combustion.

Then carbon dioxide leaves the atmosphere through photosynthesis in plants.

This carbon is passed along the food chain from plants to animals, which later die. Remember, when carbon is passed along the food chain from plants to animals, there's also respiration taking place.

Decomposition of these dead plants and animals releases carbon back into the atmosphere.

I'm Dr Alex Lathbridge and this is Bitesize Biology. Listen to all the other episodes in this series, and the other topics that we cover on BBC Sounds.