

The irreducible earth ecosystem

For thus says the LORD, who created the heavens, who is God, who formed the earth and made it, who has established it, who did not create it in vain, who formed it to be inhabited ... (Isaiah 45:18).

The Bible teaches that the earth has been specially designed and created to support life. Modern discoveries have provided wonderful confirmation of this teaching because the earth has been found to have a very sophisticated ecosystem which is ideal for creatures and plants to live in. Account must be taken of the fact that the earth changed significantly at the time of the Fall. In particular, the Bible teaches that there was no death of creatures before the Fall, because God called the original creation ‘very good’ (Genesis 1:31). However, even though the current ecosystem is different from that which existed before the Fall, it still contains clear hallmarks of design. The earth’s ecosystem has many interdependent parts that must exist simultaneously for the ecosystem to function properly. This chapter gives a brief survey of some of the sophisticated and irreducible processes that take place in the earth’s ecosystem.

3.1 The food chain

The food chain is summarized in Fig. 3.1. The food chain has three main participants: *producers*, *consumers* and *decomposers*. In general, the producers are plants, the consumers are animals (and humans) and the decomposers are micro-organisms such as bacteria. Each participant in the food chain is dependent on at least one of the other two and therefore plants, animals and micro-organisms must exist simultaneously for the food chain to work.

Plants are generally producers because they manufacture organic food

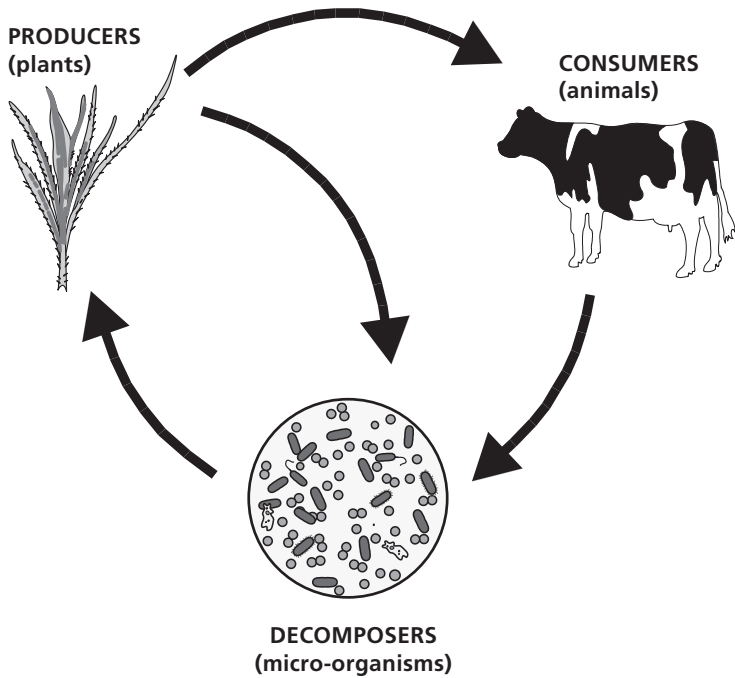


Fig. 3.1 The food chain

through a special process called photosynthesis.¹ Photosynthesis can be summarized as the conversion of carbon dioxide, water and light energy into carbohydrate and oxygen. The carbohydrate that is produced in this process is one of the key constituents of food for animals. Therefore, plants form an essential element in the food chain of animals and the animal kingdom cannot exist without plants. Of course, there is a small number of animals that are flesh-eating (carnivores) and can survive by eating other creatures but ultimately there must be many animals in the food chain that are plant-eating (herbivores). Therefore, animals are generally consumers because they rely on the existence of plants.

Even though plants are generally producers, they are still reliant on decomposers. This is because plants require dead animal and plant matter

to be decomposed to replenish the soil from which they derive nutrients. One of the most important constituents of soil that has to be replenished is nitrogen because plants use it to make protein. Decomposition can only be carried out by micro-organisms such as bacteria and therefore plants cannot exist without bacteria. However, the main source of food for bacteria is in plants and animals. Therefore, animals cannot exist without plants, plants cannot exist without bacteria and bacteria cannot exist without plants and animals!

The food chain shows that there are vital interdependencies among the different types of living organisms on the earth. The food chain is so interdependent that it cannot have evolved but must have been created fully functioning at the beginning of its existence.

3.2 The oxygen, carbon and nitrogen cycles

The oxygen, carbon and nitrogen cycles are summarized in Fig. 3.2 to show that they can only be stable when different creatures and plants exist simultaneously. The air in the earth's atmosphere is made up of the following gases: 78% nitrogen, 21% oxygen, approximately 1% argon and very tiny amounts of carbon dioxide, methane, helium, hydrogen, krypton, neon, ozone and xenon. The earth's ecosystem requires this

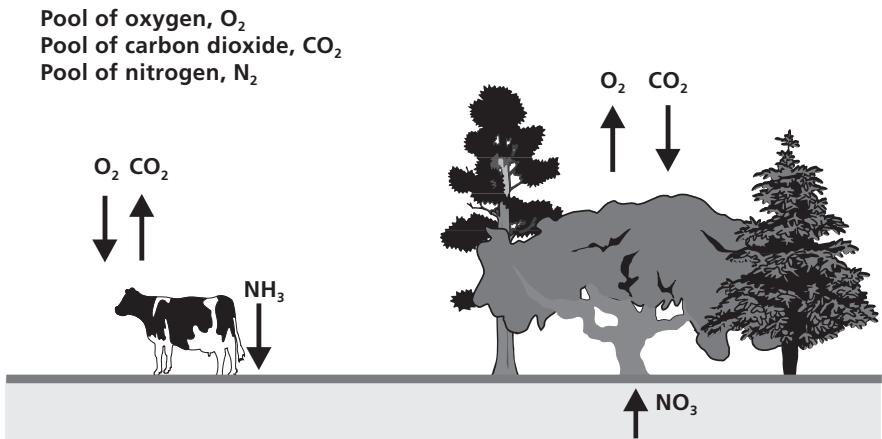


Fig. 3.2 The oxygen, carbon and nitrogen cycles

composition to remain within quite narrow limits in order to sustain life on earth. For example, even though there is only a tiny amount of carbon dioxide in the air (about 0.03%), if this increases very slightly, it can lead to damaging effects such as global warming. While it is true that increases in carbon dioxide are limited by the absorption of carbon dioxide by the sea, it has been found that excessive amounts of carbon dioxide can also damage sea life such as coral reefs.

Since different types of creature and plant supply and extract different gases in the atmosphere, it is necessary to have the right balance of these organisms in order to maintain a constant equilibrium. While animals are net consumers of oxygen and generators of carbon dioxide through respiration, plants are net consumers of carbon dioxide and generators of oxygen through photosynthesis.

There is also an interdependent nitrogen cycle. The transfer of nitrogen between the atmosphere and living organisms is shown in Fig. 3.2. When plants and animals die and decay, or when animals excrete, a substance called ammonia is produced. This substance contains nitrogen but not in the right form for plants. However, the metabolic activities (i.e. the living processes) of bacteria convert the ammonia into nitrites and then nitrates that are suitable for plants. Plants can also receive nitrogen directly from the atmosphere if there are particular bacteria living in the plants.

There are other cycles in the earth as well, including the phosphorus and sulphur cycles. Evolutionists admit the fact that animals, plants and bacteria are mutually dependent. For example, a popular textbook on advanced biology says the following about the nitrogen cycle:

The nitrogen cycle ... demonstrates the interdependence of animals, plants and bacteria.²

The chemical cycles in the earth's ecosystem provide powerful evidence for design.

3.3 The water cycle

Water is of vital importance to creatures. Two-thirds of the human body consist of water and the human being cannot survive for more than a few

days without taking in water. In order for mankind to have a comfortable existence on the earth it is essential to have a clean, local and consistent supply of fresh water. These requirements are very demanding because water can quickly evaporate or become contaminated. Therefore, it is remarkable that most places on the earth do have a convenient supply of clean water through the weather cycle and river systems. Of course, in the modern world, the problems caused by pollution mean that there is a need to have additional man-made water delivery systems. However, it is important to appreciate that before the industrial era the natural water supply system was very well suited to the needs of mankind.

The fact that there has been a clean, local and consistent supply of water is remarkable because many complex processes are needed simultaneously to achieve it. Table 3.1 summarizes the main stages and physical processes that take place in the water cycle.

Table 3.1 The water cycle

PHYSICAL PROCESSES	DESCRIPTION
1 Vaporization	Pure water molecules escape from the sea as clean vapour
2 Buoyancy	Hot air rises, taking the vapour to high altitude
3 Condensation	Vapour cools and condenses into water particles to form clouds
4 Precipitation	Water particles collect into heavy droplets
5 Gravity	Water droplets drop to the ground due to gravity
6 Soil permeation	Water seeps through soil and collects under the ground
7 Water pressure	Water builds up pressure underground and ejects from springs
8 Water distribution	Water collects in rivers and lakes and is distributed throughout the land
9 Water use	Water is used by mankind and animals
10 Water recycling	Water flows down rivers back to the sea

Here we see a wonderfully complete water cycle which includes the distribution of clean water throughout the land (Stage 8) and the drainage of dirty water away from the land (Stage 10). In each stage there are many complex processes that take place. For example, precipitation itself requires several sub-processes, such as nucleation and surface tension. The fact that all of these processes exist and work together to form an efficient

water cycle that is ideal for the needs of mankind gives powerful evidence of design.

UNIQUE PROPERTIES OF WATER

At the atomic level, water is made up of two hydrogen atoms and one oxygen atom. Despite its simple atomic structure, water has some amazing properties that are essential for life on earth. To be of use to life on earth, water must be in the liquid state at room temperature. However, all other substances that have a similar molecular weight and chemical structure to water are not liquid at room temperature. The fact that water is liquid at room temperature is a mystery to scientists.

Like air, water is completely transparent and odourless. These properties of water have several important benefits to people. The fact that water does not smell makes it possible to use water for washing and cooking. The transparency of water is useful for swimming and fishing. Water is also a solvent and can dissolve more substances than any other liquid. This property is extremely important in the life processes of organisms.

Another important and unique property of water is that it expands just before freezing. Like other materials, water shrinks as it decreases in temperature. However, when the temperature drops to about 4°C, the shrinking stops and any further reductions in temperature towards freezing cause an expansion of the water. This expansion of water as it approaches freezing point has the effect of making ice less dense than liquid water. The lower density of ice means that it floats on the surfaces of lakes and seas and insulates the warmer water below. If water behaved like other materials, it would freeze from the bottom up, leaving no water in many lakes and seas in wintertime. Without floating ice, a very large proportion of life in lakes and seas would be killed off. The fact that water expands on freezing is another mystery to scientists. However, the special physical properties of water are just what would be expected from a Creator.

3.4 Life-supporting properties of air

Air is critical to all animal and plant life. Creatures breathe in air in order to get vital oxygen which is needed to make the cells of the body function. Air

actually performs many vital functions and it is wonderful how it is perfectly designed to meet so many different requirements simultaneously. Just some of the functions of air which are important for life on earth include:

I OXYGEN FOR RESPIRATION

All creatures require oxygen for respiration. Air contains about 21% oxygen, which is just right for respiration and life on earth. If there were much less oxygen in the air, animals would be breathless. However, if there were much more oxygen, fires would burn continuously.

II CARBON DIOXIDE FOR PHOTOSYNTHESIS

All plants require carbon dioxide for photosynthesis.

III NITROGEN FOR PLANTS

All plants need nitrogen and they obtain this from the soil in the form of nitrates. There is a pool of nitrogen in the air which is needed for the nitrogen cycle.

IV RADIATION SCREEN

Air performs a very important function of screening the earth from harmful ultraviolet radiation from the sun. The ozone layer in the atmosphere absorbs the harmful rays before they reach the earth's surface.

V MEDIUM FOR COLOUR

It is easy to take the colour of a blue sky for granted but this could not exist without the special properties of air. For example, from the surface of the moon, the moon's sky appears dark even when the sun is shining. The earth's sky is made blue because air molecules in the earth's atmosphere preferentially scatter shorter wavelength blue light from the white light spectrum of sunlight.

VI MEDIUM FOR SOUND

It is also easy to take sound for granted but this is another essential phenomenon that would not exist without the special properties of air. Air

is able to transmit sound by the vibration of the molecules within it, and it does this so precisely that on a still day it is possible to hear sounds from tiny insects and birds.

VII MEDIUM FOR VISION

Air itself is colourless and this makes vision completely clear. Life would be very strange if air had a colour!

VIII MEDIUM FOR SMELL

Air is odourless, which means that we are able to sense delicate smells such as those of flowers. Life would be very different if air had a smell of its own!

IX MEDIUM FOR THERMAL INSULATION

Air provides thermal insulation. On the moon, the temperature is extremely hot in direct sunlight but at night it becomes extremely cold. Air prevents such extreme temperatures by forming an insulating blanket around the earth.

X MEDIUM FOR PRESSURE

Air also provides important pressure. When astronauts are in space, their faces become very puffy because of the lack of air pressure in the spacecraft or spacesuit. The air pressure on the earth is just right for keeping the different parts of our bodies in place.

XI DENSITY

Air has just the right level of density to support many important processes. For example, dust particles help to form droplets of rain. One of the reasons why dust is carried up to a high altitude is because air has the right density for dust to be suspended.

XII DRYING

Drying is essential for many animals because it prevents them from getting cold. Creatures dry off after getting wet because water naturally vaporizes in the air. This vaporization involves the conversion of water into an invisible vapour which mixes with the air.

To design a single substance to perform so many complex functions represents a masterpiece of design! With man-made products it is recommended not to design for more than one important function because of the difficulties this presents. Yet air is wonderfully designed for at least 12 complex functions which are important for life on earth. The many wonderful properties of air provide powerful evidence of design.

3.5 The Gaia hypothesis

Some biologists have been so impressed with the interdependencies in the earth's ecosystem that they consider the whole planet as one large living organism. People call this the Gaia hypothesis because in ancient Greek mythology Gaia was goddess of the earth.³ The Gaia hypothesis treats the creation itself as a kind of god that has its own intelligence.

The Gaia hypothesis shows how many modern scientists will do anything to avoid the conclusion of a Creator. The folly of the Gaia hypothesis can be illustrated by analogy with a man-made device. The engine of a motor car presents evidence that a designer was responsible for the order of the system. It would be ridiculous to conclude that the order in this engine gave evidence that the engine itself had the intelligence to build itself. In a similar way, it is ridiculous to suggest that an inanimate earth had such intelligence that it was able to evolve its own ecosystem, including living creatures and a biosphere.

3.6 The power and wisdom of God in creation

The first law of thermodynamics states that it is impossible for matter/energy to be created or destroyed. Therefore, while it is possible to change energy into matter or matter into energy, the total amount of matter and energy in the universe cannot be changed. A consequence of the first law of thermodynamics is that the very existence of matter/energy is a miracle. The book of Genesis teaches that God made the earth out of nothing. Indeed, God had only to speak commands in order to bring matter and energy into existence. Therefore, the very existence of the huge earth and vast universe demonstrates the power of God. A.W. Pink has described how difficult it is to comprehend God's power and wisdom in creation:

Before man can work he must have both tools and materials, but God began with nothing, and by His word alone out of nothing made all things. The intellect cannot grasp it. God spake and it was done, He commanded and it stood fast (Psalm 33:9).⁴

God's power and wisdom are also seen in the way that He keeps the earth suspended in the right place in the solar system. This aspect of God's power is described in the book of Job: '... He hangs the earth on nothing' (Job 26:7). Of course, scientists say that the earth is simply kept in place by gravity and the movement of the earth around the sun, but gravity is actually a mystery to scientists because no one knows from where it comes or of what it consists. The above statement in the book of Job, even though written thousands of years ago, has been proved by modern scientific discoveries to be remarkably true.

It is also possible to see God's power and wisdom in the weather. This is why Elihu said: 'God thunders marvelously with His voice; He does great things which we cannot comprehend. For He says to the snow, "Fall on the earth" ... Do you know how the clouds are balanced, those wondrous works of Him who is perfect in knowledge? ... With God is awesome majesty. As for the Almighty, we cannot find Him; He is excellent in power, in judgment and abundant justice ...' (Job 37:5–6, 16, 22–23).

Notes on Chapter 3

- 1 There is actually a tiny number of plants that are both producers and consumers—such as the Venus flytrap—but these are unusual plants and they have a specific ability to exist in nitrogen-deficient places.
- 2 **Roberts, M.B.V.**, *Biology: A Functional Approach* (4th edn.; Walton-on-Thames: Nelson, 1986), p. 161.
- 3 **Myers, N.**, (ed.), *The Gaia Atlas of Planet Management* (London: Pan Books, 1985), p. 13.
- 4 **Pink, A.W.**, *The Attributes of God* (Grand Rapids, MI: Baker, 1975), pp. 48–49.