

Understand and Value Nature

From silent Spring to wild Summer?

This is the third of five study articles on Biodiversity written by Annabel Ryder for Thrive’s 2019 inter-schools Enviro Quiz and Art Competition, which will take place on Friday September 6th at Kronendal Primary School, Hout Bay. All primary and high schools are invited to register to participate by emailing enviroquizart@thrive.org.za. Entry is free.

Please see Sentinel Article link:
<https://www.sentinelnews.co.za/news/understand-and-value-nature-24546203>



Our 1st article covered what we meant by Biodiversity and our 2nd, how we measure Biodiversity. In this 3rd article we will look at the interconnectedness of nature, the web of life, how the **trophic cascades** of nature work in ways we are only just beginning to understand, and more importantly perhaps, to “value”. We will look at how the principles of “rewilding” can perhaps assist our global efforts in countering climate change.

Biodiversity is more than just a list of plants and animals, but a series of critical, life-supporting relationships in a complex web. When one part weakens or disappears, every other part of this complex web is affected, and diminishes in some way.

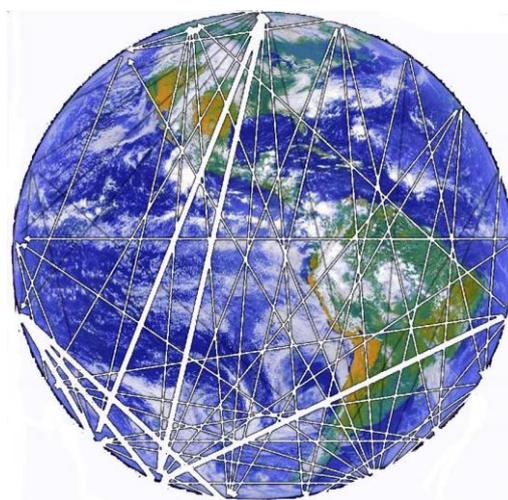


Figure 1: Everything is connected

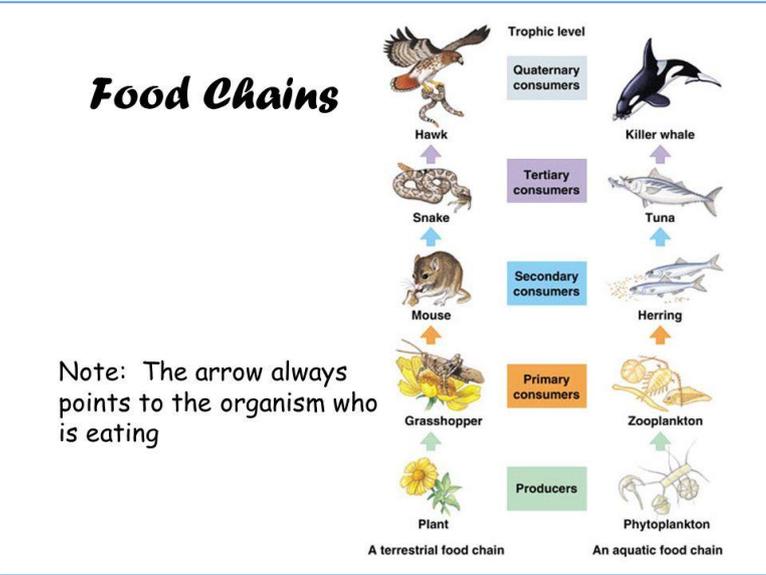


Figure 2 : Ecosystems seek to keep food chains in balance

These **trophic cascades**, or “cascades of life” demonstrate how the presence of just one species can influence the dynamics of a whole ecosystem. The word “trophic” derives from the Greek “trophē” referring to food or

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nourishment. We now know that **biodiverse living systems** which retain their large carnivores and large herbivores often behave in radically different ways from those which have lost them.

In the example, below, too much algae has reduced the level of dissolved oxygen in water systems, killing fish and other organisms relying on the aquatic ecosystem. The presence of harmful phytoplankton such as blue-green algae is most commonly caused by the build-up of excess nutrients (eutrophication), which disturbs the ecosystem dynamics. Excess nutrients decrease the population of large fish, causing a cascade that finally results in an abundance of algae. By introducing more fish to the ecosystem, or protecting the current fish populations, the balance between trophic levels can be restored. Such interventions, known as **biomanipulation**, can also effect the abundance of aquatic vegetation, which effects sediment stability and indeed nutrient cycling.

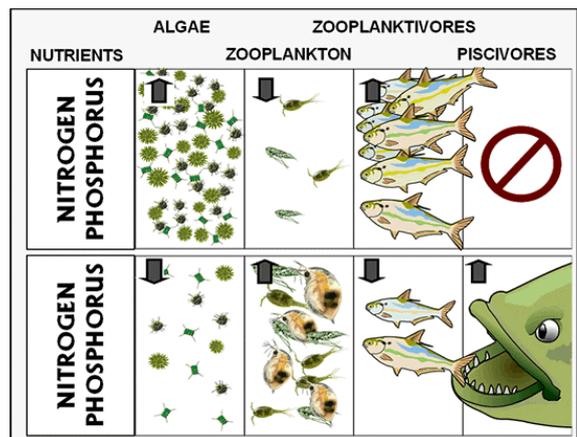


Figure 3 Dead fish as a result of excessive nutrients and low levels of dissolved oxygen in the water.

Another example, closer to home, is the Pangolin. Aside from being a very unique, insectivorous creature and the **most trafficked mammal in the international illegal wildlife trade**, these scaly anteaters also have a job — a very important one. Pangolins provide the earth with all-natural pest control and are fantastic soil caretakers, and they do these things simply through their everyday behaviors of excavating ant and termite nests for food. In doing so, the soil is mixed and aerated, improving the nutrient quality of the soils and aiding the decomposition cycle, providing a healthy soil base for lush vegetation to grow from. The mere presence of pangolins, in conjunction with that of the other organisms and processes within their habitat, is absolutely imperative to continued healthy ecosystem functioning. What’s more, it’s estimated that a pangolin eats some 70 million insects a year (mainly ants and termites), that’s almost 200,000 insects every day, and about 70 times more insects than bats eat.

In the newly released film “Eye of the Pangolin”, Dr Cleo Graf says pangolins are “in ecological terms, a **keystone species**, something that has a greater impact than you’d expect for its biomass, in the ecosystem,” and yet they are being illegally traded to China and Vietnam and are threatened with extinction. An estimated 1900 pangolin are killed for every Tonne of scales seized, and at this rate, the threat to ecosystems is very real as the numbers of (uneaten) insects can become super-abundant, and out of balance, increasing the ant and termite threat to plants and vegetation. The “Eye of the Pangolin” can be watched here : <https://www.youtube.com/watch?v=7oFalhPrdUs>.

The final examples of a trophic cascade are those presented by George Monbiot, about whale poo and marine faecal plumes. In the 1970’s it was argued that reduced numbers of large whales in the southern seas would lead to an increase in the krill population, their prey – but this never happened. Instead there has been a long-term decline in krill, and it turns out that whales not only kill their prey but they also maintain prey populations – but how? Whales help sustain the entire living system of the oceans, by returning to the surface to breathe and defecate, transporting nutrients from the depths (where waters are too dark for photosynthesis to occur) into the photic zone, where plants can live. In the southern oceans, iron is a limited nutrient, without which the plant plankton at the bottom of the food chain cannot reproduce and grow. By producing their “poonamis” – sorry, faecal plumes – in the surface waters, the

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whales fertilise the plant plankton on which the krill and fish depend. And it doesn't end there. Plant plankton, when they die, slowly descend into the dark abyss, taking with them the carbon they have absorbed from the atmosphere, to be stored out of our earth's atmosphere. You can watch more on "How whales change climate" here <https://www.youtube.com/watch?v=M18HxXve3CM>.

The reintroduction of wolves into Yellowstone National Park, USA in 1975 has impacted ecosystems there by reducing deer numbers and changing deer behaviour "How wolves change rivers" here <https://www.youtube.com/watch?v=ysa5OBhXz-Q>.

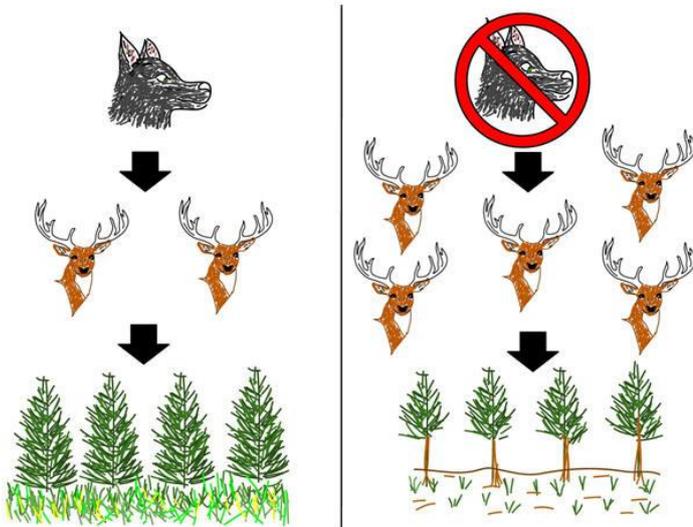


Figure 3 Wolf Trophic Cascade in Yellowstone National Park

Rewilding is simply the "mass restoration of nature's ecosystems" and by working with the natural forces of these trophic cascades, there is hope that if adopted quickly, that these natural climate solutions by restoring living systems can help avert climate chaos while defending the living world : by drawing carbon dioxide out of the air by protecting and restoring biodiverse ecosystems. Defending the living world and defending the climate are, in many cases, one and the same. Biodiversity is at the heart of the solution. For more information <https://www.youtube.com/watch?v=t3I9gDocYdk>.

QUESTIONS

1. What is an apex predator?
2. What is a trophic cascade?
3. What do we mean by rewilding?
4. How many insects does a Pangolin eat every day?
5. Name 3 benefits whales perform in the oceans to support the entire life system?
6. Name 3 examples of apex predators in Africa?
7. What is a keystone species?
8. Name 3 services that pangolins offer to their environment?
9. Trophic cascades exist in every type of environment, true or false?
10. What is the world's most illegally trafficked animal on the verge of extinction?