

The Many Shades of Green – Nick Rossiter

Talk given to Hexham Rotary Club Monday 3rd February 2020

The principal of sustainability should underpin human activity on the planet Earth.

Sustainability has a number of components, at least 3:

Stable climate (climate change, climate emergency)

Clean environment (pollution e.g. plastics, pesticides)

Biodiversity (species richness)

Space for Wildlife (a share of the planet's resources)

Need to maintain all of these components

Increasing one while depressing another is not sustainability

Green Movement is a Broad Church

Groups place differing emphases on the components

My own background:

Citizen science, studying numbers, habits of various species in the wild:

Giving numbers of birds, insects, mammals at various localities, enabling long-term trends to be determined. Trends are strongly down in some areas, particularly on farmland, but some bright spots such as birds of prey, due to reduction in persecution.

We're treated with scorn by Extinction Rebellion, who think our evidence for declining populations, has not been followed up by effective action.

This is what gives the many shades of green.

For this talk I'm calling myself a light green: very concerned with the environment but not seeking revolution! Light greens run across the political spectrum.

Another sort of green is the Red-green, formerly dark green, as in the German political party or Extinction Rebellion, who are seeking profound changes in the way we operate. Red-greens are of various left-wing affiliations.

One. Climate Change (warming, heating, emergency)

Zero carbon, 3C rise by 2080, floods, extreme weather increasing.

It's a populist cause – treating very simply with slogans a highly complex issue.

Get rid of Carbon!

Carbon dioxide is a natural component of the atmosphere – 300 parts/million, 0.03%, rising recently to 0.04%. Not a pollutant like say Mercury, a stock pollutant, not wanted at any concentration but a fund pollutant, which at abnormal concentrations interferes with balances.

Carbon dioxide is the basis of virtually all life on planet through photosyntheses, reaction of carbon dioxide with water in presence of sunlight within plants to give glucose (sugar) and oxygen. Oil, gas and coal also come from decayed plants, photosynthesis from long ago So we're raiding the planet's savings account. But the burning of coal, oil and gas has enormously contributed to human prosperity.

Humans and their dominion (domestic animals, rats, mice, cockroaches) currently use over 50% of the daily photosynthesis on the planet, as well as some of the savings. We use only a tiny fraction of the total sunlight falling on the planet.

Climate modelling is very complex. We've only got 40-50 years of quality, detailed data. But it's clear that there is a greenhouse effect with temperatures rising 0.1C per decade: heat enters the planet as before but less heat escapes back into space because of the increased carbon dioxide levels in the upper atmosphere. The effect is amplified by forcing: increased temperatures from carbon dioxide result in more water vapour in atmosphere, another greenhouse gas.

Two extremes: Venus has an atmosphere 96.5% carbon dioxide and surface temperature is 470 Celsius. On Earth in ice ages, with temperatures 4-7 Celsius lower carbon dioxide is 0.01% and without any carbon dioxide would be 33 Celsius cooler than now (uninhabitable).

So zero carbon is not a state for which we should be aiming. Nor should we be allowing large concentrations to build up. Is it possible that the excess carbon dioxide will be removed naturally? Possibly some may be; plants increase rate of photosynthesis at higher carbon dioxide levels and some goes into the oceans where it forms carbonic acid, reacting with calcium to give calcium carbonate. Increases in temperature are below that predicted by models, roughly half the expected rate.

So we can accept that increased carbon dioxide levels, through fossil fuel burning, is a concern. So what can we do about it? We could wait and see with some adaption and precautionary measures.

The Red-green or dark green brand of Green does not accept this pragmatic approach. They want all fossil fuels to be stopped immediately, with switch to so-called renewable energy. Wind, solar and biomass energy sources are very dilute: large area needed for such industries for the amount of power they produce. They industrialise our remaining wild areas, covering them with turbines, panels, electric cables and infrastructure. Electrocution is the biggest cause of premature death of birds of prey in the world today. Electric cables were a prominent factor in the fires in California (causes in official report: 25% climate change, 50% electrical clutter with invasion of people into the wild forest). Solar panels cover some deserts almost completely. Current sources of renewable energy affect biodiversity so are not sustainable but would not object to 20% component of our energy, not more, as unreliable in addition to previous concerns aired. This enables coal, a highly polluting fuel, to be phased out.

There is a power source that is carbon-free and very concentrated but the Red-greens and Greenpeace cannot abide it: nuclear power, currently fission, about 1000 times the density of renewables: it takes 1,000 hectares of renewables to generate the same power as from 1 hectare of nuclear power. Scientific misunderstanding is part of the problem. A civil power station is not a nuclear bomb with less than 5% uranium in the fuel; you need 95% uranium and some plutonium to make a nuclear bomb with a chain reaction. Even with Chernobyl, nuclear power is one of the safest energy sources. Chernobyl was an appallingly engineered and operational development, not remotely reflective of current systems. Much more nuclear power does deliver sustainability as it takes up only a small land area with no negative effects on biodiversity. So this is an obvious area, strongly supported by physical scientists, as the next generation energy source. With farming we've moved to intensive methods: we need to do the same with energy generation if our population is going to be supported. A move long-term might be to implement nuclear fusion, with same processes as in our Sun (very hot!) but this is an experimental area. Thorium has also been suggested as a way forward for nuclear power.

We can see these energy factors play out in Germany where wind contributes 17% to energy. Wind-farm installation has come to a halt through opposition by nature-focused group, local populations and removal of some subsidies. They've missed their carbon targets and resorted to using dirty lignite, clearing an entire forest to keep the lights on, as they close their nuclear power stations which did provide 25% of their clean energy. A bit like running up an escalator the wrong way. France has the cleanest energy in the world through concentration on nuclear power.

Two. Space for Wildlife.

Habitat loss through pollution and land-use changes.

A very serious problem with all sorts of residues building up in the environment, such as pesticides, herbicides, various medicines, plastics (bulk, micro-plastics), soot,

sulphur dioxide, car exhaust fumes as well as carbon dioxide. Emphasising the complexity of the state of the planet, some pollutants complicate the climate change debate. For instance sulphur dioxide in the sky reflects sunlight, reducing surface temperatures. Soot landing on ice or snow increases melting through a greater absorption of heat by the frozen surfaces (the albedo effect), affecting glaciers and mountain slopes. Contrails from high-flying planes increase global warming from a greenhouse effect through the ice crystals and exhaust gases in the upper atmosphere: the higher they fly, the worse it is.

Pollution results in a massive loss of biodiversity. Farmland birds have declined 90% through the very efficient use of pesticides and herbicides. Seabirds have suffered severe losses through plastic debris and various residues in the seas such as PCBs. It's a very difficult area as our increased productivity, say in farming and fishing, has contributed to our welfare and increased population.

Pollution renders space indirectly unavailable to wildlife. Developments like new buildings, factories, housing estates, roads, railway lines, and above all clearance of forest act directly on the amount of space available.

Human population is 7.6 billion currently and is forecast by United Nations to peak at 9 billion by 2050 followed by long decline but some estimates are higher with even a rise to 12 billion by 2100, as in zero carbon models in RCP8.5. It looks as if the pressure will continue.

If we carry on with no change, we will lose biodiversity and the integrity of the planet; we will enter the Anthropocene, the sixth age of mass extinction on Earth. On the bright side (it's an ill wind that blows no-one any good), we might miss an ice age, which would be disastrous for our large population.

Extinction Rebellion and various Red-Green groups seem to treat space for wildlife as less important than zero carbon. Light green groups, at the corporate level, are reluctant to criticise business practices.

There are severe challenges ahead!

Promising developments would be a slowdown in the growth of the human population (encouraging the careers of women), moving to next generation energy (nuclear power), having more open debate (please note BBC), and recognising that space has to be maintained for wildlife (rewilding, ending forest clearance, for instance). With respect to the last there is some common ground emerging between the Red-green and the light green:

Plant a Tree!