

Can we prevent the sixth mass extinction?

Soren Bondrup-Nielsen

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Within the last year, two reports were published warning humanity that species are going extinct and populations are declining at alarming rates. The World Wildlife Fund published the Living Planet Report in late 2018 (https://wwf.panda.org/knowledge_hub/all_publications/living_planet_report_2018/) which shows that between 1970 and 2014 there has been a massive decline in abundance on average of mammals, birds, reptiles, amphibians and fish globally. The data showing this are based on population changes over this 44 year period for 16,704 populations of 4,005 species. Species in freshwater and tropical realms are faring the worst. In May 2019, the United Nations Intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services (IPBES) published its “Global Assessment report” (<https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services>) based on analyses of 15,000 scientific and governmental reports and paints a similar picture of global declines of populations and species.

Climate change is now recognized as a scientific fact, although politically and economically it may not be accepted by all. People are beginning to see and experience the effects of climate change, and are taking action such as the spreading global phenomenon known as the Extinction Rebellion. However, the loss of populations and species, I do not believe, is as well recognized; it is harder to witness and experience the decline in populations and loss of species. But this loss will ultimately have as devastating effects on humans as will climate change. The current loss of species which is caused by humans has been called the sixth mass extinction event occurring in what is called the Anthropocene.

Planet Earth formed about four and a half billion years ago. Earth was a ball of molten rock that slowly cooled. About three and a half billion years ago when the earth was a billion years old, continents had formed and there was an ocean and the first bacteria appeared. A huge variety of bacteria evolved and were the only life on planet earth over the next three billion years. I like to think that the three billion years of bacterial evolution was a giant biochemistry experiment. Mutations in the genetic code of the bacteria resulted in a large variety of useful

proteins making bacteria capable of living in a variety of environments and make use of various resources. After this long “experiment,” multicellular organisms began to appear.

In the subsequent half a billion years, diverse organisms evolved at a tremendous rate and eventually resulting in us humans. The number of species today is unknown. Biologists have named close to two million species but the species remaining to be discovered number in the millions, ranging from a conservative estimate of five million to as many as fifty million; the species left to be found are mostly tiny but not insignificant.

During the last half billion years, there have been five massive species extinction events. The last such event occurred about sixty million years ago and caused the disappearance of the dinosaurs. This extinction event is considered by most to have occurred due to an asteroid, about ten kilometres in diameter, slamming into what is now the Yucatán peninsula. It is estimated that the asteroid gouged a crater almost thirty kilometres deep and caused a plume of debris where much of it exited the earth's gravitational pull and went into irregular orbits around the sun. The asteroid vaporized and set fire to everything up to two thousand kilometres away. The earth plummeted into darkness due to ash and debris in the atmosphere and fires burned everywhere around the globe. Estimated are that about seventy-five percent of all species went extinct, and only 0.0001 percent individuals of the remaining species survived. This is equivalent to all present-day humans on earth dying except for those of us in Nova Scotia. The devastation was beyond massive. But slowly life returned, and new species evolved, including the vast diversity of mammals.

Biologists assume that the number of species present today represents only about two percent of all the species that ever existed. Most species are only present for a relatively short time before they go extinct or evolve into new species; life is dynamic and ever-changing. But mass extinction events are devastating. They most likely occur over a very short time, but it takes hundreds of thousands if not millions of years before new species evolve and ecosystems stabilize.

Our human time scale is very short in comparison to speciation events and even though the current extinction event is occurring relatively slowly over tens of decades the evolution of new species will be as slow as in the past. When populations diminish, and species disappear ecosystems change, and the fewer the species left behind, the lower the resilience of these

systems and the lower their ability to sustain human populations. Ultimately our survival depends on resilient ecosystems providing a huge variety of functions to support all life.

The loss of populations and species are a direct result of humans. The UN report states that humans have significantly altered three-quarters of land-based environment and sixty-six percent of marine environments. More than a third of the world's land surface and nearly seventy-five percent of freshwater resources are devoted to crop or livestock production. Land degradation has reduced productivity by twenty-three percent of the global land surface. Thirty-three percent of marine fish stocks are being harvested unsustainably. Urban areas have doubled since 1992. Plastic, pollutants and toxic substances are pumped into the atmosphere, waterways and ground. The list goes on and on. This is all very disturbing, but there is still time to do something. We can reverse the amount of greenhouse gas being emitted into the atmosphere, and we can stop the decline in populations and species. But this will require and concerted global effort.

Since 1970 the global human population has more than doubled from 3.7 to 7.6 billion people. On a finite planet, there is no room for a population that keeps increasing. So-called, developed countries have primarily stopped growing, and it is tempting to blame this runaway population growth on the so-called undeveloped countries. But wait - why are some populations continuing to grow while others have stopped growing? We generally attribute a high standard of living to reduced growth rate. Those countries that have adequate and often more than adequate food, shelter, education, health care and more tend to stop growing. On the path to a high standard of living, populations go through, what demographers call a demographic transition. That is, initially, the death rate falls because of good food, shelter and health care, but the birth rate remains high. After a while, the birth rate falls. The desire to have kids diminishes for a variety of reasons and a balance between birth and death rate is reached, and the population stabilizes.

So it can be argued that if the developed countries of the world want the world population size to stop increasing, we should do everything to help the undeveloped countries reach the same standard of living that we enjoy. Another argument, however, is that the problem we are having with environmental degradation is not caused by people in undeveloped countries but by the high standard of living in developed countries. The concept of the ecological footprint determines the amount of land needed to sustain a person. People in undeveloped countries have

dramatically smaller ecological footprints than do people in developed countries. The concept of the ecoson (ecological person), which focuses on the per capita energy use is interesting in the human population growth debate. When you convert population size to ecoson size, then the US ecoson size is nine times larger than that of India, three times larger than that of China and thirty-six times larger than that of Indonesia. Then you can ask, what is it that should be controlled? If all populations on earth had the same ecoson as that of developed countries, it has been argued that we would need more than one earth to supply the necessary resources.

Biodiversity cannot be saved by establishing a few protected areas where we humans take a hands-off approach. Brundtland's (Brundland Report 1992) 12% protected areas are not enough. The new target of 17% will not be enough. Estimates are that we need to protect 50% of the earth to preserve biodiversity – this is already not an option. What we need is a radically new way for humans to live within the biosphere.

The WWF report recognizes, and are brave enough to promote, that we need to rethink our economic system. An economic system based on continuous growth is not sustainable on a finite planet. We may be able to reduce greenhouse gas emission within our growth economy because switching to alternative sources of energy can lead to economic growth but not so with population and species loss. Continued economic growth requires continued use of resources even if we substitute types of resources and increase efficiencies. Our current economic system is not sacrosanct – we made it up – we can change it! Can we find an answer to the biodiversity crisis caused by our current economic system by applying our current economic system? I doubt it!

Insanity is doing the same thing over and over again and expecting different results. We need to stop “worshipping” material goods as most spiritual practices in most cultures around the world have discovered in the past. We need to adopt an alternative economic system and they already exist such as Steady-State Economics and Donut Economics.