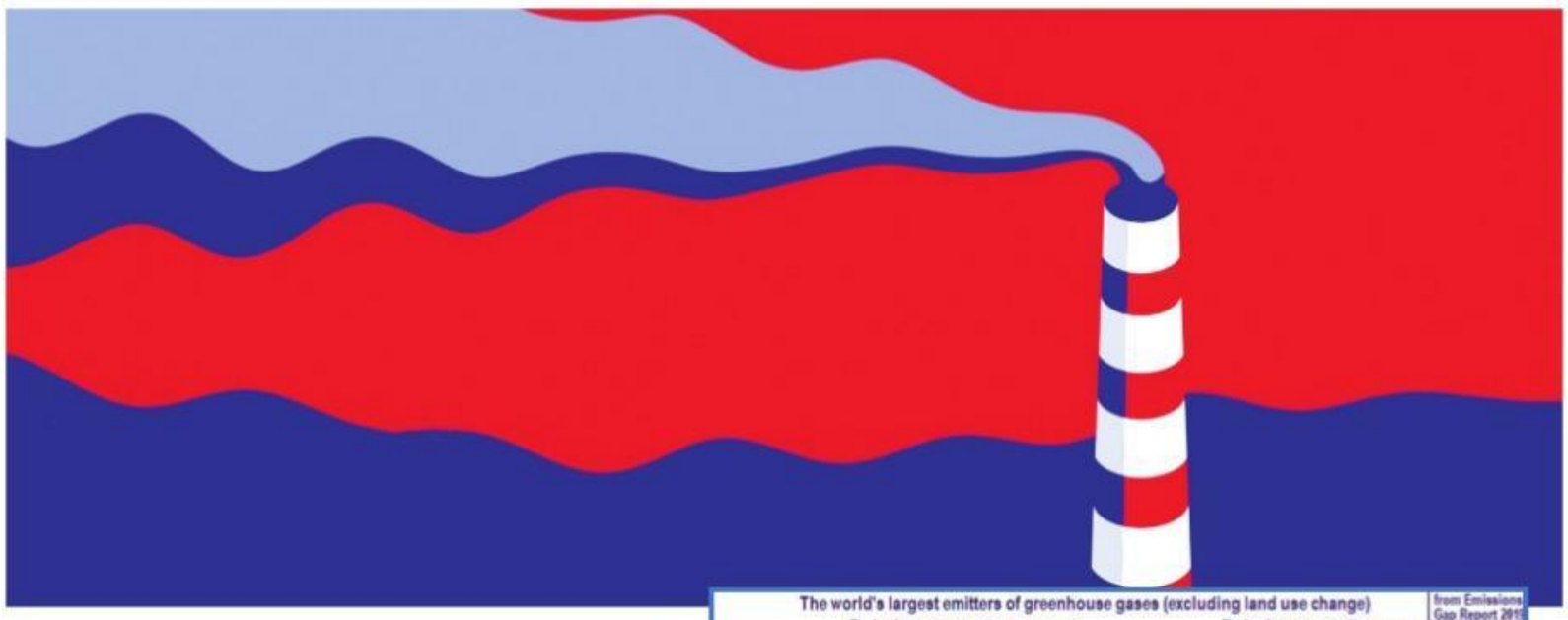
A wasted decade

Should the Earth be allowed to slip into ruin by default?

S ANANTHANARAYANAN



The Paris summit of 2015 saw 192 nations of the world get together to find ways to limit global warming and stave disaster. This was to follow up the Copenhagen accord of 2009 and the Cancun meet of 2011, where 42 developed and 44 developing countries confirmed pledges to keep warming down to 2°C, and to try for 1.5°C.

Niklas Höhne, Michel den Elzen, Joeri Rogelj, Bert Metz, Taryn Fransen, Takeshi Kuramochi, Anne Olhoff, Joseph Alcamo, Harald Winkler, Sha Fu, Michiel Schaeffer, Roberto Schaeffer, Glen P Peters, Simon Maxwell and Navroz K Dubash, from institutes in Germany, the Netherlands, Denmark, UK, US, Norway, Brazil and India, in a paper in the journal, Nature, have reviewed the progress made over the last 10 years. They find that the window of 30 years, which was available in 2010, has shrunk to just 10 years. And the extent of reduction in emissions that needs to be achieved in this short period has increased. "...even if all unconditional Nationally Determined Contributions (NDCs) under the Paris Agreement are implemented, we are still on course for a 3.2°C temperature rise," says the 2019 review by the United Nations Environment Programme.

As late as 2015 and the Paris summit, scientists were speaking of a 2°C rise in global temperature being acceptable. But we now know that 2°C would be too high and we need to achieve the target of 1.5°C. During the last 10 years, since we committed to the 2°C limit, however, the world did not work towards the target, it moved away and increased the task at hand.

The task, of course, is to rein in the levels of CO2 in the atmosphere, which became alarming when it rose beyond 400 parts per million -- corresponding to 3,132 giga-tonnes (billion tonnes) of CO2. The level has been rising and was reported to be at 415 parts per million, or 3,250 Giga-tonnes in 2019. It is estimated that since 1959, some 350 Gt of CO2 have been emitted, of which some 55 per cent has been absorbed by the processes on land and the sea. Once in the atmosphere, however, CO2 stays put, till it is absorbed or fixed as carbohydrates by vegetation and sunlight. While the capacity of these CO2 sinks stays nearly unchanged, the emission has been rising, and studies have shown that business as usual would take CO2 levels and the rise in temperature so high that human life as we know it may be impossible by the end of the century.

Hence the series of international conclaves, to create awareness and impose on States the obligation to find ways, mainly of reducing the use of fossil fuels and the pressure of land, to retard, and then reverse, the rising load of CO2 in the atmosphere. What the world thought in 2010, the paper in Nature says, was that we had till 2040 to reduce to half the level of emissions. But we now need to do it by 2030, and there is more to do in the shorter time we have.

"Had serious climate action begun in 2010, the cuts required to meet the emissions levels for 2°C would have been around two per cent per year, on average, up to 2030," the paper says. But in place of reduction, the levels of emission have steadily risen. Against even the annual 43.1 Gt CO2 equivalent estimated for 2019, the paper cites the UN report that says emissions are at 55.3 Gt a year in 2018. The current estimate is that if we plan to limit temperature within the window available, the "emission cuts required cuts from 2020 are more than seven per cent per year on average for 1.5°C (close to three per cent for 2°C)," the paper says.

The study in Nature is an analysis of the data that the United Nations has been collecting every year, since 2010. This data, the Emissions Gap Report, is the comparison, by the UN Environment Programme, of the action that the nations of the world have taken, individually, against what they should have, collectively, and the excess of emissions that we need to eliminate to avoid the worst impacts of climate change.

The annual review, over the last decade, has clearly not served its purpose as a means of monitoring progress. The review, and the idea of the "gap", however, the paper says, has helped keep UN summits adequately informed. But "the past decade of political failure has cost us all dear," the paper says in its opening sentence. And its synthesis of the 10 annual reports since 2010, in preparation for the review to take place in Glasgow later this year, hopes to get nations to overhaul their promises. And then, crucially, to keep them -- "if the yawning gap between 'talk and walk' is going to close by 2030."

To build on earlier accords and mark out the course for their implementation was also what the summit of 2015 had intended. If the meet in Glasgow is to have any meaning, it is essential that more forces come into play than just the UN resolve to get governments together. The world cannot afford to let politicians fiddle while the Earth, quite literally, gets ready to burn. This country has seen the courts of law being moved to enforce several provisions that are of public interest. Could there be a more human rights issue than the need to control global warming? Could mass awareness force the hands of governments, so that the voices of Greta Thunberg and Licypriya Kangujam do not go unheard?

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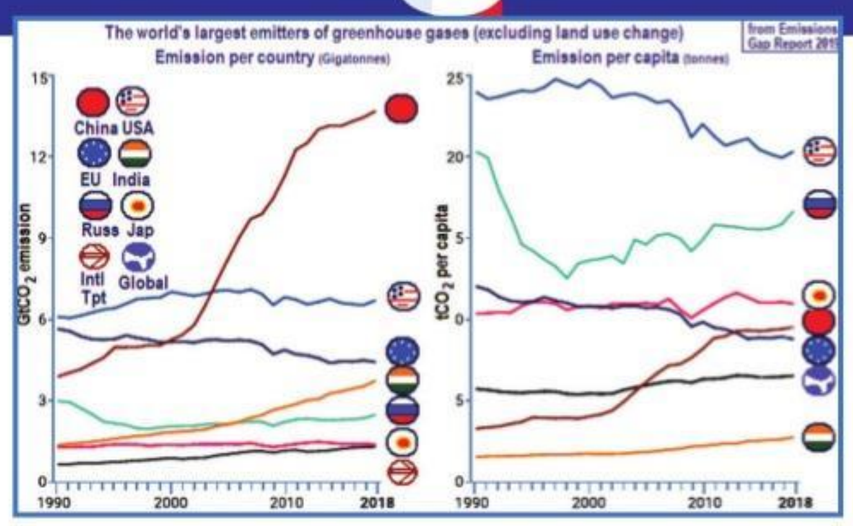
From the UNEP report

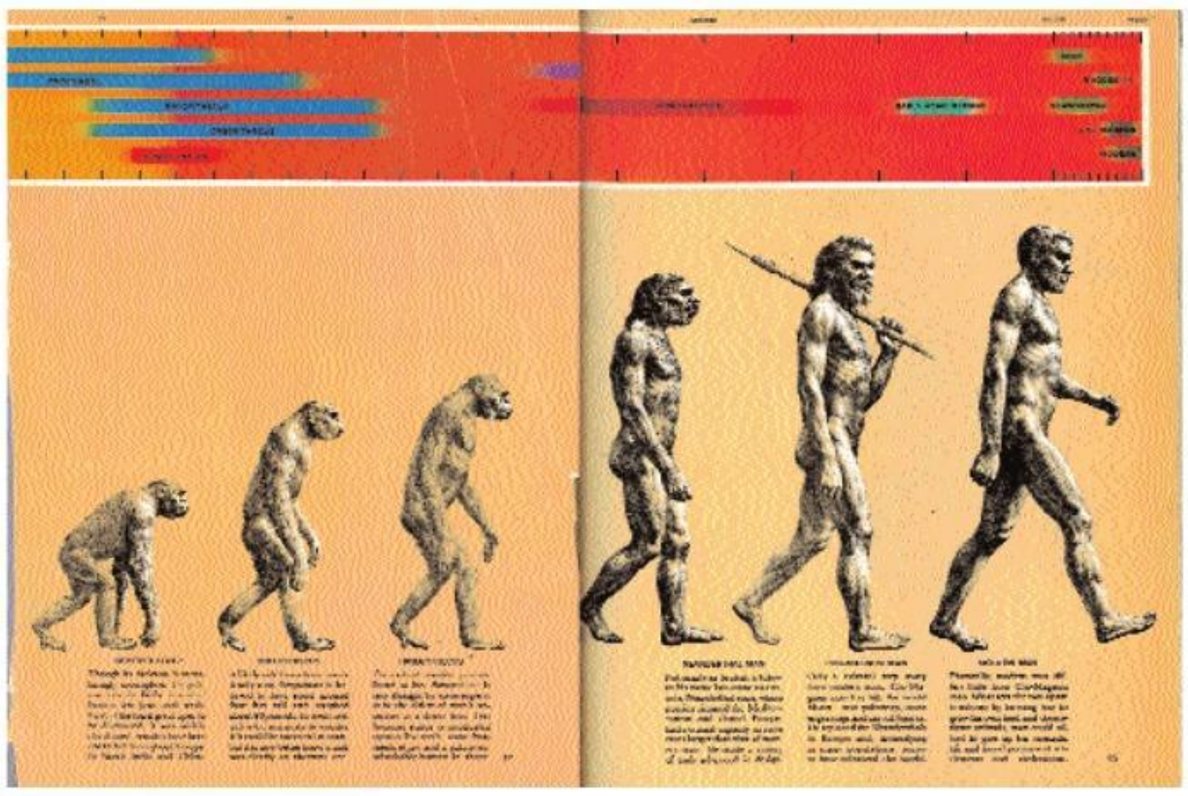
"If we rely only on the current climate commitments of the Paris agreement, temperatures can be expected to rise by 3.2°C this century. Temperatures have already increased by 1.1°C, leaving families, homes and communities devastated.... ....We need to close the 'commitment gap', between what we say and what we need to do, to prevent dangerous levels of climate change. Governments cannot afford to wait. People and families cannot afford to wait. Economies must shift to a decarbonisation pathway now. .....We have to learn from our procrastination. Any further delay brings the need for larger, more expensive and unlikely cuts. We need quick wins, or the 1.5°C goal of the Paris Agreement will slip out of reach."

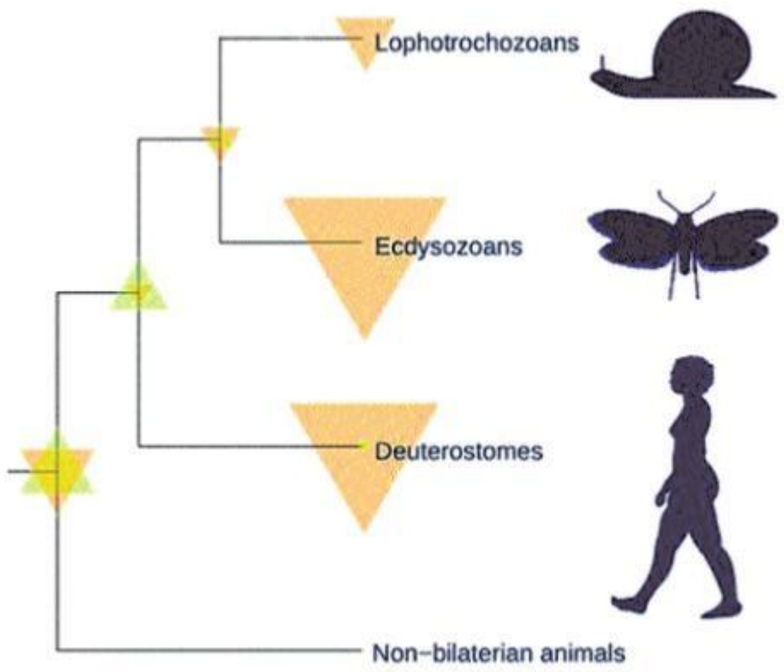
– *Inger Andersen*, Executive Director, UNEP



Drunken steps of evolution

Here's why the famous 'March of Progress' image is just wrong





A tree of life diagram showing the changing number of genes of different animal groups. Downward pointing orange triangles indicate gene losses. Upwards pointing green triangles indicate gene gains. The bigger the triangle, the greater the change.

JORDI PAPS & CRISTINA GUIJARRO-CLARKE

Evolution explains how all living beings, including us, came to be. It would be easy to assume evolution works by continuously adding features to organisms, constantly increasing their complexity. Some fish evolved legs and walked onto the land. Some dinosaurs evolved wings and began to fly. Others evolved wombs and began to give birth to live young. Yet this is one of the most predominant and frustrating misconceptions about evolution. Many successful branches of the tree of life have stayed simple, such as bacteria, or have reduced their complexity, such as parasites. And they are doing very well.

In a recent study published in Nature Ecology and Evolution, we compared the complete genomes of over 100 organisms (mostly animals), to study how the animal kingdom has evolved at the genetic level. Our results show that the origins of major groups of animals, such as the one comprising humans, are linked not to the addition of new genes but to massive gene losses. The evolutionary biologist Stephen Jay Gould was one of the strongest opponents of "the march of progress", the idea that evolution always results in increased complexity. In his book Full House (1996), Gould uses the model of the drunkard walk. A drunkard leaves a bar in a train station and clumsily walks back and forth over the platform, swinging between the bar and the train tracks. Given enough time, the drunkard will fall in the tracks and will get stuck there. The platform represents a scale of complexity, the pub being the lowest complexity and the tracks the maximum. Life emerged by coming out of the pub, with the minimum complexity possible. Sometimes it randomly stumbles towards the tracks (evolving in a way that increases complexity) and other times towards the pub (reducing complexity).

No option is better than the other. Staying simple or reducing complexity may be better for survival than evolving with increased complexity, depending on the environment.

But in some cases, groups of animals evolve complex features that are intrinsic to the way their bodies work, and can no longer lose those genes to become simpler -- they become stuck in the train tracks. (There are no trains to worry about in this metaphor.) For example, multi-cellular organisms rarely go back to become unicellular.

If we only focus on the organisms trapped in the train tracks, then we have a biased perception of life evolving in a straight line from simple to complex, mistakenly believing that older lifeforms are always simple and newer ones are complex. But the real path to complexity is more tortuous.

Together with Peter Holland from the University of Oxford, we looked into how genetic complexity has evolved in animals. Previously, we have shown that the addition of new genes was key to the early evolution of the animal kingdom. The question then became whether that was the case during the later evolution of animals.

Studying the tree of life

Most animals can be grouped into major evolutionary lineages, branches on the tree of life showing how the animals alive today evolved from a series of shared ancestors. In order to answer our question, we studied every animal lineage for which a genome sequence was publicly available, and many non-animal lineages to compare them against.

One animal lineage is that of the deuterostomes, which includes humans and other vertebrates, as well as sea stars or sea urchins. Another is the ecdysozoans, comprising the arthropods (insects, lobsters, spiders, millipedes), and other moulting animals such as roundworms. Vertebrates and insects are considered some of the most complex animals. Finally, we have one lineage, the lophotrochozoans, which includes animals such as molluscs (snails, for example) or annelids (earthworms), among many others.

We took this diverse selection of organisms and looked to see how they were related on the tree of life and what genes they shared and didn't share. If a gene was present in an older branch of the tree and not in a younger one, we inferred that this gene had been lost. If a gene wasn't present in older branches but appeared in a younger branch, then we considered it a novel gene that had been gained in the younger branch.

The results showed unprecedented numbers of genes lost and gained, something never seen before in previous analyses. Two of the major lineages, the deuterostomes (including humans) and the ecdysozoans (including insects), showed the largest number of gene losses. In contrast, the lophotrochozoans show a balance between gene novelties and losses.

Our results confirm the picture given by Stephen Jay Gould by showing that, at the gene level, animal life emerged by leaving the pub and making a large leap in complexity. But after the initial enthusiasm, some lineages stumbled closer to the pub by losing genes, while other lineages drifted towards the track by gaining genes. We consider this the perfect summary of evolution, a booze-induced random choice between the bar and the train track. Or, as the Internet meme says, "Go home evolution, you are drunk".

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PLUS POINTS

App for jaundice

Doctors in the UK have developed an app capable of detecting jaundice in newborn babies.

The condition affects more than half of all newborn babies and causes skin and whites of the eyes to turn yellow. Although most cases are harmless, in severe ones a neurotoxic form can enter the brain, leading to death or disabilities such as hearing loss, neurological conditions such as athetoid cerebral palsy, and developmental delays.

Scientists from University College London and University College London Hospitals tested the app on the eyes of 37 newborns and processed images to remove the distorting effects of background light. Matched against their blood test results, they say it successfully identified all cases where treatment would normally be required while identifying cases that would not require treatment 60 per cent of the time.

"In many parts of the world, midwives and nurses rely on sight alone to assess jaundice," said UCL's Dr Terence Leung, senior author of the paper, "However, this is unreliable, especially for newborns with darker skin. Our smartphone-based method provides a more robust assessment; ensuring serious cases do not go unnoticed. While we await the evidence of a larger trial, we believe that this method, used as an app, could help to prevent the deaths of newborn babies due to severe jaundice worldwide."

The larger trial, involving 500 babies, is currently under way in Ghana. "Our screening method would require no special equipment apart from a smartphone and is a tenth of the cost of commercial devices used in the UK," said Felix Outlaw, first author of the research, published in the PLOS One journal, "Given that smartphones are common even in poor and remote parts of the world, being able to use them to screen for jaundice would have a significant impact."

The app is part of a new wave of smartphone-based tools used to detect diseases and conditions, made possible by advances in software and camera technology. In 2017, a similar app was developed by researchers at the University of Washington for adults in the hope of better diagnosing jaundice in cancer patients.

The independent/agencies

Longer summers in Oz

Australian summers are lengthening by a month or more while winters are getting shorter due to climate change, according to an analysis by a leading think tank released recently.

The Australia Institute said large swathes of the country were experiencing an additional 31 days of summer temperatures each year compared to the 1950s. While Sydney was just under the average with an extra 28 hot days a year, Melbourne added 38 warmer days since the middle of the 20th century.

In some regional areas ravaged by bushfires in recent months, such as the New South Wales town of Port Macquarie, residents are now experiencing seven more weeks of typical summer temperatures. "Temperatures which were considered a regular three-month summer in the 1950s now span from early-to-mid-November all the way to mid-March," Australia Institute climate and energy programme director Richie Merzian said, "Summers have grown longer even in recent years, with the last five years facing summers twice as long as their winters."

Australia's capital, Canberra, lost 35 winter days while the city of Brisbane, in the country's east, lost 31 cooler days. The country's latest summer heralded a devastating bush fire disaster in which more than 30 people died, thousands of homes were destroyed and at least a billion animals perished. The crisis led to renewed calls for the country's conservative government to cut the emissions contributing to global warming. But while Prime Minister Scott Morrison belatedly acknowledged the link between the bush fire disaster and a warming planet, he has been reluctant to reduce the country's reliance on coal.

Agence France-Presse