Asteroid Impact and Sustainability Assembly

For the last few weeks, the sustainability committee have been promoting Turn it off week. Let me illustrate the importance of their work with the help of an example. Let us reflect upon asteroids. Every few months asteroids skim past our planet, just missing us. Often they pass the Earth within the orbit of the moon, which in cosmological terms is the equivalent of missing by a whisker. Asteroids are common - we are currently tracking the orbits of well over 300,000 chunks of rock of all sizes, and there may be as many as a billion to be found across the whole of our solar system.

Nor is it unusual for one of these rocks to cross the orbit of the planet Earth, making an impact a possibility. There may be as many as 100 million rocks larger than 10 metres that cross the orbit of the Earth. The asteroids are travelling at various speeds in various directions as they move through our solar system; the Earth sweeps round on its regular course at more than 100,000 miles per hour. Every now and then, it is inevitable that one of them will collide with the Earth. The vast majority are small enough to be burnt up by the heat of passing through our planet's thick atmosphere. Amazingly, the Earth gains 30,000 tons of cosmic dust from space in this fashion every year.
That doesn't affect life on Earth much, but there are estimated to be about two thousand asteroids, whose path crosses our orbit, whose impact on Earth would effectively end civilisation. We think it was an asteroid impact that caused the extinction of the dinosaurs. And that's not to speak of the hundreds of thousands of house-sized rocks, any one of which would be enough to destroy a city. We are estimating these numbers as we just don't see them until they are upon us – we would have only a few days warning of an asteroid unless it was more than a hundred metres across, and then only if we happened to have a telescope pointed at it. Most of our knowledge of near misses comes after the rock has skimmed past the Earth. After all, they are travelling at many tens of times faster than the fastest bullet, and very few people are actually looking for them.

But what happens when a large rock hits the Earth at perhaps 200 times the speed of sound? The air below the incoming asteroid has no time to get out of the way. It is suddenly compressed and rapidly heats up. In fact, the column of air below the asteroid would heat to 60,000 degrees K – 10 times the temperature of the surface of the sun. No structure or object beneath the asteroid would survive the fraction of a second it would take for the rock to pass through the atmosphere and hit the surface of the earth. The force of that impact would instantly vaporise the meteorite itself. However, the energy must go somewhere, and about 1000 cubic kilometres of earth would be thrown into the atmosphere as a crater three miles across was formed. Anyone within 250 miles who hadn't already been killed by the heat flash would now be killed by the blast. If an observer were to watch it, they would see the brightest flash ever seen by human eyes, followed by an approaching blast front that would stretch from horizon to horizon. They would not hear its approach, as it would be travelling many times faster than sound. Anything within 1500 kilometres would be

knocked over, set on fire and flattened. Beyond that blast radius, the damage would diminish with distance.

You might feel relieved to make it through the first few minutes after impact. But think again. There would be devastating tsunamis set off across the world's oceans. Across the world a series of earthquakes and volcanic eruptions would follow.

Perhaps a billion and a half people would die in the first hours after the impact. But that is not the end. The ionosphere would have been affected, knocking out all communications around the world. The debris thrown into the atmosphere would then blot out the sun, perhaps for many years, meaning that crops could not be sown or harvested.
And the effects would not pass swiftly. The climate was affected for about 10,000 years after the asteroid strike that killed the dinosaurs off.

The effect upon civilisation would be immense and possibly total. Yet an impact like that is a relatively minor event. An impact like that occurs on the Earth about once every million years. The one that killed the dinosaurs was worse. You might feel a little depressed at the thought, but here's a crumb of comfort. With such devastation and destruction you might be amazed that anything survived the last such impact. In fact, scientists studying exactly such a strike in Iowa have found that there were no extinctions associated with the impact of a rock a mile and a half wide. The disruption was profound, but no species disappeared because of it. Somewhere, survivors made it through and continued the breed and thrive.

We are all interested by the drama and fury of the destruction wrought by a massive asteroid strike upon the earth. The suddenness of it, the horror of it. But we are being distracted by the headline-grabbing nature of a meteorite impact if we think that is the thing to worry about. For all of the incredible temperatures and violence involved, not one species was made extinct in the last such strike. And here we come back to the work of the sustainability committee, because we are told that every day tens of species are disappearing from our planet because of the impact - not of asteroids - of our own species. We are the ones to worry about, not the asteroids. And although an asteroid strike may come unannounced out of the sky, our own impact on the planet is well known and well documented. We can't do much about a meteorite, but we can do something about our environment.

A vast chunk of rock causing a circle of destruction 3000 kilometres across is very dramatic; turning down your thermostat by one degree isn't, but the second will prevent destruction on a far greater scale than the first. And that is why I am so proud of our environmental committee, and their switch it off campaign. I am full of hope that we can make the difference needed to keep this world as we would wish. Let us not be distracted by dramatic, headline-grabbing worries from the real work of our times – the little things we can all do to create a sustainable future.