The Earth has given another seasonal reminder of the power of nature. On Boxing Day, 2003, it was the Bam earthquake - death toll 26,000. This Christmas, it is the SE Asian tsunami. Humans played no part in these natural tragedies, but they warn us about disturbing the natural status quo. The consequences of upsetting this planet's thermal balance through global warming could be just as dramatic.

It isn't just large-scale threats that we should fear. Mankind can easily be undermined by viruses, such as an epidemic of bird flu, an age-old problem with a modern dispersal method - the jet plane. Prince Charles has warned of "grey goo" overtaking the planet. He was referring to nanotechnology, the science of the minute. It was a stupid expression to use, either pushing people into a panic over a less colourful version of the Green Death, or making you dismiss his argument as the kind of anti-technology drivel that you'd expect from someone who talks to his plants. This was unfortunate. Nanotechology should not produce either response, but it should be treated with caution.

Nanotechonology is simultaneously the cutting edge of science and as old as the hills: we have used it for generations without knowing it. It isn't actually a single technology, but an umbrella term for the kind of things that you can do with particles measured in nanometres. The flu virus already mentioned is about hundred times bigger than the size of the nanoparticle and that virus is about a thousand times smaller than the width of a human hair.

At these sizes, the properties of materials change dramatically. Materials that insulated against the passage of electricity start to conduct it. Materials that wouldn't dissolve in water now do. The transparent gains colour and vice versa. The rule-book is out of the window. These changes in property can be manipulated to make new products from self-cleaning windows to new generations of drugs and cosmetics.

To make nanoparticles, you can start with a chunk of stuff and then whittle it down to a collection of nanoparticles or the nanomaterial can be assemble from smaller units. This is where the "grey goo" term originated. Some science-writers have suggested that - just like a virus that divides and spreads - one nanoparticle could create several others that would in turn create more and before you know it Buckingham Palace would be filled with self-replicating slime. Plus ca change some would say, but that would be unfair.

Eric Drexler, nanotechnology's "father", says such reproducing robots would be unnecessary, but even if you accept his view, there are other reasons to be cautious. The size of nanoparticles puts them into a new league of reactivity. They can also do a Heineken - reach the parts that other particles can't, for example by crossing the blood-brain barrier. It is genie-out-of-the-bottle argument again. But when you have such sober bodies as Royal Society, Royal Academy of Engineers and the insurance giant Swiss Re making this argument - as they did recently - then we all should be listening.