

## **WHICH PERIL WILL STRIKE US FIRST?**

In the early part of the 21<sup>st</sup> century we are facing several perils which threaten our existence. Some of the perils are man-made, such as global warming and the intensive extraction of dwindling resources. Man-made problems also affect animals – there has been a 52% reduction in animals in the past 40 years owing to man's over-exploitation of the planet. But which of the perils is the most likely to strike **us** first in a major way?

All the perils have a combination of risk and size. For example, around 65 million years ago there was a major impact from a meteorite which caused an immense dust cloud which blocked out the sun for a few years and caused the extinction of the predominant animal life-form – the dinosaurs. Such an impact could very well cause our extinction but the probability of it happening is so low we can ignore that particular peril.

Another impact from space could be a novel virus which could wipe out humanity, again a very low likelihood so we can ignore that peril.

Now for a peril that seems much more likely, indeed certain – the consequences of global warming. Global warming is being caused by modern man burning fossil fuels and so causing an increase in the so-called “greenhouse gases” carbon dioxide and methane which reflect heat back to the earth so causing global temperatures to be higher than they otherwise would be. So far, the average global temperature has increased by nearly 1°C which does not sound much. However, the experts say that once that rises to 2.5°C we shall be in deep trouble, because that would cause a “run away” with the temperature rising in an uncontrollable manner to several times that figure. The reason for the “run away” is that, with a rise above 2.5°C the permafrost or tundra of the Arctic would melt and the exposed peat would give off a massive amount of greenhouse gas to reinforce what has been put into the skies by man's activities. Although there are international conferences to discuss climate change it seems that the chances of stopping global warming are very small. For example, China emits more carbon dioxide than any other country and has doubled its output of that gas in the past 10 years. And India is now starting down the same path.

What would be the result of severe global warming for our 7 to 9 billion people? Vast parts of the planet would be uninhabitable since they would become deserts. People would attempt to migrate towards the Arctic (which would then have a climate more suited to crop-growing but not on the scale required). However, other people in more fortunate northern latitudes would resist the immigrants since their own existence would be threatened. Mass starvation of people in the hotter, drier countries would be the result.

When will global warming really be life-threatening? Impossible to predict but it is not imminent. The global population is predicted by the UN to rise from 7.2 billion at present to 9.2 billion by 2050. The UN estimates that we need to double food production by then – because of the increase in mouths to feed and the change to more meat-eating. The latter means more cattle, the main methane-emitters, and more people - and more affluent people - means more energy consumption for air conditioning, cars, etc so we shall see an acceleration in the progress from nearly 1°C to 2.5°C – the tipping point. A complete guess would be 50 years to “run away”.

An associated problem is that of water shortage which is considered more urgent than global warming. Agriculture consumes about 80% of the world's harvested fresh water, and industry and urban living the rest. Climate change is already making some parts of the world arid, and farmers are increasingly relying on wells to make up for reduced rainfall. However, the aquifers are not being replenished and the water table drops inexorably. Soon, the aquifers will be dry, for example in the important wheat-growing part of India's Punjab. Not only will that deny India of a vital source of food, it will cause a mass migration of people from the Punjab. Water shortage problems are with us already; the effects are happening now; many people will suffer but other people in wetter parts of the planet will not suffer, so it will not be the end of mankind.

Degradation of agricultural soil does not create the same sort of headlines, but could cause one of the biggest threats to man's existence. We need to double food production by 2050 but already intensive agriculture, mostly monoculture, has degraded the soil's fertility. The organic matter in soil helps with water retention and with supporting those life forms on which we rely to convert chemicals in the soil to forms which can then be taken up by plant roots. These micro-organisms really are our friends and we kill them off with artificial chemicals and the degradation of the soil's organic matter. Also, farmers apply the fertilisers nitrogen, phosphorus and potassium to the soil but do not replace the other 16 vital trace elements so the soil is increasingly impoverished. For example, eight trace elements in vegetables were measured by the Ministry of Agriculture in 1941 and again in 1991. There had been a drop of 40% in those 50 years. That is a catastrophic rate of decline which must be continuing and probably at an even faster rate as modern agriculture is ever-more efficient at getting more crops from a given acreage of farmland. More crop extraction equals more trace element extraction equals fewer vital trace elements in the food we eat. As a result we will be ever-more likely to develop life-threatening diseases such as cancer, heart attacks, strokes, diabetes, etc, etc. This life-threatening peril is happening now and will get worse and worse as time goes on.

Degradation of agricultural soil is caused by farmers applying the fertilisers nitrogen, phosphorus and potassium but ceasing to apply adequate amounts of animal manures (which they did do prior to the Second World War) which put back organic matter as well as the other 16 vital trace elements. But there is another threat, a very serious one – we are running out of phosphorus. There is plenty of nitrogen, which comes from the petrochemical industry. There is plenty of potassium, since the reserves in the ground are simply huge. But reserves of phosphorus are strictly limited. **No plants can grow without phosphorus.** As plants take up phosphorus in the soil it **has** to be replaced, either from animal manures, compost or from phosphorus rock mined in just a few parts of the world. **It is not that there is an absolute shortage of phosphorus, it is simply a question of the cost of extraction.** We need about 18 million tons of phosphorus rock per year to meet the needs of agriculture at present – and that means 36 million tons per year by 2050 if we are to double food production. Europe has no phosphorus ore. The phosphorus rock in the USA is fast running out. Morocco controls about 75% of the world's remaining good-quality reserves, but most of that is in the disputed territory of the Western Sahara. When Spain moved out of the Western Sahara Morocco moved in and the local Saharawis, backed by Algeria, fought a guerrilla war. The UN brokered a cease-fire in 1992 which still holds. But another question is the cost of extracting phosphorus rock from the Western Sahara, which seems to be a closely guarded secret. So far, only two mines near the Moroccan border are in operation and phosphorus rock from there costs more than at other mines owing to it being 120 feet below the surface. The experts have estimated that the world will have used up about half the world's phosphorus rock by 2034 – yes 2034. The easiest half will have been mined and the half which is more difficult to extract – and more expensive to extract – will remain. Then the price of that essential crop fertiliser will increase exponentially as it dawns on everyone that we are fast running out and there will be the usual hoarding and wars over access to the supplies which remain. For example, in 2008 there was a phosphorus shortage scare and the price increased by 700%. When the easily-extractable phosphate reserves are used up the price could mount by thousands of percent and half the world's population could die of starvation since they would simply not be able to afford that essential fertiliser.

So with the above-mentioned perils, the one that is most likely to be the first to cause mass deaths is that of phosphorus shortage. Rich countries will be able to afford the higher prices for longer and the armed forces to secure the trade routes. But what can we do for ourselves meanwhile? We are back to farmyard manure. Apply plenty of it to your soil every year, keep the phosphorus content high as well as the organic matter and all 19 vital trace elements. A little self-help in this way will bring a high likelihood of health benefits and enable us to keep our heads while those around are losing theirs.

Happy gardening!

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