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Ecologists warn the planet is running short of water

Leo Lewis in Tokyo

Graphic: water usage

A swelling global population, changing diets and mankind's expanding "water footprint" could be bringing an end to the era of cheap water.

The warnings, in an annual report by the Pacific Institute in California, come as ecologists have begun adopting the term "peak ecological water" — the point where, like the concept of "peak oil", the world has to confront a natural limit on something once considered virtually infinite.

The world is in danger of running out of "sustainably managed water", according to Peter Gleick, the president of the Pacific Institute and a leading authority on global freshwater resources.

Humans — via agriculture, industry and other demands - use about half of the world's renewable and accessible fresh water. But even at those levels, billions of people live without the most basic water services, Dr Gleick said.

A key element to tackling the crisis, say experts, is to increase the public understanding of the individual water content of everyday items.

A glass of orange juice, for example, needs 850 litres of fresh water to produce, according to the Pacific Institute and the Water Footprint Network, while the manufacture of a kilogram of microchips — requiring constant cleaning to remove chemicals — needs about 16,000 litres. A hamburger comes in at 2,400 litres of fresh water, depending on the origin and type of meat used.

The water will be returned in various forms to the system, although not necessarily in a location or at a quality that can be effectively reused.

There are concerns that water will increasingly be the cause of violence and even war.

Dan Smith, the Secretary-General of the British-based peacebuilding organisation International Alert, said: "Water is a basic condition for life. Its availability and quality is fundamental for all societies, especially in relation to agriculture and health. There are places — West Africa today, the Ganges-Brahmaputra river system in Nepal, Bangladesh and India, and Peru within ten years — where major changes in the rivers generate a significant risk of violent conflict. Good water management is part of peacebuilding."

David Zhang, a geographer at the University of Hong Kong, produced a study published in the US National Academy of Sciences journal that analysed 8,000 wars over 500 years and concluded that water shortage had played a far greater role as a catalyst than previously supposed.

"We are on alert, because this gives us the indication that resource shortage is the main cause of war," he told *The Times*. "Human beings will definitely have conflicts over this."

Although in theory renewable sources of water were returned to the ecosystem and their use could continue indefinitely, Dr Gleick said, changes in the way water was exploited and how its quality degraded meant that methods of processing it would become more expensive.

"Once we begin appropriating more than 'peak ecological water' then ecological disruptions exceed the human benefit obtained," Dr Gleick said. Defined this way, many regions of the world had passed that peak and were using more water than the system could sustain.

A significant part of the problem is the huge, and often deeply inefficient, use of water by industry and agriculture. UN calculations suggest that more than one third of the world's population is suffering from water shortages: by 2020 water use is expected to increase by 40 per cent from current levels, and by 2025, according to another UN estimate, two out of three people could be living under conditions of "water stress".

The World's Water report sounds a particularly strong note of alarm over the state of water usage and pollution in China, where rampant economic expansion has overtaxed freshwater resources and could even begin to threaten stability.

"When water resources are limited or contaminated, or where economic activity is unconstrained and inadequately regulated, serious social problems can arise," wrote Dr Gleick, "and in China, these factors have come together in a way

that is leading to more severe and complex water challenges than in almost any other place on the planet.”

Drop by drop

— Water footprint calculations are still only rough. They differ around the world and depend on climate, soil types, irrigation methods and crop genetics. The water footprint of different meats depends on what the animals are fed and the relative “thirst” of the crops used to feed them

— The amount of water required to produce a single litre of soft drink may be only three or four litres, but vast quantities are used to produce the sugar and corn syrup feedstocks. For example, one kilogram of paper requires 125 litres of water to process, but that excludes the water needed to grow the tree

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