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Claus Leitzmann on The Limits to Growth

The first task is to conserve the world

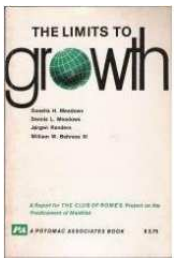


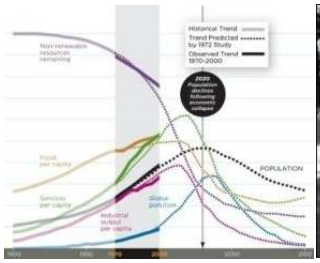


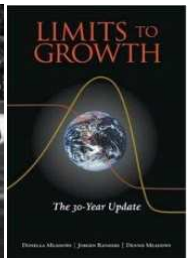




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Claus Leitzmann (top pictures, left and right) is from Germany. He was treasurer of the Federation of European Nutrition Societies 1990-1997, and of the International Union of Nutritional Sciences 1997-2005. After working in the US, and then Thailand (Mahidol University, Bangkok, and Chiang Mai) he joined the Institute of Nutritional Sciences at Justus-Liebig University, Giessen, and became professor of Nutrition in Developing Countries, and then director of the Institute. His 700 publications include authorship or co-authorship of 28 books, two shown above (top pictures). He convened the *New Nutrition Science* meeting at the University of Giessen in 2005 (second from right). He has chosen *The Limits to Growth,* first published in 1972, whose 30th anniversary sequel was published in 2002.. The covers of these editions are shown above (left and right), together with a figure projecting a warning of the consequences of what then was and now is the overuse and abuse of natural resources. Authors of the original edition, including Dennis and Donella Meadows, then working at the Massachusetts Institute of Technology, are shown above.

For forty and more years now, my inspiration to work for a sustainable future for humankind has come from the book *The Limits to Growth,* first published in 1972 (1). The authors, then based at the Massachusetts Institute of Technology (MIT), analysed the consequences of unchecked economic and population growth in the light of finite resource supplies, with the best computer-aided calculations and projections then available. Their book rediscovered the wisdom of the term 'sustainability' originally conceptualised by Carl von Carlowitz in the 17th century (2).

As a father of four children, the authors' sobering predictions motivated me to broaden the basis of my view of the world and especially of nutrition, far beyond the human health and disease implications typically associated with eating and drinking.

Growth outpaces resource

The purpose of *The Limits to Growth* was – and remains – to explore how exponential growth interacts with finite resources. The authors simulated the consequences of interactions between the earth system and the human system. In their model, five variables were examined under assumptions similar to those made earlier by Thomas Malthus, that any growth increases exponentially, and that the ability of technology to increase the availability of resources grows only linearly. Malthus said in 1798, when the total human population was 1 billion: 'The power of population is so superior to the power of the Earth to produce subsistence for man, that premature death must in some form or other visit the human race' (3). The human population in 1972 was just over 3.5 billion. Since then it has doubled to over 7 billion.

The authors went beyond population. They explored the potential for a sustainability that could be achieved by altering the growth trends of five variables. These were – and are – world population, and industrialisation, pollution, food production, and resource depletion. Their warning was less dramatic and more broad-based than that of Thomas Malthus, but just as ominous. They said of the five variables above, as indicated in the graph in the strip of pictures above: 'If the present trends…continue unchanged, the limits to growth to life on this planet will be reached some time within the next 100 years' (1).

Two scenarios indicated overshoot and collapse of the global system by the mid- to later part of this 21st century. One scenario resulted in a stable global system. But this would require radical change in human activity.

The predictions made by the authors were well received by some and were criticised by others. However, comparison of the predictions made in 1972 with the current situation 40 years later, shows that the evidence we now have confirms and reinforces the projections for all five variables. If the present global system continues in the same direction and at the same speed as in the last decades, its collapse will indeed occur in the second half of the 21st century.

My own journey

So that readers can fully understand how this warning has influenced me personally and professionally, I would like to share the following events that have shaped my life course.

My childhood in Germany before, during, and after the Second World War was characterised by severe deprivation of food, water, clothing, electricity, and everyday items. Those years taught us to be frugal in every aspect of our lives. We lived very simply. One could almost say it was a 'sustainable' way of life, although nobody used that word at the time. My apprenticeship as a gardener in different parts of Germany and Switzerland broadened my view beyond the small agricultural village where I was raised in northern Germany. These years of intense contact with the soil, plants, and animals, deepened my understanding of the biological cycles of nature with their inherent sustainability.

The chance to emigrate to the USA opened a new world of prospects in what we all then envisioned as 'the land of unlimited opportunities'. I enrolled in an undergraduate programme in biology specialising in botany, since I had solid practical experience in that field. Sustainability continued to be a determining factor in my college years, during which my wife Ilse and I started our family.

I then switched to chemistry to learn more about the inner workings of plants. After my BSc in chemistry at Capital University, Columbus, Ohio, I turned to microbiology and genetics for my MSc to obtain an even closer look at the keys of life, and received a PhD in biochemistry, both at Minneapolis at the University of Minnesota. Then as a postdoctoral fellow at the University of California at Los Angeles with Paul Boyer, later a Nobel prize laureate, I had the opportunity to apply my knowledge to understanding the process of energy production in the cell.

From work at cellular level I then decided to return to a whole systems approach. That opportunity arose with an offer by the Rockefeller Foundation to work as a lecturer at the newly-founded Mahidol University in Bangkok, Thailand. This offered insight into an economically undeveloped country, which Thailand was at that time. The relative wealth in Bangkok was stark contrast to the widespread poverty, limited resources, and hard physical work of the rural population, which reminded me of my childhood in Germany.

After rereading the 1962 book *Silent Spring* by Rachel Carson (4) and similar reports published in the 1960s, I became aware of the potential hazards of pesticide use, and wrote my first paper on the dangers of DDT. Because of the ongoing war in neighbouring Vietnam, I became aware of the military, political, and economic scheming that went on – and goes on – all around the globe.

When I then became chief of the laboratories at the Malnutrition and Anemia Research Centre, in Chiang Mai, northern Thailand, it was *The Limits to Growth* that kept me motivated to contribute to a sustainable future for humanity. I recommended production and consumption of seasonal and local food instead of the industrialised products that were beginning to appear in the local markets.

I returned to Germany in 1974 as professor of Nutrition in Developing Countries at the Justus-Liebig University of Giessen, named after the founder of modern nutrition as principally a biochemical discipline. This gave me the opportunity to address some of the issues in *The Limits to Growth*. My training in botany, chemistry, microbiology, genetics, biochemistry, and nutrition, combined with my experiences in three very different regions of the world, enabled me to develop a broad concept of nutrition.

Reasons for hunger

Thus, my lectures dealt with the existence of and reasons for hunger in many regions of the world. The roots of hunger include poverty, natural disasters, climate change, and civil wars. But much of the hunger in economically developing countries is caused by interference with the natural resources that are the basis of their life. Those of us who are in the global North are co-responsible for processes that cut down their rain forests and that displace human food crops by soy and other fodder to fatten the animals in our economically rich countries. We export our government-subsidised surplus foods into impoverished countries, with the result that the local farmers' income bases are undermined and destroyed. And it is the rich and powerful countries that have created the present world trade system that predominantly favours our selfish interests.

As from the 1970s, strong support for my ideas on sustainability came from my students, and I learned much from them. They were disappointed with the limited view of conventional academic nutrition science. They had also been motivated by *The Limits to Growth* and similar publications. Together, we developed our concept of 'wholesome nutrition' based on earlier work by Werner Kollath (5). In addition to health aspects, we integrated social, ecological and economic dimensions into nutrition. We introduced the term *Ernährungsökologie* (nutrition ecology) without then being aware of the work of Joan Dye Gussow, who had written her book *The Feeding Web – Issues in Nutritional Ecology* in 1976 (6).

An important impetus for our work was the Earth Summit in Rio de Janeiro, Brazil, in 1992. Delegates from more than 150 countries signed a resolution that poverty and injustice must end. It became clear that economic and ecologic interests do not need to be mutually exclusive. After that conference, the term 'sustainability' became a frequently used expression – but unfortunately not with many real practical consequences.

At the beginning of this century a new opportunity to advance the holistic view of nutrition came from Mark Wahlquist, president of the International Union of Nutritional Sciences 2001-2005). Mark invited me, with Geoffrey Cannon, to set up an IUNS task force on 'eco-nutrition'. After some thought it became clear to us that the term 'eco-nutrition' suggested no more than a new branch of nutrition, and in any case did not encompass social, political and economic phenomena such as globalisation, food and nutrition insecurity, inequity between and within countries, and the linked fuel, food and financial crises. What was needed, we realised, was a new conceptual framework, definition and principles for the whole of nutrition.

For me the starting points for this ambitious work were the concepts of wholesome nutrition (7) that we had initiated in the 1970s, and of nutrition ecology (8) developed in the 1980s. These include social, ecological and economic dimensions together with health. Our concepts embraced agricultural production (including machinery, energy, fertilisers, pesticides) and food systems (including production, harvesting, preservation, storage, transportation, processing, packaging, trade, distribution, preparation, composition, consumption, and disposal).At every step, decisions taken determine whether sustainability is hindered or helped.

The new nutrition

Then in 2005 I had the special privilege and opportunity to convene the historic four-day workshop conference at the Rauischholzhausen Castle near Giessen. Participants are seen in the top strip of pictures above (second from right). One important aspect of the workshop was the participation of experts from a great range of fields from agriculture to philosophy, biology to finance, epidemiology to medicine. They included the current president of the International Union of Nutritional Sciences Ibrahim Elmadfa, and the president of the World Public Health Nutrition Association Barrie Margetts. Other participants included *World Nutrition* contributors Colin Tudge, Tony McMichael, Tim Lang and Michael Krawinkel, as well as my co-convenor and now *WN* editor Geoffrey Cannon. Our work culminated in the *Giessen Declaration* (9). This integrates all aspects of human activity that interact with food and nutrition.

The Giessen Declaration was presented at the 18th International Union of Nutritional Sciences congress in Durban later in 2005, and was published as part of a whole special issue of *Public Health Nutrition* (10). The concept of the *New Nutrition Science project*, as it is termed, is now part of the vision for a sustainable future. Eight years later, it is commonplace to identify nutrition as a biological, social, economic, and environmental discipline. This new thinking incorporates the social determinants of health and now shapes international global development plans.
To be fully achieved, this vision needs to be expressed personally. One priority is to increase the production and consumption of seasonally available plant foods. In

addition to international organisations, governments and industry, it is people as citizens and also as consumers who are shaping the future of our planet. We can see every food purchase as a ballot for the quality of our life and that of our children and of future generations.

The initial inspiration of *The Limits to Growth* after its original publication over 40 years ago, continues to influence my thinking and behaviour. Its sombre message surely needs to guide global and national policy and practice. I am also motivated by my five grandchildren, and by thousands of former students who carry the banner of sustainability forward on behalf of the next generations. The course of my professional and my personal life has been influenced by my own deeply held convictions, rooted in my childhood. Destiny has been kind to me. I am able to interact with friends and colleagues at local, regional, and global levels. Together I feel we are continuing to raise consciousness of the imperative need to conserve the world.

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Editor's note

Inspiration is a new *WN* feature. Contributors are invited to choose and write about the document that has most impressed and moved them in their life and work. The choice can be from this year, or ten or a hundred or thousands of years ago. It need not be explicitly about nutrition or public health, but it should be offered as inspiration to *WN* readers in their own thinking vision and work. The document should be available in pdf form. Please send suggestions for this page to wn.network@gmail.com.