

Science for the Long-Term Future

John Scales Avery (john@ccs.ki.ku.dk)

H.C. Ørsted Institute
University of Copenhagen

Learning in the Perspective of Complex and Long-Term
Change, Vancouver, May 28-31, 2007

Exponential growth of science

- Traditionally, science was performed in an academic environment, and its main aim was to understand the laws of nature.
- Before the mid-20th century, science could be supported by university budgets. Some scientists, for example, Brahe, Lavoisier, Boyle and Darwin, were wealthy men who financed their own research.
- Because of the exponential growth of science and the increasing cost of scientific equipment, university budgets are no longer sufficient to support research.
- The new patrons of science and engineering are industries and national military establishments

Soldiers in the laboratory

- Industries are not ideal patrons for research because they aim at the development of new products that are not necessarily needed. Often the results of industrial research are not published.
- Military establishments are still worse as patrons of research since the results are used in directly harmful ways.
- Eisenhower warned against the power of the military-industrial complex. Today he would call it the military-industrial-scientific complex.
- We must redirect the aims of science to fundamental research and to solving the urgent problems facing humanity.

Science for human needs

- Resurgence of infectious disease
- Renewable energy
- Climate change - mitigation and adaptation
- Food security
- Peace research and governance

Resurgence of infectious disease

- HIV/AIDS will grow to 50-75 million cases by 2010.
- Approximately 2 billion people are today infected with TB.
- Every year there are 300 million cases of malaria.
- Pharmaceutical companies neglect research on tropical diseases because they think that it is not profitable.
- Disease causes poverty. Poverty causes disease.
Research on tropical diseases will help to reduce global economic inequality.

Renewable energy

- The Hubbert peaks for oil and natural gas will occur within a few decades.
- After the Hubbert peaks the prices of these resources will rise steadily.
- Because coal will be used to make liquid fuels, its rate of use will increase.
- The fossil fuel era will be over in about 100 years.
- Large-scale research on renewable energy is urgently needed.

Climate change - mitigation and adaptation

- Adverse effects of climate change include aridity and crop failures in grain-producing regions, ocean level rise, loss of biodiversity, violent weather, new epidemics.
- Climate change is a very slow and long-term process. Melting of the polar ice caps and ocean level rise will not be complete for many centuries.
- Global warming can be mitigated by switching to renewable energy, carbon sequestering, switching to public transport, and reforestation.
- Countries like Bangladesh will soon need aid for adapting to the effects of ocean level rise.

Food security

- Modern petroleum-based agriculture will be hard-hit by rising oil and natural gas prices and by climate change.
- Energy inputs to modern food systems are very high, for fertilizers, farm machinery, transportation, packaging and distribution.
- Monocultures are vulnerable to plant diseases.
- Population stabilization will be needed to avoid severe future famines.
- Agricultural research is of great importance.

Peace research and governance

- Because of the destructive power of present and future weapons, a stable future world must necessarily be a war-free world.
- Compared with the trillion dollars that the world spends each year on war, the amount now spent on peace research is negligible. This field of research must be given the support that it deserves.
- Studies of international law and the histories of federations would be valuable guides to constructing a reformed system of global governance.

UNESCO as a patron of science

- If it had sufficient money for this purpose, UNESCO would be an ideal patron for science.
- UNESCO could direct research towards urgent human needs.
- UNESCO could encourage international cooperation in research.
- The prestige thus gained would help the United Nations to solve global political problems.

The Tobin tax

- Among the methods that have been proposed for giving the United Nations and its agencies sufficient money to perform their tasks properly, the most promising is the Tobin tax.
- The Tobin tax is an extremely slight tax (a small fraction of a percent) on exchanges between international currencies.
- Despite the small size of the Tobin tax, the amounts involved in currency exchanges are so large that it would give the UN several hundred billion dollars annually.
- This would allow UNESCO to become a patron of scientific research. National governments might choose to support UNESCO in this role with the contribution of additional funds.