

# What are our expectations from the sustainability science?

László SZARKA

geophysicist,

Member of the Hungarian academy  
of Sciences

# Summary

**1. Earth's resources:** a) fossil energy: decreasing; the renewables are not able to satisfy the present demands; b) rare earth metals in future might be unavailable

**2. Groundwater:** the reservoirs are diminishing, since the freshwater consumption is much larger than the refilling of the subsurface reservoirs

**3. Soil:** the Earth is hardly able to feed ~9 billion people, predicted for 2040, but on the price of ecosystems and biodiversity, and there is no room for biomass production

$\Sigma$ : **Earth and Life:** the global ecological system is at risk. We are all at risk!

- **Climate changes:** a) The Earth's history is not else than history of climate changes, b) the Homo sapiens seems to be one of the agents of the environmental change

- **Geohazards (environmental catastrophes):** the increase of number of catastrophes is of anthropogenic origin

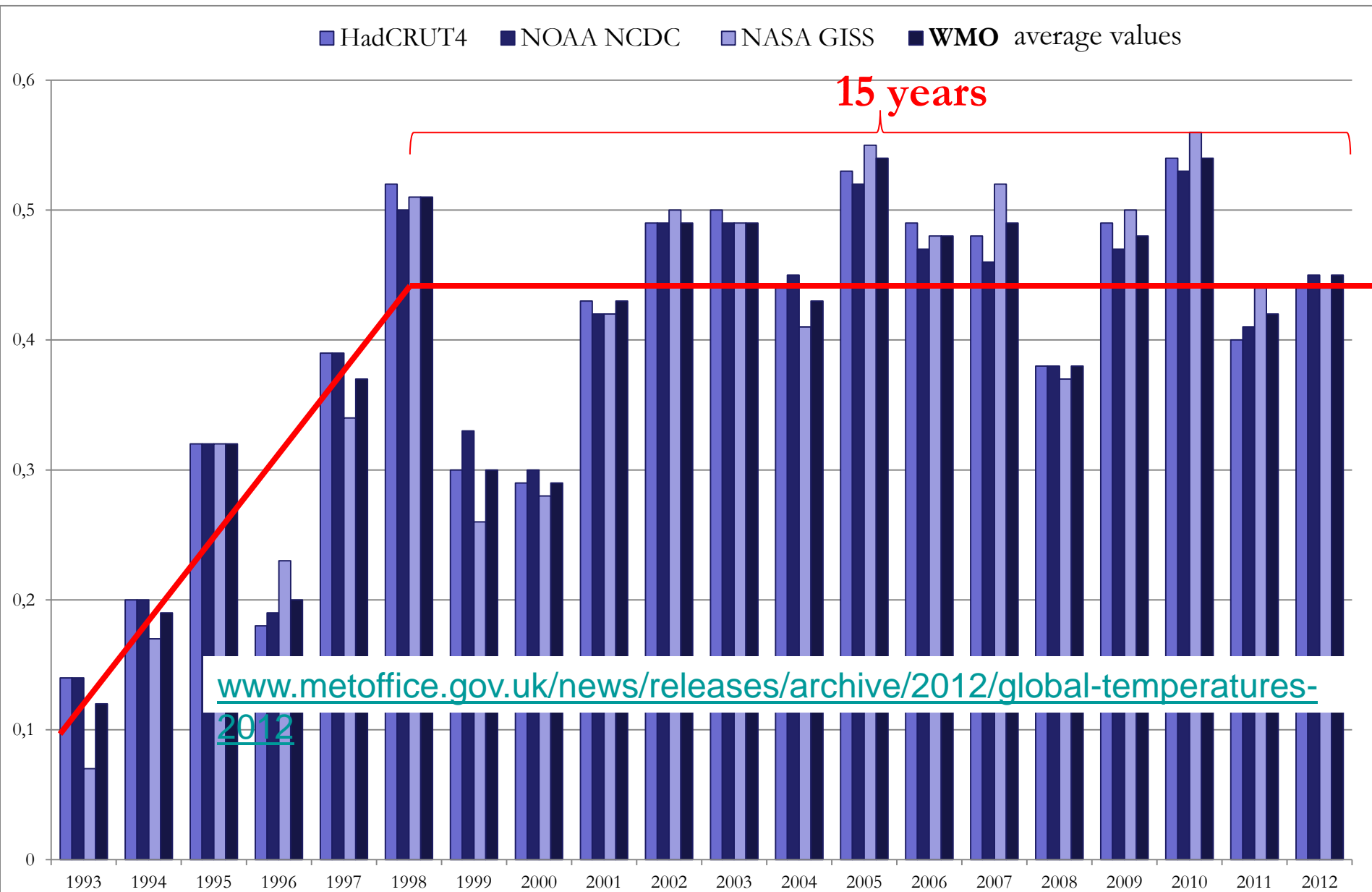
- **Earth and Health:** a better co-operation between geologists and physicians would be required

- **Megacities** are not sustainable

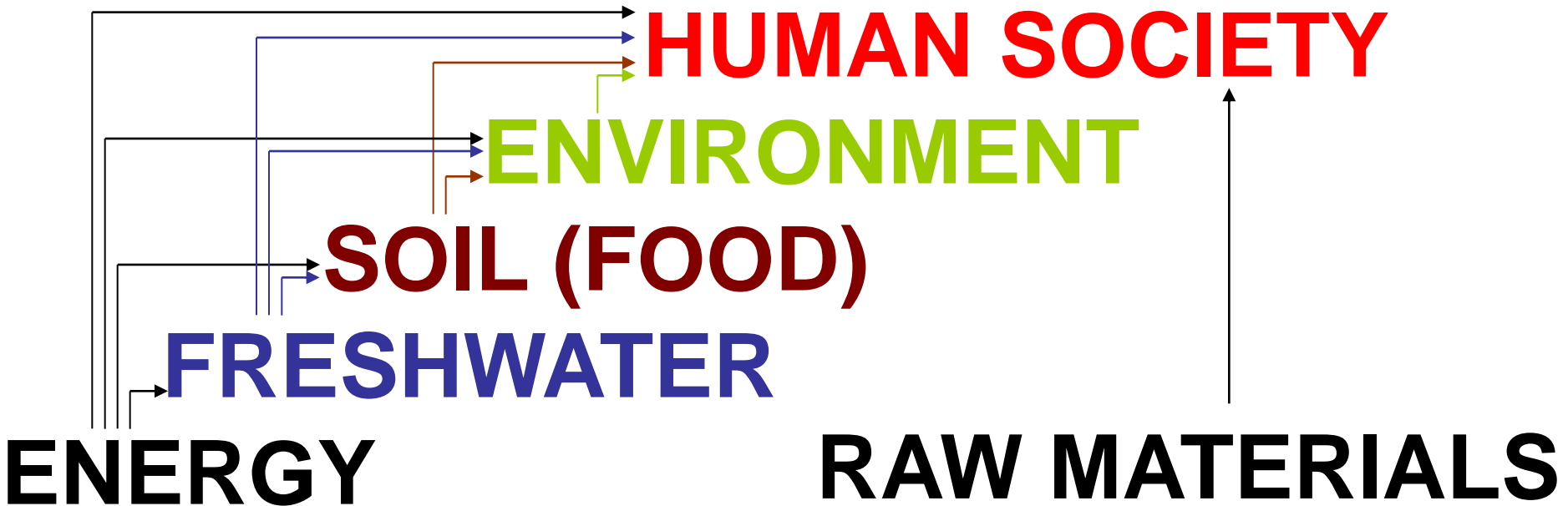
- **Oceans:** the future is full of surprises (1. biology, 2. resources, 3. environmental risk)

- **Deep Earth:** slow, permanent changes

**Global mean annual temperature values between 1993-2012 on basis of HadCRUT4, NOAA NCDC és NASA GISS data published by Met Office, as a difference of the mean global temperature between 1961 and 1990 (14.0 °C)**



# ORDER OF „IMPORTANCE”



Similar to Smalley's classification

"Anyone who believes exponential growth can go on forever in a *finite* world is either a madman or an *economist*."

(Kenneth Boulding, 1910-1993)



(i) **Dynamic Planet** - understanding how planet Earth is changing due to natural phenomena and human activities. The emphasis will be on observing, explaining, understanding, projecting Earth environmental and societal trends, drivers and processes and their interactions as well as anticipating global thresholds and risks. Building on existing knowledge, there will be a particular focus on interactions between social and environmental changes across scales

(ii) **Global Development** - providing the knowledge for addressing the most pressing needs of humanity including sustainable, secure and fair stewardship of food, water, biodiversity, energy, materials, and other ecosystem functions and services. The emphasis of this Future Earth research theme will be on understanding the impacts of human activities and environmental change on the health and well-being of people and societies and on the interactions of global environmental change and development.

(iii) **Transformations toward Sustainability** – providing the knowledge for transformation toward a sustainable future: understanding transformation processes and options, assessing how these relate to human values and behaviour, emerging technologies, and economic development pathways, and evaluating strategies for governing and managing the global environment across sectors and scales. The emphasis of Future Earth research will be on solution-oriented science that enables fundamental societal transitions to global sustainability. It will explore what institutional, economic, social, technological and behavioural changes can enable effective steps towards global sustainability and how these changes might best be implemented.