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Science in Ecologically Sustainable Societies

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When discussing general priorities of action in order to overcome the ecological crisis, supporters of the deep ecology movement inevitably disagree to some extent. One reason is divergent visions about future ecologically sustainable societies. Or disagreement is due to divergent time perspectives. One participant has in mind actions in support of a fairly probable state of affairs in a comparatively near future, another may think of a highly imaginative state of affairs perhaps centuries distant from our time. In this discussion, I shall start with disagreements about what the participants mean by the word *science*. I say “the word” because the participants have very different things in mind.

Some supporters paint a dark picture of what they call “natural” science. “The less of it, the better.” Others draw a clear distinction between the so-called natural sciences—primarily physics, chemistry, and mathematics—and the humanities, accepting the latter, for instance, history and archaeology.

There are today millions who would gladly spend a considerable part of their personal Gaia gift for certain types of research. Suppose society A, on the way to sustainability, introduces tough legislation and financial policy with the result that a new more powerful telescope cannot be financed. There is a minority in A who believe that their astrophysical research requires this telescope to solve some, according to them, extremely important problems. They persist in applying for funds, but to no avail.

One way to resolve the conflict is to ask people who are eager to support continued development of telescopes to inform others about their attitude. Say five per cent of the population are positive, that is, one million out of 20 million. If they, through their money grant (a kind of tax on the telescope), or through work hours in sustainability-increasing prospects, or through lowering of their energy use, reduce

their contribution to unsustainability, the telescope project should be accepted. The Gaia budget permits it. The average per-capita contribution towards sustainability is not diminished, in spite of the production and operation of the telescope. Evidently, the long way to go permits variations. Some are vitally interested in big musical instruments like pipe organs, others in telescopes.

Some people reject every kind of industrialism, wishing that there should be *no* factories of the modern kind; others require very strong limitations. Even such tasks as restoring old paintings today depend upon a kind of scientific enterprise that was created and melded by the wasteful Western economy. As I see it, the necessary tool of effective restoration of valuable old paintings today is contemporary science, but that does not imply an amount of energy (E) and resources (R) that is in itself excessive. That is, my norm and value priorities accept the ER involved. So does that of saving the art treasures of Venice.

There is no necessary link between contemporary mathematics, physics, and chemistry and the vast modern scientific *enterprise* in general. There are formulae discovered by the weapons industry, for instance formulae discovered in the 1930s and 1940s by theoreticians hired to make atomic bombs, which can be used without making bombs. This does not imply that the actual contemporary use of formulae is politically "neutral" (whatever that may mean). But I cannot see a justification for a conclusion that there are inherent unecological features attached to every contemporary use. Also I see the justification of publishing such a conclusion using the very "science" the author warns against. But I do not accept a certain kind of determinism: that a tool, whether a formula like $E=mc^2$, or a tool like the Wilson Chamber, should have a power of supporting the contemporary kind of wasteful scientific enterprise. The gigantic research and development budgets of the leading industrial states could be cut to one per cent of their size without endangering, for instance, the use of some parts of contemporary science in the battle against ecological unsustainability. An example is the use of solar energy.

What I find very doubtful is the generalization of the specific character of contemporary, very special scientific enterprise to every kind of future scientific enterprise, for instance a Spinozistic scientific enterprise. What is the chance of realizing a Spinozistic scientific enterprise? Small, it seems, but not zero.

It is always difficult to make clear whether something we say is part of a description of a utopia we cherish, or part of a program to fight the

ecological crisis. I trust that the many things said against science and the use of science are warnings against misuse of research efforts.

Suppose five per cent of the members of a society with 20 million people ardently wish to devote their spare time to that enterprise. They may ask for a big telescope. Let us say its energy and resource budget when distributed among the one million require ten per cent of their “Gaia budget.” If only 250,000 people urgently asked for it, it would require 40 per cent, and would be prohibitive, resulting perhaps in supporters starving or living in tents. Suppose though, that they are willing to eat porridge twice a day and never travel except by bicycle and so on; their lifestyles would require so much less than the average in a green society as pictured in today's utopias, that it would permit the construction of a formidable telescope.

Suppose the beautiful old myths about stars are revived, and myths about a certain beautiful little patch of light in the Andromeda-region gets its appropriate myth, appreciated deeply by the millions who contemplate the heavens and everything they see. If now a tiny minority says the patch is a world of stars far away, I think it only just to let this be treated as a new myth, and not be prosecuted as a mistake. But what if the sincere and devoted believers in the Andromeda Galaxy myth say that there are probably more than a hundred thousand million stars there? “Quantification! An absurdly big number!” some would say.

A minority following an old Indo-European tradition defend the quantifiers. Many even bigger numbers are holy! Actually, if we read Sanskrit dictionaries it is astonishing how many words, at least hundreds, are proper names of enormous numbers. *Sagara*, according to one usage, means the same as our word *ocean* in a geographical sense. But *sagara* is also the name of a definite big number. Descriptions of mythical events often contained quantifications. Different from old Greek mythology, rarely *big* numbers, but often number mysticism. And the tradition of Pythagoras, that everything is number, continued through the Western Middle Ages and is very much alive today. Extreme anti-quantification attitude is a Western phenomenon.

Therefore, some of us try to see how research and quantification function within different total settings, trying to verbalize parts of total views characteristic of the cultures. Today, the myth of material, unstoppable, global economic growth seems to dominate the life of people in the materially rich cultures. Its notion of being productive is separated from satisfaction of vital needs, discarding the dictum

“enough is *enough*.” All other myths and actions in harmony with them are classed as unproductive, whereas the manufacturing and constructing of things, especially big ones, are seen as eminently productive. The notions of production, productivity, and ways of production (Marx) do not refer to caring, to serve each other's vital needs in real communities. Because research and science have been used with extraordinary success in perverted kinds of products, a negative attitude towards them has developed.

The historical knowledge about Babylonian, Chinese, Indian, and the sciences of other great cultures, including their “hard” sciences, is today considerable, but has little influence on what is taught in schools. Western provincialism dominates and is now exported worldwide. It has been uniquely successful in the use of thinking in terms of models and also in specifying rules of testability—interpersonal, intercultural rules how to test hypotheses and theories. The colossal threat is due to its focus on mindless economic growth. Only a tiny, practically vanishing, fraction of research and development budgets goes to research done in a Spinozistic spirit. Studies dealing with humans’ deep *attitudes* towards nature and of how they could be changed, just to mention an example, are neglected or not even seen as relevant in most schools, universities, of privately financed research institutions.

Research on rainbows using the conceptual framework of mathematical physics seems to some people to reduce the status of the rainbow. Perhaps they think that a certain kind of view about what is, or the most real, an ontology of such a kind, is implied. That is, they perhaps think that the very methodology implies a certain kind of ontology. And the ontology believed to be implied is attributing higher status of realness to the physical abstraction than to what is perceived spontaneously. An answer in terms of physics is thought to assert what the rainbow *really* is in contrast to what it seems to be.

But what could be in the methods, the procedures, and the actions the physicists use or perform, that necessitates the assumption of an ontology, a doctrine, of realness, of such a kind? I cannot find anything of the sort. I do not believe that people who have such views about mathematical physics should, in green societies, get the power to refuse grants to research in physics.

Five per cent of the population transferring part of their personal Gaia budget to cover the ecological expenditure required in cosmology and physics is, in my view, an admirable procedure. Their personal lives will be ecologically more modest than the required average of the

member of their society. They “pay” what research “pollutes” by not using the full amount of their personal Gaia gift for personal affairs.

Other groups of the society may be enthusiastic about other kinds of ecologically expensive activities. Some wish to travel far every year. Others love ecologically expensive vehicles, but see to it that they use them sparingly, trying to use their bikes as much as possible and in other ways make up for the great ecological cost of the fabrication of the vehicles.