CHE lecture, 13th November 2001. Ulrich Loening

Strike-out omissions as made in lecture, indicated in GREEN

4. Nothing exceeds like success

The successes

The success is clear to all – the large human population on the planet represents the largest number of individuals of any large animal ever in the whole evolutionary history of the Earth. This alone is unprecedented. It is clear that the equally unprecedented use of resources, per person as well as a whole, is not sustainable unless something changes from current directions to new ones. Even those who consider that more of the same inventive technologies that have led to the problems will succeed in solving them, do agree that there is a problem. I will illustrate the excesses below.

Odstraněno: first

Odstraněno: Most of the increase occurred in just the last 200 years, with a doubling of numbers from 3bn to 6 bn in the last 50 years or less. Whether or not this amounts to the excess that it seems to be, is a question we have to examine.

The problem is not just the large growth of populations; it is also of course, the growth of the use of resources of all kinds, made possible through continuously developing technologies. Indeed without such technology, the Earth could not support the large human population. That alone is evidence enough that never before in the planet's evolution have there been so many large animals of one species – the intelligence and tool-making of the human species is unprecedented.

I want first to put the growth into the context of nature, Every single organism, be it a bug, fungus, plant, insect or higher animal, is capable of breeding very much more rapidly than in practice is achieved or can be contained. Families of 12 or more children were not uncommon. But being human, we do have a certain amount of choice in the matter. An oak tree doesn't; or doesn't seem to. A large oak, growing for say 400 years, must produce millions of acorns. Shortened: Yet on average only one (or even less under conditions of deforestation) ever becomes a mature oak. You might consider the purpose of acorns to be to grow more oaks; the proverb we use appears apt. Yet in reality, an acorn growing into an oak tree is an extremely rare event. A simpler description would assign the role of acorns to feeding squirrels, or maggots, mice, or pigs, fungi, bacteria and a host of scavengers. And indeed, the earth would not endure as it does if these functions of feeding, rather than reproduction, did not occur as the major product of seed. Breeding success is quantitatively minor but almost infinitely expandable – feeding something is quantitatively vital.

Odstraněno: in some attempt to see whether humans are unique in this respect and whether their numbers does indeed constitute excess.¶

In every case, for every species in all of nature, the potential to breed far exceeds the capacity of the earth to sustain. Their numbers are maintained by the complexities of interaction in nature, that I described in other contexts in earlier lectures. Most species in practice do not outbreed their habitats. Modified: Of course there are ups and downs, there may be occasional plagues when something changes thorugh an upheaval, or humans upset the balances by cultivating crops or felling

trees. And occasional catastrophic collapses in population of a species, which then gradually recovers. In general, vast excesses do not occur and if they do are not maintained for long periods.

Conclusion here: the potentials for successes are built in, and in nature the controls that maintain those successes without creating damaging excesses, are also built in.

The growth of the human population as seen at this level, is not a question of mind-set or ethics – it's a fact of nature; even plants try, as it were, to over-produce. Only, with humans, the controls have been overcome.

Cartoon, other infrastructure wallpaper

The Excesses

The word Excess is a relative term. It implies danger or damage as a result of something having got too big or extended compared to a base which is not dangerous. If the human population is too large, it means that it has reached proportions that cause damage to the world and can no longer be supported. The comparison has to be to the planet, to nature. Excess defines an aspect of carrying capacity, which may not be just in numbers of individuals, it can equally be in impacts, effects, activities which threaten trouble. The model could be the Plimsol line in a boat. There are two requirements for the boat to float: one is that it is not over-loaded – down to the Plimsol line is safe provided that the load is evenly spread. The other is that the load be evenly spread; if all is on one end, the boat will tip and sink. This model serves exactly for comparison between human activities and nature – the carrying capacity for humans on the Earth depends on numbers and technologies and on how these are distributed – concentration often leads to as much problem as total amount.

I'll illustrate with some examples.

What makes the human species so different that it causes damaging excesses?

The first of course, are the sheer quantities of stuff that the human population transforms. Excess quantity turns what was a circular flow of resources into a linear flow from resource to waste. There are lots of these, where human action has so increased that natural cycles are exceeded.

a) one is the cycles of carbon dioxide, just at this moment the subject of active political negotiation in Marrakech. The flow of carbon dioxide between land, sea and air is huge in nature. Yet a relatively small extra input from fossil fuels, deforestation and various land uses like agriculture, have combined to create an excess part of which is accumulating in the atmosphere. This by any criterion is excess and damaging. We are down to the Plimsol line.
b) Another is the product of agriculture. There are two major ones, of which food is only an intermediate product: one is the human

Odstraněno: ¶
Complex controls, as by poisons and antibiotics. Etc¶

Odstraněno: is

Odstraněno: The first obvious

population itself and the other is sewage. Of all the cycles of nature that maintain life on earth, a universal one is the return of the waste products of animal metabolism to the soil. But the major stock on the world's agriculture is human. The Chinese maintained their agriculture for forty centuries by cycling this asset. Industrial societies have turned most of it into a waste. This is crazy, given that we now have the knowledge and bio-technology to manage the recycling even for such an excessive population and amount, without causing the diseases and problems associated with sewage from concentrated human habitats. Agriculture and its products have grown to be an excess, in the way we operate.

c) A parallel flow that has become an excess is the chemical input to farming and the direct pollution, not through humans, that flows out. Nitrogen fertiliser, which itself causes disease problems on the farm, also causes pollution of water beyond the farm. In many places, this has become one of the main polluter of clean drinking water.

d) Of course, there are many other flows, natural and artificial ones, which by passing through the human economy, create wastes. We should note, that there is no "away" to which waste can be thrown. Waste is both a waste of resources and a source of long-term trouble. It is always an excess in itself, however large or small the amounts. Quantitatively small ones would include, e.g., the hormone mimics of industrial chemicals that have spread all over. Junk mail cartoon.

e) Nature is not free of waste from linear activities. It is a question of time and space. Practically all biological wastes are recycled and never constitute an excess. But some are so slow that they constitute a linear flow. One of these is the micro fauna of the sea, whose dead bodies sink to the bottom as calcium carbonate, taking huge amounts of carbon out of the cycle, and only return as chalk cliffs in geological times later.

These are the material aspects of excess. There are more subtle ways in which industrial society causes excesses, beyond the flow of resources and concentration of materials in damaging ways. Here are some examples:

1. The use of antibiotics in medicine and in animal farming has created such resistance in bacteria that many have become useless for medicine. I'll drive this point home: in thirty years of human use, 3 billion years of evolution have been challenged. This is by any measure, excessive. Inappropriate use has led to loss of value and to eating up some of the capital of the biosphere, the subject of my first talk. There is another aspect for agriculture: here are natural substances that can be used safely for the control of certain bacterial diseases. This is one of the dreams for organic agriculture, yet the Organic Standards do not permit the use of antibiotics except in extreme circumstance of animal suffering or incipient death. Why not, if they are such mild and safe natural cures? What could be better?

Odstraněno: Every farmer understands this, and up till recently all returned their cattle and sheep waste to their farms. Indeed, this is the major part of the nutrient cycles in a traditional or now organic farm. Only about 10% of the farm's productivity is brought in and goes out as food; 90% cycles within the farm, and improves the soil as a "by-product", one that we desire and therefore call a product. The whole of the wild animal community does the same. It is difficult but possible with modern understanding of nutrient flows, to run a farm without animals, without their stock. Of course, there still is stock even then, as worms and other soil fauna, which add up below ground to as much animal weight as a cow above soil.

Odstraněno: .

Odstraněno: New antibiotics have constantly to be invented and discovered. To put this into perspective, antibiotics have been made by fungi and bacteria for most of the time of life on Earth, by which they control, inhibit and stimulate each other – part of the systems of the ecosphere at every stage of evolution. Yet after only some 3-5 decades of human use, so many bugs have become resistant.

Odstraněno: The warnings were voiced from the start, not to over-use, to take the whole course so no bugs escape that might be resistant. And through a series of government Commissions, like the Swann Commission by my former boss in Zoology and later Principle of the University of Edinburgh, the recommendation to limit severely the use of antibiotics in animal feed. The reason for feeding pigs with antibiotics is that they reduce the bacteria in the gut and stimulate growth of the pig. Thereby more resistant bugs are spread into the environment. Except for continuing on the treadmill of ever more new antibiotics, there is now no way out.

Odstraněno: even

The trouble is the excess use to which antibiotics have been put; they have become part of the giant agri-chemical industry and the excess is clear for all to see and to suffer from. Organic farming is not so much concerned with substance as with excesses. Buy a farm cartoon, note that the total amounts of antibiotics in the biosphere are not the problem. I would guess, but it is not I think known, that there is vastly more of any one antibiotic in the world than the industry grows in big vats. It is the re-distribution into other areas of life, ours, that causes the excess and the damage. **We had foreseen this and could have avoided the problem. (in the lecture, "repeat the chorus" after me!)**

Odstraněno: In conclusion,

2. The genetic engineering of the toxins in the Bt bacterium is very parallel to the use of antibiotics. Here is a soil bacterium that synthesizes a series of proteins that are toxic to a number of insect species. The bug can be safely sprayed on crops as a pesticide, and disappears quickly. The genes for one or two of the toxic proteins have been engineered into half a dozen major crops, cotton, maize, potatoes. These crops, grown over huge areas, synthesise the toxic protein in every tissue of the crop all the time in all these crops. Of course they are not actually resistant, they are poisonous. There can be no better way to repeat the antibiotic disaster. The pests will become, perhaps some already have, resistant to the BT toxins. So the treadmill to engineer new toxins has already started again. Meanwhile, the use of the bacterium itself as a spray against caterpillars and Colorado beetle will become useless because these pests have become resistant. One of the best, mildest, rapidly self-destroying pesticides for sustainable farming thereby is lost. **We had foreseen this and could have avoided the problem.**

Odstraněno: They become what the agrochemical industry call "resistant" to the pests.

3. Of course, pests themselves are the excess results of farming, especially in large monocultures. The cabbage patch presents the same opportunity for the caterpiller, as our technology with nature's bounty for us. Inappropriate forestry and farming has over centuries actually selected improved pests who grow faster on farm crops than anywhere else. **We had foreseen this and could have avoided the problem.**

Odstraněno: Organisms, which lived as part of the ecosystem, become pests when they are given the opportunity to expand. Farming presents them with such abundance, often free of their pests the predators, that they over-run any crop.

4. All human activities necessarily challenge other species, as they do to each other. But now such a loss of habitats that the rates of extinction of many life forms is some 100 or even 1000's times greater than occurs naturally. But it does seem that industrial society is causing as great or greater rate of extinction as any that have occurred before, the last being 65 m years ago. **We had foreseen this and could have avoided the problem.**

Odstraněno: Thereby they also provide a source of infections for wild places.

Odstraněno: recently the combination of de-forestry, farming, urbanisation, mining and so on, is causing

5. As an example of subtle excesses that do not involve large quantities, I use the cleaning up of the environment in the interests of environmental improvement. What a paradox! When the flushing loo was invented in the early nineteenth century, one of the results was the increase in polio infections, especially among young people, causing paralysis and death on a large scale. It is likely that the cleaner environment in which babies grew up, prevented polio infection as infants, when it is relatively or wholly harmless. They did not become

Odstraněno: There is of course much doubt and discussion about the numbers. This is case where no amount of scientific investigation will ever provide a hard answer.

immune, and were all the more susceptible at the more dangerous older age. Now there is serious discussion that one of the reasons for the increased asthma among young people is that they live in a more sterile environment, and do not become immune to the filth and the mite associated with asthma. They therefore suffer all the more. Cleanliness may become an excess and is not next to godliness. The immune system needs to be challenged during early development as part of the process of growing up, just like muscles do. We provide for the latter through sports, but fail to service the former through dirt. **We had foreseen this and could have avoided the problem.**

6. Another type of excess is social – the concentration not of chemical but of economic and human potential. Several ways of putting this: The distributed markets that Adam Smith assumed become very different when all independent markets were merged into just a few. The increase in specialisation advocated by Smith, itself leads to excesses of concentration, which destroys skills and externalises the costs of production… **We had foreseen this and could have avoided the problem.** **Cartoon, olympic spirit, top.**
7. Take this further to merge the activity into giant conglomerates, and excess results. Consider the 30m eggs a day that the UK eats. This requires huge battery farms, bulk imported feed, causes excess manure pollution and so on. But if every one of our 60m people kept a hen in their backyard, as part of their organic veg patch, as one of our colleagues pointed out, there need be no problem. (ASIDE: **We had foreseen this and could have avoided the problem.**
8. As Mike Cooley pointed out long ago, we are becoming more like bees than architects; skills are degrading through excessive technological specialisation, and thereby civilisation is driven backwards. So much for those that argue that you cannot stop progress – that is precisely what the technocrats are doing. Nuclear power, where this argument was most strongly expressed, is indeed a prime example of incredible and impressive scientific and technical progress, which nevertheless drive the options for a sustainable energy policy back, and prevents real development. The concept of the monoculture of technology has taken over. **We had foreseen this and could have avoided the problem.**
9. Finally, consider the global picture of the international agri-materials market and of the WTO as a whole. There can be no better scheme for creating the most destructive exploitation of the biosphere and of each other, ever. That is a major reason why GM crops pose such threats to sustainability. **We had foreseen this and could have avoided the problem.**

In contrast to the above, Nature, surprisingly, does not create or suffer from such excesses. Natures big swings are buffered, recovered after time. The largest volcanoes certainly affect the world; earthquakes are massive on our scale. But all these are part of the normal ups and downs.

Even islands have sustainable ecosystems, if developed by themselves and not (as below) invaded by foreign species. Even the Spruce Bud-

Odstraněno: (although other physical activity is much reduced)

Odstraněno: the

Odstraněno: one

Odstraněno: The small market economy could sometimes be sustainable. But

Odstraněno: the concentration has also spread disease. I could safely eat a raw whipped up egg from our dirty garden hens, and often did so. Now we are asked to cook them for safety. Salmonella has taken over. However, with antibiotics (ha!) infection has been reduced. Yet "Which" reported 7k salmonella infected eggs per day. Actually this is nothing – one in 20 years of eating raw eggs. Often the maniacal safety freaks, both greens and officials, need a lesson in arithmetic.)

Odstraněno: Now

Odstraněno: The concentration of the agro-chemical and biotechnology markets into a few global players, creates just the most damaging forms of excesses. Note especially that it will not be sufficient to ameliorate these dangers by some environmental protection regulation. That is certainly needed, and soon. But it cannot solve the problem which is the deeply structural one of intrinsic excess.

worm is one of periodic plagues that devastates whole forests, yet serves to create sustainability; not stability but long term resilience.

There are many further controls, beyond whether one can eat or be eaten. There are much subtle ones like the range of poisons, the antibiotics, and attractive an repulsing chemical signals by which species maintain each others numbers. Even rabbits control their breeding hormonally when they get too crowded.

We are the first species that have engendered so many long-term ups and downs that now, over the past two centuries or so, the long-term global down threatens the homeostasis of the planet.

Human Successes that are not Excesses.

I also need to explore another aspect . There are many huge human achievements that are not excesses. The pyramids and the great cathedrals, are more like minor earthquakes at their time. ON the scale of the countries, they did not involve too much resource. They are monuments to art and soul. Likewise is the violin, of a piece of music, things that wholly absorb humans, perhaps to personal excess, but that are successes than in themselves do not create ecological excesses nor even social ones. (That said, of course, one needs to explore the economies of the time – the Egyptians for example could not stop building because of the resulting unemployment).

Odstraněno: point

Summary so far

All the above are examples of the ways in which human societies live differently and evidently in opposition to nature:

a. Linear instead of cyclically, in material process as well as in thinking, philosophy and even religion (at least Western)
b. Regarding waste as such and not as resource
c. Conquering and short circuiting natural processes instead of understanding and fitting in, as the Brundtland Commission pointed out
d. Glorifying in the scales and excesses of our civilisation. Instead of being the most fitting in nature becoming the fittest in the sense of expanding to excess. This is the simplistic Darwinian interpretation of the Victorian period of conquest and growth. We are proud of excess, it is regarded as achievement, the bigger the better.
e. Decreasing the diversity of life instead of increasing, in spite of the huge numbers of crop varieties, which themselves are being rapidly lost through global domination of farming.
f. Failing thereby to do anything to avoid local and planetary instability, loss of resilience and collapses
g. The notion of optimum population rather than maximum population, remains a minor fringe consideration – nations still want to either grow or keep their excess populations, except perhaps now the

Chinese and Indians. Europe should celebrate and not bemoan its falling numbers.

h. Scarcely even thinking about implementing any forms of negative feed-back to control excessive growth and maintain human in reasonable proportions according to the true carrying capacities of the planet. Negative feedback is a positive boon.

i.

This sounds like a set of gloomy conclusions. It need not be so; the crisis, like the crisis of the chinese proverb, could become the opportunities to create a better life for all through the synergism of humans and nature together. Think of the life in a tropical rain forest: unbelievable growth, huge diversities, luxuriance by any critieria. Can one invent a social and economic system less geared to the conquest which is now out of place and more modelled on a forest?

This para put earlier?:

There are many lessons from nature which, as a civilisation, we have not bothered to notice or research. We all know this, intuitively, but have become geared to the education provided by the narrowly scientific, linear, technical education that serves to pass on our culture to the next generation; a culture that has forgotten frugality and encouraged hugeness and excess. Thereby we educate to prevent change, progress and improvement in the human condition.

In the face of the deep biological life force, to instigate a new social ethic and social structure which applies our own feed-backs to keep us in check, in place of the now not tolerable nature's feed-backs, is the huge task ahead.

Omit next two para?:

Consider the insects of the field: they do not do that. They are by far the commonest animal life on earth, maybe 90% or more of all animal species. They are the greatest success, in this sense. But in no way are they in excess as we have become. Insects every corner of the world, creating a life force that is vital to keep the planet as well as ourselves healthy and thriving, they yet would not so anything as daft as destroying life support on the planet.

Our colleague Manfred Max-Neef, at a party in Chile to launch a PhD program in ecological economics, mused about this. What is the difference between man and animals? Stupidity. No insect would do what we are. What humans now need is "insectivity"!!

The means for uncontrolled growth - The dangers of neo-classical economics

We can easily identify small scale models of the results of excessive growth that led to collapse. The classic human case is that of Easter

Island, on which developed an extraordinary civilisation dependant on the unsustainable use of its forests. AS we all know, it collapsed and left a small impoverished population. The same happened when deer introduced to an island where they could multiply without control and all died. Small islands are microcosms of the larger world. Yet perhaps on the larger scale the world has much greater resilience; the scope for internal controls is greater, the diversity of life is greater, excesses in one place might be counter-balanced by healing in another. But the question remains, are we vulnerable? It seems so.

Our Age of Economics is not the ultimate factor that determines our un-ecological behaviour. I suggested here that our basic biological drives to expand led to the design of our social institutions. The social nature of the economy has become the driving force in practice.

Odstraněno: Most of the social infrastructure now requires review and overhaul. It may have served well up till now, but has become out of place in the modern expanded world of excess. The economy is one of those – now used as a tool to continue the old ways of expanding and of conquering nature.

Just briefly, without trying to give a seminar on economics, I want to outline how this dangerous situation evolved.

The ancient invention of money was brilliant. It could replace barter and allow one to carry the equivalent value lightly. Its problem arose because it created the ideal way to growth without any physical basis. I have to repeat just how this happened and what it developed into.

Think about the following story: Cartoon: child's guide to money So Pamela, who has saved 1000 gold coins, takes it to John the jeweler who places it safely on the bank at the back of his shop. She receives a piece of paper confirming this, in effect an IOU. Then Paul comes to borrow 900 coins to buy a motor bike from Max. John keeps the balance of 100. Paul gives John an IOU for the 900, to be repaid when he's earned some money. He pays for the bike and Max deposits his 900 gold coins at John's, who give him an IOU and puts the gold on the bank at the back. He keeps 100 in reserve again and then lends Basil the remaining 800 to start a business in second hand books. The medium for barter has now swollen to £2700, available for spending in the market, from the original 1000 deposited by Pamela. This is the origin of the word and process of banking. The 100 reserves are kept by law, actually about 14% not 10%, to minimise this gross creation of so called wealth out of nothing. Now add interest payments for the loans, and you will see that John can earn interest for money services he does not own. Interest necessarily creates poverty, because on average the rich lend and the poor borrow. And if everyone tried to live off the interest from everyone else's money, of course that could not work – it would be the ultimate case of the tragedy of the commons. See Soddy below.

Odstraněno: It is of course safer to store your money at the jewelers or other secure place.

Odstraněno: ¶

Now expand these transactions beyond the facilitation of barter by money. Using either barter or money, both parties profit, because both get what they want. But use money to buy something you do not want, merely to sell at a profit for more money, and the transaction evolves into capitalist circulation: money to commodity to money. Then omit

the commodity altogether, and use money just to trade according to interest rates, tax rules, depreciation or accounting rules and so on. This brings profit for some, but necessarily the equivalent loss for others. No real wealth is created. An economy based on such "money fetishism" has lost any link with real productive activity and still more crucially, with any biophysical limits of the real world. Yet the profits can be used to continue to degrade with excesses.

Yet that is the basis upon which our civilisation rests its activities. It could not be better designed for uncontrolled growth – both by creating money and in charging interest. Other than artificially putting taxes or similar costs onto natural products, there is no way for such an economy to lead to sustainable development. Quite the contrary, it leads to the growth that all governments and most people espouse. Just look now at any paper any day, and you see the need for growth assumes, as a way forward. The "Green Revolution" and genetic engineering are not only attempts to help feed the world, they are also attempts to speed up growth relative to income from the natural capital of the land; they might create increased economic activity but at the very real expense of stability and resilience.

So we need to look at growth.

So I would have liked to quote extensively from the work of several economists on growth, but of course cannot do that here and it has been very well documented. All the main economists of the past sensed and feared the eventual end to growth – even Adam Smith, Ricardo and of course Malthus.

Malthus appreciated the limitations to human development. Many people find cruel rationality of Malthus, apparently devoid of ethics, obnoxious and therefore wrong. And anyway they would point out, look how wrong Malthus was. As I pointed out in the first talk, Malthus was wrong only because we continued living off the natural capital of the biosphere, steadily degrading our habitat and expanding into new lands. That cannot go on forever, and probably not for much longer. He may be right in the end.

Odstraněno: – like any animal the human population can grow only to the extent that the food supply will allow – and agriculture could only expand at the rate of opening new lands.

John Stuart Mill had this to say:

John Stuart Mill, 1848

> "If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a better or a happier population, I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it."

(The quote clearly links population with economics and resources; it distinguishes quantity ("larger") from quality ("happier") and fundamental human needs from assumptions about the need for growth.)

Then:

> "I cannot.....regard the stationary state of capital and wealth with the unaffected aversion so generally manifested toward it by political economists of the old school. I am inclined to believe that it would be, on the whole, a very considerable improvement on our present condition. ....It is scarcely necessary to remark that a stationary condition of capital and population implies no stationary state of human improvement."

However, it seems that we are still in "the old school" and that last remark needs to be made again in the context of the modern economy.

Frederick Soddy, whom I mentioned before as the Nobel prize winning chemist and physicist later turned to economics and showed how the economy is wholly irrational in that it does not and cannot relate to the realities of the physical world, let alone the biological. He likened continued economic growth to a perpetual motion machine. Soddy was among the earliest to show how debt, following the laws of compound interest, appears to provide "a means of dodging nature, of evading the second law of thermodynamics, the law of motion, ravage, rust and rot." Debt cannot be serviced by real growth. And the idea that people can live off the interest of their mutual indebtedness is just another perpetual motion scheme – a vulgar delusion on a grand scale. Cartoon: work harder

I have never before seen the argument about the lack of logical science in economics put so bluntly and clearly. Of course, within the subject, economics is logical and rational; it's just that this does not apply when viewed from outside and certainly not to the real world.

Soddy was followed by Georgescu-Roegen, and Kenneth Boulding to whom is attributed this: "Anyone who believes exponential growth can go on forever in a
finite world is either a madman or an economist."

Then:

Herman Daly, (1992) had this to say.:

> "..economic growth is held to be the cure for poverty, unemployment, debt repayment, inflation, balance of payments deficits, pollution, depletion, population explosion, crime, divorce and drug addiction. This is growthmania. When we add to GNP the costs of defending ourselves against the unwanted consequences of growth and happily count that as further growth, we then have hyper-growth mania. When we deplete geological capability and ecological life support systems,

and count that depletion as net current income, then we arrive at our present state of terminal hyper-growth mania."

Cartoon, Herman

I do not need to go into all this more deeply now; it suffices to show that economics as we practice it, could not be better designed to promote uncontrolled growth. It therefore has to lead to excesses.

What direction the answers?

Clearly a revolution is needed, as so many have said for so long.

Amelioration of the worst consequences has to be promoted. The attempts now by the WTO, the World Bank, the IMF, the more socially responsible taxation systems, the efforts at controlling the worst material excesses like greenhouse gas emissions just now at Marrakesh, all these are necessary actions. But they have a downside: that is that the very amelioration designed to lead to final cures, also help to maintain the system. The ills and the directions of change will be preserved. My analysis indicates that this is unlikely to be adequate.

Cartoon, GATT

Anyway, it has all been happening before this economic system arose. The latter is a consequence of human nature, indeed of nature. All religions preached frugality, seeing the dangers and trying to instigate social orders to control them. Now that the scales are a hundred times larger, the social response also has to be a hundred times more effective.

The campaigns and demonstration against the G8, the WTO, the monopolisation of agriculture, all these are vital. Yet, apart from the unfortunate violence obscuring the problem and preventing the issues being properly publicised, it remains taboo to open the forum fully. To repeat what Mark Hope of Shell said earlier in October, we cannot move because we are stuck in the system. Therefore the new organisations, small and not yet heard much, have a vital role – the NEF, the ISEE, the Third World Network, and many others. The focus has to be on the rich countries – that is where the change is needed most and where the damage is caused.. The attempts to help the poor can only work if the pressures that create them are changed, for the very first time in history. Schumacher of course got it right; the trouble is we live as though bigger were beautifuller.

Meanwhile, all the apparently little things we can all do, do need to be done and done completely, wholly, with effort and conviction.
Re-cycling is not just something to encourage, although that is necessary. The real change is to making all activities part of cycles - that would become their nature instead of linear flows we use now. Take this home to our immediate lives: driving children to school because of the dangers of driving is among the most absurd. Not recycling EVERY aluminium can is a crime, next to using one at all. Supplying every shopper with yet another plastic bag has no purpose what-so-ever; it is merely the result of spurious competition, to make you choose that shop. I don't buy in such shops. Solutions now depend on big changes, not from 5% to 20% re-cycling, but from 5% to 95-99%.

Odstraněno: Of course, many argue that we can move towards a service economy, that we can "dematerialise" the economy, and the excesses of consumption can be avoided. For example, tourism proves wealth without too much material consumption. Banking indeed more so. I answer back, firstly that all services actually depend in the end on material flows; and secondly that even if they did not, the tourist who drops their crinklies in Scotland still has to earn them somewhere. It is a real question whether services ever create ultimate wealth, or merely serve as the means of re-distribution of buying power. This was Soddy's argument.¶

Cycling becomes the symbol of a new way of life. And with this, the regenerative, organic, agricultural practices need to spread worldwide; because of their nature they prevent excesses yet maintain or imporve our abilities to feed the world.