

Human Ecology: Bringing the Principles down to Earth

23rd October 2001. Ulrich Loening

1. Civilisation runs on Natural Capital.

a) Background

Sir Frank Fraser-Darling wrote in his introduction to his American Journal in 1950, (quoted in Morton Boyd, 1986)

"...The phenomenon of accelerating devastation and increasing population has, in effect, been inevitable from the moment man began to break ecological climaxes and upset equilibria without allowing them to rebuild... Most of us are not prepared to defer to this final logic, that the very achievement of humanness dooms us, and that civilisation is an ultimate contradiction."

Similarly, the Brundtland Report (1987) begins with the idea that:

"Humanity's inability to fit its doings into this (nature's) pattern is changing planetary systems, fundamentally."

And then:

"The next few decades are crucial. The time has come to break out of past patterns. Attempts to maintain social and ecological stability through old approaches to development and environmental protection will increase instability. Security must be sought through change."

These quotes put bluntly the predicament we are in: unprecedented human development, yet closely linked to poverty and ecological degradation. In these talks I am going to try to bring together some of the ways to approach the issues as I have perceived them, to try to see if F F-Darling's contradiction could be resolved.

So we will ask, what is the nature of that contradiction? What did the Brundtland Report consider should change? What are the features of humankind that must evolve into something better?

It is the accumulated wealth of the biosphere that has provided the means for human development. In the process this capital wealth has been squandered and civilisations have died. This time round, can we reverse this contradiction?

Humankind is yet young in her endeavours, like a rebellious teenager. With greater maturity might come the possibility that civilisation also become a part of the process of creating the wealth of the biosphere, The later lectures explore the options and constraints for civilisation to mature.

You can picture three graphs of going up, going down and the differential of rates of change or rates of use and growth. Our civilisation is in a unique phase; planet in the most dramatic period due to one species, it has ever been in. The current state of our civilisation has been called “the oil interlude”. However, this most dramatic period is still not widely recognised for what it is. International conventions, local actions, efforts towards sustainability, are still very minor activities in spite of global conferences like Rio 92. Yet we are also conscious beings, aware of some of our actions, and potentially capable of self-regulating our activities to fit with the realities of the biosphere. Are we also blind? One is, horrifyingly, tempted to compare such blindness to reality with that which failed to recognise the depths of divisions that led to international terrorism.

There is a close correlation between development of civilisations and ecological degradation. The long history has been well documented. Even studies of pre-history, show how mankind has almost always been the exterminator: large slow eatable animals have been harvested to extinction. Maybe some cultures which have not developed large enterprises have an intuitive understanding of nature that enables them, perhaps unknowingly, to live in symbiotic relations with their environments. Our science now could tell us that we have much to learn to be able to do likewise in a modern and crowded world. But as it is, it does appear that continued development is necessarily leading in the wrong direction towards greater degradation and exploitation. Both the ways of living that work and those that don't, like ours, need to be studied and understood. Human ecology is a required approach in both cases.

b) Natural Capital

The capital of the ecosystem:
What is the capital of nature?

It is not only, or even mainly, the resources of timber, minerals, fossil fuels, soils, etc. These are the products accumulated over time; they are what civilisations have sought and plundered. The real capital of nature,

the basis of the assets on which we live, is the POTENTIAL TO GO ON RE-PRODUCING ALL THESE RESOURCES. For example: LIST:

- the hierarchical order of the biosphere, the huge diversity of living things, including the fungi and micro-organisms which we tend to forget; they work for us, but we mostly do not notice;
- the complexities and diversities that stretch from the micro scale to the global scale
- fit into and function as the living ecosystems of the planet; it is these that have created
- the systems of energy and nutrient flows, and
- the cycles of water by evapo-transpiration, even of weather
- the maintenance of stability and sustainability, the homeostasis and control of the environment.
- the age range of living things; often very long time scales created the potentials that we draw on to-day.
- the stability of the planet as a whole

All these features of the biosphere constitute underlying assets or capital which provide the continuing services on which we depend - the renewable resources of the earth. Maybe our minds are so made that we see only *things* rather than *potentials* – surprising actually, because humans are also artists, not just mechanics.

We need to stress, it is not just the immediate resources that civilisations have sought and used, but in using them have destroyed also the productive capital. Renewability itself has been lost; renewably resources have become depleted. It is environments that seem to offer the potential for development that are sought. We, like other animals, have inborn instincts to sense what makes an environment valuable for us. We can see the potential in healthy, living deep rich soil. Such soil has taken thousands and hundreds of years to build up; it is not the resource itself, it is the potential to grow crops or to rapidly re-establish a complex ecosystem that constitutes its value. Every farmer knows that. Why then is soil erosion still one of the world's greatest problems?

c) Civilisation

Put another way, civilisations have searched for and found low entropy in nature (explored in next lecture) and almost always increased it to disordered chaos; and then left for elsewhere or died out. Now there is nowhere else to go.

Ancient and modern ways alike of organising society have inexorably led to this situation, like market capitalism does now. The question is whether any revision or modification can be sufficient to change direction or whether deeper and more drastic revolutions in thinking and action are needed.

Social structures of law and governance and of exchange systems like money, were invented because they are immediately useful, and mostly local in scale. Yet, when considered on the wider arena and longer time scales, social organisation that developed from our instincts and intelligence applied to our needs, has become at the same time the source of grave trouble. Our social heritages are no longer appropriate. Are we therefore doomed because of our nature, as F F Darling implies? Or have we been unable to foresee long-term consequences? After all, any philosopher of old, while pondering the future, risked having his cattle and wealth stolen. Philosophy seemed not to have paid off - while violence has. Put another way, is it inevitable that an intelligent, tool-making animal will create trouble precisely because of its power and success? There may be much wrong with human nature, but did we have to set up social structures that bring out the worst? As a farmer said recently, Man has been too clever, yet not clever enough.

In that light, what is civilisation? It is said to be:
quote: "Civilisation: a human society that has highly developed material and spiritual resources and a complex cultural, political and legal organisation; an advanced state in social development."

Yet if it continues to live off the natural assets of the planet, destroying them in the process, we have to question that definition.

In effect, our so-called "developed world" still lives by hunter gathering. We have not progressed nearly as much as we imagine. Instead of harvesting the plants and animals and minerals directly, we now harvest the capacity of the biosphere to continue to produce those needs. Even in harvesting non-living minerals, we still destroy the ordered structure of the surface of the earth, scattering the products, both the so-called waste

and the sought for metal, rock, lime etc, everywhere. They do not disappear, copper remains copper, it's just scattered in such a way that it cannot easily be retrieved. Similarly, agriculture and most forestry practices continue to degrade soils and always to simplify ecosystems. The resilience of our environment is being compromised and made more fragile. The sources of the organisation of life are being weakened. Logging companies continue to operate as nomads, going from one old growth forest to another and leaving long-term degradation behind. In all these cases, the capital assets of order, of organisation for productivity and of concentration have been lost. If that constitutes what we are proud to call civilisation, there is clearly a long way to go.

Look at it another way: Civilisation can also be defined as building and living in cities – creating civic society. Yet on this definition too, the greater the progress, the more the separation from nature, the more the unseen dependence on the productivity of the biosphere. Even in the ancient city of UR, 5000 years ago, the richer classes lived in the city and the lower classes of society were hired for the production of food. So called “Civilised” people live away from the land and engage in higher activities like philosophy. And as we shall see in later talks, much of our science is still applied with that same attitude, of understanding nature in such a way that she can be overcome, avoided, conquered. The degree of separation and independence from nature remains a measure of the success of development of civilisation.

To examine this a bit more deeply, let us try to evaluate the wealth of nature's services.

d) The value of ecosystem services

Firstly, it is clear that the commons in the form of natural capital are not accounted within any of our economic systems. The tragedy of the commons has become a global one.

The money economy does not and probably cannot, measure the values of the eco-sphere. And since most transactions, local, national and international, are financial ones, at least in the sense that decisions are taken on financial grounds, the capital of the means of production can be used up, squandered, without accounting. No business could afford that for long; and omitting such externalities as economists would call them, amounts to criminal negligence. Yet, putting a money value onto natural resources seems even more absurd than not doing so.. As examples, Frederick Vester made an attempt, tongue-in-cheek, many years ago to assess the monetary value to the economy of Austrian beech forests. He

guessed values of amenity, wild life conservation, soil improvement, water management, climate amelioration, and many other such factors of which timber value was a minor one, for a beech tree. He arrived at some £2000 per annum per tree; or 7 times the Austrian GDP for all of the country's beech woods! Similarly, recently Bob Costanza and colleagues assessed the values of the earth's ecosystem services, on the basis of what it would cost if our economy had to pay to provide them. The total came to at least as much and perhaps three times as much, as the whole of the world's total GNP. In his conclusions, Bob pointed out that some growth of GNP probably already results from the need to replace failing natural services with artificial ones - it is money spent, the expenses of amelioration, with no gain in living standards. Conversely one could argue, but he did not, that expenses could be reduced by ecological restoration, and so improved living standards achieved at lower costs and lowered GNP.

While all such calculations are somewhat unreal, maybe they serve to show just how far from a true civilisation we are, and how simple it would be to achieve something better. Actually, such calculations are not as absurd as they seem – it is the economic system that is spurious. The economic system we work on depends on explicit and implied assumptions, confined to limited scales of time and space. It could not survive any rigorous scrutiny in a scientific frame. Look at Garret Hardin's simple example: Judas's 30 shekels invested at 5% per annum, would be the weight of the earth in gold by the time the great cathedrals were built that honour his master. And this time is only a third of the life of a Pacific redwood tree. The calculation of the value of the earth's ecosystem services had to be made, precisely because the economic system fails and has to fail, to respond to signals about the state of natural capital. Something different is needed in the way we structure and handle our economy. There are plenty of newer ideas, but the conventional remains the dominant.

What is it then that has to change?

To look deeper into that, we should note that those things that stand out as most successful, especially the growth of population and improvements in standards of living, (at least for some) are also those that have been the causes of the greatest degradation and of unsustainable lifestyles. It is therefore those that require the most questioning of the assumptions on which they are based. In effect, we have scaled up the many earlier trials of civilisation into a giant global experiment, one that no ethical or scientific committee would allow, and we have yet to draw proper conclusions from it.

e) Economic and social structures

The inherited social systems and the economic structures that arose from them, became concentrated in recent times in the two major world powers. There was nothing to choose between them, from the point of view of living off their capital. But the collapse of the one has opened the way to domination by the other through market forces, throughout a world driven by unprecedented economic growth. This has meant, among other things, that the remaining super-power can bargain to buy some of the natural capital of the other, in the form of carbon credits. It has also deprived the greater part of the world, the 2/3rd World, the developing world, of the kind of 'bargaining power' they could use during the cold War. The results of economic developments over the last century and especially the last 50 years, has been phenomenal gain for a less than 1/3rd World, an increased relative as well as absolute poverty, and continued steady losses of natural capital, upon which the whole show ultimately depends. All the intertwined structures of governance are leading inexorably further into unsustainable life styles. "The world is ruled by the well-off (including those in poor countries) who believe they can ring-fence their prosperity and resist scientific and other arguments that demand change."

In spite of the widespread concern, it remains market incentives, the media culture that depends on advertising, and the very mechanism of finance that creates money without wealth, that can only continue these unsustainable ways.

Globalisation of trade promotes the exploitation by concentrating the benefits and diffusing the costs - cheaper resources and lower labour costs are sought everywhere and concentrated among the rich. Trade is surely good; it does not follow that more trade is better, nor that the consequent breaking of Adam Smith's invisible hand nor superannuating of Ricardo's comparative advantage, leads to a healthier society and ecological responsibility. In these ways, the tragedy of the commons has become absolute and planetary.

Maybe poverty has its roots in ancient tribal conflict, maybe even further back in the animal kingdom, in common with chimps tribal warfare. There has always been, it seems, a built-in continued exploitation of nature and continued creation of poverty.

Whatever their origins, our economic systems evidently have to depend on inequality. It is when this escalates beyond the proportions of a true market into a global one, that it also escalates the divisions between rich

and poor. The international economic system is bound to exaggerate poverty and as we all know the disparity between wealth and poverty has increased. Whatever the arguments for economic growth to alleviate poverty, simple observation, as by any natural historian, has shown that this is a myth and has failed. If the IMF encourages all to grow coffee for export, the price will fall, the rich countries will get cheaper coffee, and the ability to pay back debts and interest is reduced. The poor pay back their loans about four times over, and poverty inevitably increases. Similarly the turning of natural assets into commodities for the market assumes that the commons of nature, the natural capital as well as income, are there for the taking. "The environment", whatever that is, is regarded as the base from which we act.

We are now stuck within this structure. (Shell quote, Mark Hope) "Corporations take their signals from the regulations and from the market. We cannot move faster – it is part of the system we are in." The continuing health of the economy depends on continued spending, shopping, material and service flows, with no connection to reality. There is no feed back at all about whether this activity fulfils any human need, nor whether it might or might not be sustainable, nor what effect it might have on the other economies of the world, perhaps far distant ones. This is the myth that ecological modernisation, the next phase of civilisation, must overcome.

f) Sustainability - The taboo

Individually, people recognize these lethal trends, yet talking constructively about the implications and what to do, has become a taboo. Ideas about reducing consumption cannot be tolerated when the very existence of the economic system depends on continuous economic growth. The idea of reducing population, - that is, total numbers and not merely reducing rates of growth, - is similarly taboo. Sustainability may have become an accepted concept, but its significance is well outside most decision-maker's visions.

We reach a paradox of inability to act: we are either overwhelmed by public and political inability to recognize the problem, or overwhelmed by the magnitude of the problematique itself, once recognized. The need to reduce human impacts appears only reluctantly on political agendas. (Many activists, like here in CHE, may be overwhelmed by the task of reinforcing sustainability in the public arena.) Yet clarifying and popularizing the problem such as to make it more understandable also leads to feeling overwhelmed or paralyzed by its magnitude.

I am reminded of Nick Humphrey's BBC Bronowski lecture many years ago, on the nuclear arms race. He described the uselessness of visiting your neighbour, to announce that the world is on the edge of an abyss – I thought you might like to know! And he asked, in the face of all the evidence and argument, why don't we all scream? We have as much need to scream now as we had then (and in fact still do).

To drive the point home, consider how globalisation has become a boring topic. Compare the reporting of Seattle or Genoa with that of a football match. The sport is thoroughly described and every move of the players analysed and their play and potential evaluated. In contrast, the long-studied and researched arguments of the demonstrators against globalisation have never been properly presented in the media – we only get the rioting reported. What would the reporting have been like if there were no violent confrontations, and the alternative conferences as well as the official ones were reported and analysed as thoroughly as if they were sport?

YET, there are many who think differently: that the environment is in fact being cleaned up; that human ingenuity has always overcome problems and can do so again and again; that the market economy will always provide the signals for action. This is a vocal and powerful body of opinion. I will not here argue how wrong I think they are, but only ask, how is it that one can have such wholly opposed evaluation of the state of the planet and how we live in it? The difference is not based on science alone, but on attitude and philosophy. It is based on the power of arguing point by point, when the issue is one of multiplicity, inter-connections and inter-relations. My answer is that human ingenuity indeed can overcome the problems - that that ingenuity now will be focussed on recognising the feed-backs of nature, on the interactions of ecosystems, on fitting in with ecological processes.

g) The examples of forestry and development of agriculture

Agriculture developed probably independently on 3 continents. It has always been an abuse on the environment. It has to, by definition; the idea is to grow food where other things grew before. But if that abuse is within the elasticity of the ecological systems, it can be tolerated and continued. In practice it has not been. China is the best documented, and perhaps only, example of sustained agriculture for 4000 years. Yet this also depended on continued deforestation, for fuel, fodder and building. All other civilisations have degraded their land – Ur, Greece, Rome,

Europe and Russia, and now USA. And the impacts of these “developed” nations on agriculture world-wide, have increased yields but threatened and degraded forests and soils throughout. Malthus has been proved wrong only by eating up nature’s capital.

Forests have been cleared for thousands of years, for their timber and for agriculture. Plato already appreciated the devastating effects of deforestation, leaving the land as an emaciated skeleton, fit only for bees.

Ideas for sustainable forestry have developed over the past few hundred years in Europe; scarcely at all in UK or in USA, nor generally internationally. Old growth forests are still being cut, as in Siberia, Canada, Chile, Argentina as well as the tropics. True sustainable forestry is difficult to conceive, because the multiple values of forests are easily destroyed, even if trees remain standing. Even the Rio Summit failed to create a convention, as it did on biodiversity. One wonders how a convention on biodiversity can be sustained if forests go on being lost! Now that there is so much degraded land of all sorts everywhere, there is no excuse whatever for continued cutting of virgin old forests anywhere. Restoration of forests would also help to restore soils and fresh water, and re-build some of the lost capital of the past 4 millennia.

Scotland of course has practically no forest. The absurdity of growing trees for only some 50 years and then clearing the lot, has nothing to do with forestry as such; the policy is dictated by the economics of discounting the future. Reforesting Scotland is now the major task. SNH (Scottish Natural Heritage) should be renamed SNR, Scottish Natural Regeneration. Meanwhile, the desire for sustainable hardwood timber for the new parliament building is thwarted by the procurement methods, which do not allow for planning ahead. A small token prestigious batch of oak will be Scottish, and sawn and machined locally; the rest comes from the Appalachians, and machined in SE Asia. All this time, hundreds of tons of prime oak have been exported from all over Scotland, to England, Germany and Japan. This is just to underline how the social and economic infrastructure is what prevents local sustainable development.

Agriculture depended in its expansion in large part on de-forestation. Farming has always necessarily aimed at over-coming the constraints of nature – that was the whole idea. The increasing abilities to do that and the increasing productivity that resulted, has led to the present large global population. It was a success. But the costs are also high. The first, 10k years ago, was lowered health and stature. Farming did not

improve on the healthy diet of the hunter-gatherer. Then it led to salination, as it still does. Then it led to loss of biodiversity, as it still does. Then it led to such concentration of cultivation, rich feeding with fertilisers, that pests and diseases increased, as they still do. Seen overall, a crude judgement has to be, that farming has been both a great success and a driving force in spending, not enhancing, natural capital, which it continues to do. No-one now can claim that modern farming is sustainable. Much effort is going into trying to make it so. Meanwhile, it is clear that there has to be a change in direction. The question is what kind of change.

One option is to continue along the path of clever interventions into natural processes which have been so successful. Such extrapolation of development along old mind-sets however, is equally likely to lead to similar problems of loss and degradation. That is why I am critical of genetic engineering technologies applied to agriculture – they continue a path of domination that never was a good long-term one. GM (better named GE) is tackling one of the profoundest aspects of the structure of life – the separation between species. The alternative mind-set or approach is what grew out of concerns about the effects of more industrial farming on health, soils and crop and animal health in the 1920's, now dubbed organic farming. This has hardly started yet – the options for various sustainable farming methods are only now becoming recognised, all over the world. A more thorough, rigorous biological science would indicate that we would be wise to study more how things work than how we can short-circuit them. I will look at this in more detail in later talks.

And what can we do in Scotland? Almost all vegetables that Edinburgh needs can be grown locally – for instance, 5m cabbages on some 200 ha using modern sustainable agriculture techniques. The fertiliser can come from biological treatment of domestic sewage, growing 100 different treatment species, which are then composted. Thereby agriculture is supported, health improved, local sewage plants become near to botanic gardens in appearance and value. Many external costs, like pollution and waste treatment are avoided. Idealistic perhaps, but also perfectly realistic. The hang-ups are not technical.

h) Conclusions.

The question we have to tackle is whether one can perceive of a newer civilisation that remains true to the meaning of that word - civilised as opposed to wild - yet is mature enough to understand the biosphere and

live within income and not off the capital. Can modern society move towards that goal fast enough?

One could regard civilisation as that which strives for the highest achievements of humankind, of the deepest understanding of nature, of those means of living that integrate humanity with the biosphere. A culture of society, in other words, that recognizes how the striving for over-coming nature's constraints must be improved, not merely balanced, by self-regulation in the place of nature's regulators. Then we would see that there is a long way to go. However, Fraser-Darling's contradiction would be seen as a self-evident contradiction applied to past civilisations.

To do that requires turning our assumptions upside down. Instead of assuming the commons and building civilisation on the apparent readily available natural capital, the only real options are how to live from income. It becomes necessary to re-model social structures, economics and modes of living, starting the design from ecological realities, which become necessarily linked to social equity.

At last, after years of small groups like the CHE struggling with such issues, there are some visible sign that things are moving. So many NGO's, and new ones, are being taken seriously even while the pressures of unsustainable globalisation become more pervasive. Recently here in Edinburgh, I participated in a workshop run by the New Renaissance Group, which produced a hard-hitting statement, Beyond Sustainable Development, introduced with a paper by Michell Batisse – “The Road Ahead.” Similarly, Mathis Wackernagel is proposing a “Sustainability Academy” for training for leaders. CHE itself is working along such lines, as are many others. The New Economics Foundation is working on exactly that. We might well reflect back to Conrad Waddington, whose work in science and society, the human future, the tools for thought, led him to found CHE (“The school of the man-made Future”) almost thirty years ago.

My other talks will examine some aspects of these big questions and pose further possible ways forward.