Chapter 8 – Economics

So far we have covered issues relating to sustainability and how an engineer can implement their skills within society to work towards sustainable systems. In each of the chapters there has been a common theme as to the cause of the unsustainable systems – the constant drive by society for economic growth.

This chapter is therefore intended to explain where economic growth comes from, rival understandings of it in economics and what problems it causes. We will also introduce "ecological economics" which is a concept system that recognises these problems and seeks solutions to them within the bio-physical carrying capacity of the planet. Ecological economics takes many of its ideas from the mainstream subject but with important differences which we will highlight.

Economics, in parallel with environmental and social factors is a cornerstone of the sustainability triangle. The reason for including a chapter on economics in this module is so that engineers can understand the driving forces affecting macro scale social organisation in order to better help contribute to a sustainable future.

What is economics? – what the different paradigms focus on

Definitions – Economics can be described as the study of how people make choices between alternative allocations of resources – where what we call "resources" are the means available to attain desired ends. Key concepts are:

Allocation: Economics is concerned that allocation decisions about resources are efficient – so that the best use of available means are made - bearing in mind that resources are scarce and not all desired ends can be met.

In neoclassical economics, the mainstream, this question of allocative efficiency is the key focus. However 'allocative efficiency' is not the only dimension. Another approach, that of ecological economics, gives prominence to two other issues in considering the impact of the economic process on the ecological system and on society. These are:

Scale: how far can we go in any given activity and use of resources – what are the bio-physical limits of the ecological system? If we go beyond these limits ecological economists argue that we are involved in ***uneconomic growth*** – because the additional benefits of economic activity are less than the additional costs. These costs take the form of a degraded and exhausted environment with impoverished resources and impaired "eco-system services" passed on to future generations.

Justice: how are the benefits and costs of economic activity distributed in society, including the benefits and costs of action to mitigate or adapt to environmental damage? Do the benefits go predominantly to one group and the costs to another?

A moments reflection tells us that sustainability is itself a justice concept. As described in Chapter 1 the Brundtland Commission report, written for the UN, defined sustainable development as

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

As is clear this definition is about intergenerational justice and it seems, at the very least, inconsistent to assert the importance of inter-generational justice without a parallel concern for justice for people alive today.

In fact there are good reasons to suppose that all of society gains from a concern for distributive justice. For example, two authors, Richard Wilkinson and Kate Pickett have assembled a mass of evidence in their book ***"The Spirit Level"*** which shows that in rich countries a smaller gap between rich and poor means happier, healthier and more successful populations more generally. http://www.equalitytrust.org.uk/why

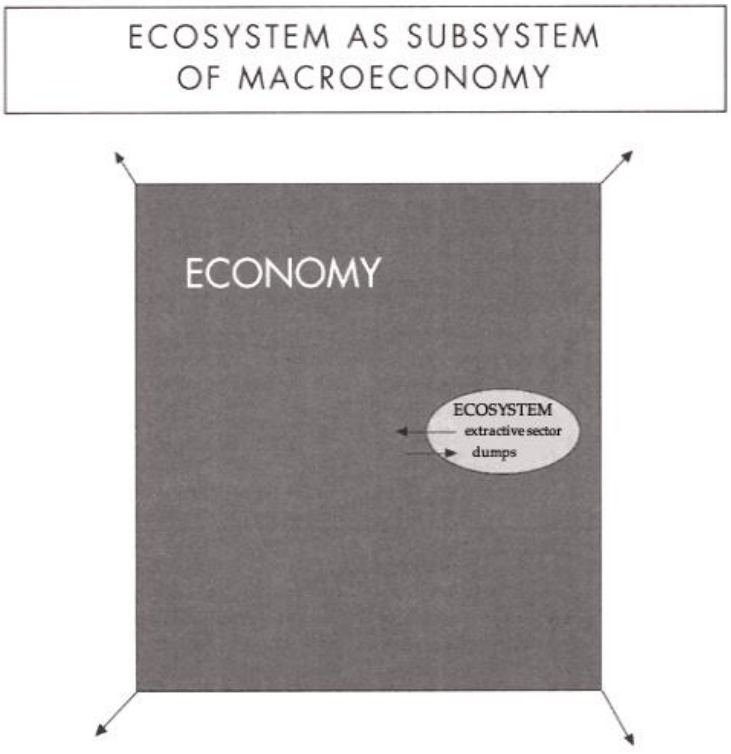
Although distributive justice is neglected in the economic mainstream the evidence shows that it matters to general human wellbeing. The idea, that we do not need to concern ourselves with distribution if growth continues because greater production will provide more for everybody, is not true. The evidence assembled by Wilkinson and Pickett shows that growth will NOT lead to happier, healthier or more successful populations. There is no relation between income per head and social well being in rich countries.

Pre-Analytical Visions

The concern about scale in ecological economics is related to what Herman Daly has called its different *"pre-analytical vision"* from that of the neo-classical mainstream. These visions can be represented diagrammatically as follows:

1. **Pre-Analytic vision of neo-classical (mainstream) economics.**

The relationship between the economy and the ecological system is essentially colonial – profit maximising companies push what are termed "environmental costs" unpaid for onto the world around them which economists call "externalities" as it they are minor abberations in an otherwise efficient system. This aberration can be corrected for as long as prices for resources and waste absorption by the planet are set correctly to incentivize markets to provide substitutes for scarce resources and alternative arrangements for waste absorption. The economy can go on expanding indefinitely.

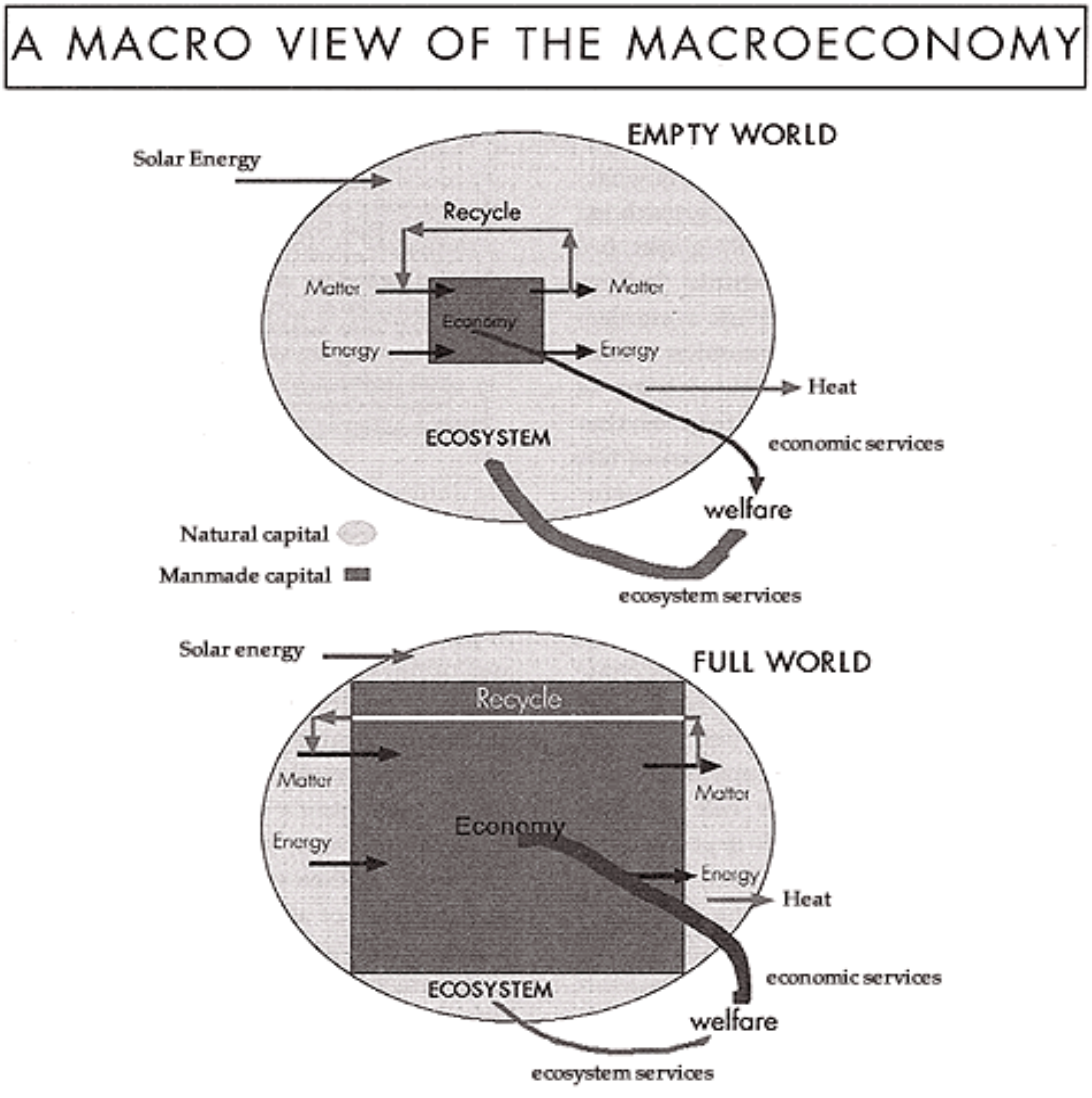


In the mainstream view any economic activity involves costs, including environmental costs, so whether any particular activity should occur or not is best worked out by comparing the stream of

benefits and costs in the future to work out the net benefits. Then, because people have a “time preference” in which current benefits are preferred to future ones, there is a need to discount future net benefits to show what should happen when resources are allocated here and now. In the economics mainstream the interest rate is a payment to compensate people because when they lend money they forego current spending and consumption so need to be paid for doing so. At a 3% interest rate a £100 today is worth £103 in one years time and the logic of discounting arises because, looking at that the other way round, £103 in one year should be discounted back to £100 to get its present value.

Here and now suffice it to note that a concept system that discounts future benefits like this across generations and sees the income of future generations as less important than benefits now is already downgrading priority to future generations. Mainstream economists however have no problem with this because they see economic growth as continuing and assume that future generations will be much richer than we are. Ecological economists think that this begs important questions.

2. Pre-analytic vision of ecological economics



In this vision the economy cannot go on expanding in what Daly terms the “full world” situation. The availability of “natural capital” sets restraints on what how much the economy can expand both in regard to sources of materials and energy and in regard to “sinks” where the wastes of economic activity have to be absorbed by the planet. Moreover certain inputs into the economy are absolutely crucial because they enter into all economic activity – specifically energy inputs which power all the machines and devices of modern civilisation. It is true that materials like metals can be recycled but this takes energy and there is always some net loss.

Moreover most energy is currently fossil energy and is non renewable. It is subject to the laws of physics and entropy. One cannot recycle energy and there is evidence that it is becoming more costly, in energy terms to access fossil energy (coal, oil and gas). At the same time there are absolute limits on the amount of renewable energy too, which, because it is less dense and intermittent, is not such a convenient source.

Scale Limits, Sustainability Rules and Substitutability

What measures can we use to assess whether economic development has reached the sustainable limits?

On this question mainstream economists and ecological economists tend to disagree and have developed what have been termed alternative “weak” and “strong” sustainability criteria.

The *weak sustainability* criteria held by neo-classical economists is based on a belief that future generations will be richer because of economic growth and that all that is required is that the “bequest package” of all kinds of capital from one generation to the next is not, in aggregate, smaller. In this point of view it is perfectly justifiable to run down “natural capital” resources as long as adequate substitute human made capital resources are built up instead. To these economists what matters is the overall monetary value of the bequest package rather than what the portfolio of real assets underlying the financial package actually consists of. Future generations may not have all we have access to – but will have adequate or better substitutes.

By contrast *strong sustainability* rules suggest that minimum amounts of different types of capital (economic, ecological, social) should be independently maintained, in real physical and biological terms. Ecological economists insist that there are some natural resources which are essential inputs in economic production, consumption and welfare that cannot be substituted for physical and human capital, some environmental components are unique and some critical environmental processes may be irreversible – eg climate regulation. This gives rise to *strong sustainability rules:*

For a *renewable resource* – soil, water, forests, fish – the sustainable rate of use is not greater than the rate of regeneration of the resource (e.g. fish – not sustainable if more fish are caught than the rate of growth of the remaining fish population)

For a *non renewable resource* – fossil fuels, high grade mineral ores, fossil acquifers – the sustainable rate of use is not greater than the rate at which a renewable

resource is substituted for it (eg an oil deposit can only be used at a rate at which some is set aside and invested in wind/solar/biomass so that when the oil is gone an equivalent energy stream is available to replace it).

For a *pollutant* - the sustainable rate of emission is no greater than the rate at which the pollutant can be recycled, absorbed or rendered harmless in a sink. (eg sewage can be put in a water system no faster than bacteria and other organisms can absorb its nutrients without the aquatic ecosystem being overwhelmed and destabilised).

Markets, Technology and Substitutes to the rescue?

Mainstream economists do not see things in this way. They assume that markets will be able to anticipate scarcities and problems arising from the limits to growth, that these problems will be reflected in rising prices in forward markets – and then the rising prices will create and incentivise profitable opportunities for technological solutions. If necessary it is recognised that the state may have to step in to adjust prices to ensure that incentivisation is strong enough to bring about the necessary new technologies and substitute arrangements. Thus markets and ingenuity will always provide alternative arrangements on a rising curve of human wellbeing. The message is therefore that we do not need to be particularly worried about climate change or peak oil or the depletion of fossil energy or other resources. Greater efficiency of resource and energy use and other ways of doing things will enable us to find a way out of our problems.

But there are problems with this view which can be illustrated with a case study – energy usage and carbon by the internet. At the current time the internet uses about 1 to 2% of the global energy supply. Roughly 50% of this is energy used in the internet day to day and the other 50% is the energy used to create the computers, infrastructure and so on. Technological change is so rapid that the energy efficiency of the internet is improving 10 times every 5 years. That seems highly reassuring – however despite this, overall energy usage by the net is doubling every 5 years. Continue that trend for half a lifetime and the net would be using an amount of energy equivalent to the current entire global energy usage. (Starting at 2% and doubling every 5 years this would be 4% in 5 years, 8% in ten, 16% in 15, 32% in 20 and so on....)

The fact that energy usage increases even though energy efficiency is rising was first noticed by the English economist Stanley Jevons in the 19th century. Indeed increased energy efficiency tends to generate increased usage – people with cheaper low energy light bulbs leave them on all night. Corporations that use internet video conferencing between their executives rather than flying them to meet each other save a lot of money and energy – but the money saved is then used for business expansion which means the purchase of goods and services...which consume energy...so the value to the environment of the gains are undone with no absolute reduction occurring.

Locking in the gains of energy and materials efficiency would require an absolute cap on energy usage that would be reduced to the sustainable maximum that the planet can bear.

The Drivers of Economic Growth

If this is so what drives the current fixation on (un) economic growth? One aspect of the answer is that growth appears to avoid the need to address a variety of problems – because with more growth, it is argued that greater income and wealth in the future can be devoted to dealing with poverty and even environmental problems. The so-called “Environmental Kuznets curve” appears to show an improvement in environmental conditions as societies become richer. However, it turns out that this is largely an illusion because as they become richer countries ‘offshore’ their dirty industries to poorer countries like China and then import the products produced with environmentally destructive technologies instead of producing them themselves.

What particularly drives the growth process is, however, a debt based money and banking system. For centuries most societies regarded money lending against collateral and the payment of interest as unethical and socially corrosive. In pre-industrial economies which do not grow repayment of loans with interest compounded each year would transfer greater proportions of national income to money lenders and be destabilising. However, when lending occurs to industries and people whose production and incomes are growing there is an increment of income and production to be shared with lenders. Larger scale production, involved purchased inputs and paying wages with a time gap until later product sales brought money in from distant markets – this frequently necessitated money to be advanced to cover the gap.

The finance sector evolved to serve this need. But now the economy had to keep on growing to repay loans and pay the interest too. If and when the economy did not grow this led to insolvencies. It also put the solvency of the finance sector at risk if loans could not be repaid.

An insolvent bank sector would have further implications for aggregate demand and markets in the economy. Although most people probably think that it is created by governments 97% of the money in circulation is in the form of deposits created out of nothing when banks make loans. If lending slows down, or goes into reverse with loans being paid back, then the money supply falls. A self reinforcing vicious circle occurs. With unemployment and bankruptcies increasing households and companies hold back on discretionary spending on themselves or on investment projects. Expenditure falls even more. The growth economy based on debt money does not have a reverse gear. It grows or collapses.

Only the state can save the economy in these circumstances. Faltering economic activity typically means that taxation revenues will fall while some state expenditure like social welfare and unemployment benefit will rise. So the state tends to fill the deficit in demand but at the expense of a budget deficit. The state (or the central bank) may also step forward to bail out important “too big to fail” institutions like the banks.

All of these processes mean, however, that a crisis of private sector finances arising from too much debt in relation to faltering economic growth gets turned into a crisis of state finances as state revenues fall, and expenditures rise, leading to a rising deficit.

Economic Problems Facing the world today

Of course, it would be misleading to understand all economic problems in the world as simply symptoms of a limits to growth crisis. There are other processes going on too that contextualise the situation in which engineers are working. Two other processes in particular are having dramatic consequences for economic activity: financialisation and changing competitive imbalances between countries.

Financialisation – the growth and influence of the finance, real estate and insurance sector in many countries has transformed what were service activities into being effectively the dominant sectors in economies – with considerable influence in political systems. Globally the number of transactions involved in trading financial and other assets, transactions in foreign currency exchange, in borrowing and lending, as well as the transactions which are essentially bets about the forward prices of currencies, interest rates and financial assets are all, taken together, much greater than the number of transactions involved in the production of goods and services in the so called “real economy”.

As a general rule the finance sector attempts to put all of the risk of borrowing onto the borrower. Other forms of capital provision approaches are possible – for example capital providers and capital users can share profits and losses. However, most western debt finance involves requiring borrowers to forfeit collateral, for example their house. Thus modern financial systems tend to lend very little to what are seen as risky businesses ventures – instead a large part of lending is for land and buildings and indeed most bank lending is collateralised against the housing and property markets.

Another part of finance sector lending is to governments. If states cannot pay their lenders then the practice enforced by economic orthodoxy is now to privatise their assets – as in the current Greek crisis. Of course, in theory countries that issue their own currencies can always get their central banks to print more to pay their debts and mainstream economists are typically disapproving about this. “Monetizing state debts” risks creating too much money chasing too few goods – in other words it is said to risk inflation and a fall in the value of money to the detriment of savers, typically pensioners. Thus the Treaty of Maastricht bans central banks in the European Union from directly providing money for state bonds. And of course in the eurozone member states cannot print money as they do not issue their own currencies.

This is somewhat ironic because when the money supplies of countries have been created and controlled by the private banking sector in a completely unregulated way then money creation oscillates between the over creation of money which inflates asset prices (particularly land and house prices) and the under creation of money which leads to recessionary conditions. This should not surprise. Banks lend when they and borrowers are most confident, which is during periods of expansion. They thus create credit money and purchasing power when it is not needed and thus tends to over hype the booms. Land prices and rents in particular are inflated because the supply of land and locations is fixed. So wealth concentrates in property and credit is created to cash in on rising property values, which pushes rents and

prices up even more. This is a speculative bubble which ends typically because servicing the debt accumulated when buying at the higher and higher prices becomes unsustainable.

Subsequently, in the recession, sentiment is pessimistic so banks are cautious about lending and borrowers cautious about borrowing. So banks create debt money when it is not needed and do not create it when it is needed.

None of us have a divine gift of being able to forsee the future which remains inherently uncertain. This is true also for players in the financial markets who, when they commit money, are making judgements about what they think will happen motivated by the prospect of gain and the fear of loss. So how do they make these judgements? The answer is that, to a large extent, they go along with what other traders are thinking. Markets are powerfully driven by crowd...or herd...psychology. In a speculative boom optimism prevails. In a recession pessimism is infectious Indeed a largely ignored economist called Hyman Minsky described bubbles as “the euphoric economy”. In such periods of over confidence ethical restraints also tend to loosen. A professor of economics and law, William K Black, estimated that there were at least one half a million crimes committed in the period of the sub prime bubble in the USA. Reckless lending to people with no income and no assets brought the brokers’ bonuses and then the risks of these unsound loans were parcelled up into collateralised debt obligations and passed on to unsuspecting investors like pension funds and banks at the other side of the world.

As Black observes, neoclassical economists like to point out that when economic actors pursue their private interests through markets that a self organising process occurs that leads to the provision of the goods and services that people want. But the same self organising process, motivated by self interest, will also self organise the provision of ‘bads’ too - for example, a market for crooked accountants to look the other way during a bonanza of predatory lending.

Another important observation is that financial markets (and the politicians looking after their interests) are incredibly short term in their thinking. It is these markets, and their players that have most influence over governments and preoccupation with short term financial issues tends to crowd out consideration of the long term issues that is needed to take decisions about sustainability.

Competitive imbalances between countries

Debt and financial problems are compounded by changing power relationships between nations and parts of the world. Borrowing is a mechanism for dealing with imbalances – if an individual, company, state or nation is spending and consuming more than its income this is possible by running down savings and/or by getting into debt – but only up to a point beyond which crises loom. As competitive imbalances between countries grow a mechanism for rebalancing exists in changing the exchange rate between their currencies. If the Yuan falls against the American dollar then American people buying Chinese products have to pay out less dollars to buy the yuan that they will need to buy the Chinese products. Conversely Chinese people buying American goods have to pay more yuan to buy the dollars that they need to buy the American products. A falling exchange rate thus gives a country an

advantage in selling its products abroad – or, the other way round, disadvantages foreign competitors. This can lead to “beggar my neighbour” conflicts between countries that are facing falling demand and rising unemployment.

In the Eurozone member countries have given up national currencies and therefore lost a mechanism adjusting for competitive imbalances. The southern eurozone countries are sending their purchasing power abroad to buy German goods more than the Germans and northern Europeans are buying in the southern countries and Ireland. This produces shortages of purchasing power – and then unemployment not to mention causing shortages of state revenues and increased state support expenditures in the countries of the south. To a large extent the budgetary crisis in the southern countries are an indirect result of the inability of southern countries and Ireland to compete with Germany. The budget and state debt crises of these countries cannot be solved by cuts and tax increases as this only drives these economies deeper into recession causing state revenues to fall even more in a vicious circle. The other aspect of the crisis has been a property bubble – cheap finance from eurozone banks created speculation in the building and property that burst and leaving southern and irish governments to bail out the banks.

Disaster Capitalism

Disasters caused at the limits to growth (eg the Russian heat wave that destroyed the harvest in 2010, the floods for two years in Pakistan and in Bangkok, the hurricane that destroyed large parts of New Orleans), catastrophes caused by the financial crisis as well as by competitive imbalances between countries, intensify increasing inequality of power, income and wealth. Those economic sectors that are “too big to fail” and which have access to finance from state backed rescues are in a position to take advantage of the crises of states, companies and individuals. By driving whole societies into ruin opportunities are opened up. Privatised assets can be acquired cheaply. At the same time social unrest, rising crime and distress are profit opportunities for the armaments and securities industries. Further the bail outs to the finance sector (for example in the USA) has given elite financiers cheap money that they can use to buy up natural resources that become scarcer as the limits to growth kick in – land, harvests, fossil fuel resources etc. One controversial consequence is the way that, in the USA, this cheap money has funded the boom in fracking for oil and natural gas. Most of the exploration and production companies paid out more than they have received (negative cash flow) which suggests that fracking has been what economists call a “bubble” carried along by a collective illusion, while creating considerable environmental and social costs.

Controversies in Economics

In conclusion, it is useful to remember that economics evolved originally out of the moral philosophy of David Hume, Adam Smith and then the utilitarianism of Jeremy Bentham (whose mummified body can still be seen on display at the London School of Economics at his own request). Mainstream economics is anthropocentric and takes for granted that Planet Earth is there for human use. In this world view nature is turned into a human artefact available as a resource for our consumption. It could not be more different from a view of nature as Pachamama, for example, loosely translated as mother earth, which is the world view of indigenous peoples in the

Andes to whom the extractive exploitative economics of “advanced economies” is an anathema, which is why they have passed laws, for example in Ecuador, embodying rights for eco-systems in their constitution.

The utilitarian philosophy from which economics was developed assumed that the welfare of individuals would be reflected in their preferences based on what gives pleasure or reduces pain and these “welfare” seeking motivations are reflected in what prices people are prepared to pay, or will accept in payment for things, including for a clean or safe environment. These preferences are sacrosanct to many neo-classical economists. Thus the attempts of politicians or officials to decide about the environment are held to be inferior to decision mechanisms in which what people are willing to pay, or what they are willing to accept in payment, for ‘environmental goods’ are regarded as more accurately revealing the choices that will maximise “environmental welfare”. This way of thinking then leads to benefit cost analysis and to so-called “Least Common Denominator Utilitarianism” embodied in the Kaldor-Hicks compensation principle – a policy change is justified if the winners (measured in strictly economic terms) can compensate the losers of a policy and still have something left over.

Quite how this is supposed to work when future generations are not yet here to express their preferences and to be compensated remains unexplained. Nor does the economics mainstream have anything to say about how preferences are formed. Ask people what they are prepared to pay to protect Pandas and Polar Bears and you might get a positive sum of money offered – but a survey of uninformed people are probably less prepared to pay for the bamboo that pandas eat and even less for the creepy crawlies that are integral part of the eco-system in which Pandas... and humans.... find themselves. All of this suggests that for environmental policy to be appropriate it must be well informed and the subject of collective deliberation in decision making processes that are quite unlike how we express our preferences in purchasing decisions between the alternatives of baked beans and spagetti hoops in a supermarket.

The matter of available information is particularly important because many environmental decisions are about issues where there is a great deal of uncertainty in what outcomes will be. Mainstream economics does not have a good record in taking uncertainty into account, especially where it is what is called “strong uncertainty” - unknown unknowns or known unknowns but where risks and probabilities cannot be calculated.

In order to “prove” from its starting assumptions that competitive markets optimally allocate resources in the best of all possible worlds economic theorists have constructed theoretical models that assume that market actors have “perfect information” now and about the future. This seems a long way from the real world in which none of us have a divine ability to foresee the future, in which it takes time and effort to find about current situations, in which people have great reluctance to accept unpleasant realities, in which there are taboos against some kinds of knowledge because of ideological allegiances in groups, in which there is a massive network of arrangements to ensure that many business dealings, including environmentally destructive ones, are kept secret - and in which there is good deal of misinformation put out by the public relations industry hired by vested interests in

order to throw doubt on inconvenient truths – for example about climate science.

Nor is it true that all people decide on environmental issues based on maximising their personal welfare. Many people decide to do things not because those things will give them pleasure, or reduce their pain, but because they think that they ought to or because they think that it is the right thing to do. This includes doing things that do not give them pleasure but are perhaps risky, or involve considerable self sacrifice. The world is full of war memorials celebrating dead people who were clearly not motivated by utilitarian principles.

In conclusion, as the economy reaches the limits to economic growth new ways of thinking are needed in order to be able understand what is happening, approaches that are transdisciplinary. Unfortunately there is considerable inertia in the realm of ideas and considerable fragmentation of subjects which makes the broad viewpoint that is needed unavailable to mainstream economics, a discipline that has become over-specialised. Even worse the thinking of economists typically reflects the viewpoint of powerful vested interests, taking for granted the world view and agendas of wealthy clients as self evident and unproblematic. The physicist Max Planck argued that in science new ideas rarely displace old ones because an old guard are converted to new ways of thinking - Saul does not become Paul on the road to Damascus. Rather the old guard retires and dies and a new generation replaces them who are familiar with a different way of thinking. It is important that training engineers familiarise themselves with the new way of thinking in economics for the very different and difficult world we are entering.

Concluding Note

In 12 pages this description of ecological economics is inevitably a simplification of a variety of approaches not reflecting fully differences of emphasis and view - for example between American and European ecological economists. Many of the latter have developed a more radical perspective sometimes called social ecological economics. There are thus greater and lesser degrees of difference with the economics mainstream, and greater or less tolerance for conceptual plurality - with some ecological economists arguing that an "anything goes" kind of plurality does not properly advance knowledge or understanding. Thus, for example, Clive L Spash is trying to develop a much more rigorous philosophical basis for the subject - basing it on an explicit ontology, epistemology, methodology and with explicit ideological values - in an approach which seems to me to reject a lot more of the economic mainstream.

Herman E Daly and Joshua Farley. "Ecological Economics", Island Press, 2004 A textbook of ecological economics one of whose authors, Herman E Daly, is one of the original pioneers of the subject.

Herman E. Daly "Uneconomic growth in theory and in fact" First annual Feasta Lecture 1999 , in Feasta Review number one, Dublin 2001 - available at http://www.feasta.org/documents/feastareview/daly1.pdf

Tides Foundation/Annie Leonard The Story of Stuff http://www.youtube.com/watch?v=9GorqroigqM

Brian Davey, “Credo: Economic Beliefs in a world in crisis” Feasta Books, 2015 – book website with updating articles at www.credoeconomics.com Alternative textbook about economics, environment and ethics.

Josh Ryan-Collins, Tony Greenham, Richard Werner and Andrew Jackson "Where does money come from? A guide to the UK monetary and banking system" New Economics Foundation, 2011 Explains how the banking system creates new money and concludes that the current money system is inhererently unstable.

Steve Keen *"Debunking Economics. The Naked Emperor Dethroned"*, Zed Books 2011 This is a sort of anti-textbook that demolishes most of the theory found in standard economics textbooks. It has little on ecological and environmental issues however. Very thorough in what it does but not for beginners.

Fred Harrison *"Boom Bust."* Shepheard -Walwyn Publishers, 2005 A study of the economics of the land market and the financial system. Harrison is also associated with the *Renegade Economist*
blog http://www.renegadeeconomist.com/

http://michael-hudson.com/2012/03/film-real-estate-4-ransom/ *Real estate for ransom* -- Australian internet video on the role of property speculation, land and rent in the Great Recession. This internet video is on the website of Professor Michael Hudson who, taking a viewpoint derived from of the classical economists, views most neo-classical theory, that justifies the predations of the finance, real estate and insurance sector, as "junk".

Naomi Klein's Shock Doctrine and the rise of disaster capitalism
http://www.naomiklein.org/shock-doctrine also
http://www.youtube.com/watch?v=hA736oK9FPg

Yves Smith, *"Econned"* Palgrave Macmillan 2010 This book is an expose of the corruption and lawlessness of Wall Street high finance by an author who runs the *Naked Capitalism* blog http://www.nakedcapitalism.com/

Internet video lecture on economic crime by a Professor of Law and Economics, William K Black
Why Elite Frauds Cause Recurrent, Intensifying Economic, Political and Moral Crises.
https://webdisk.lclark.edu/econ/steinhardt2010/steinhardt2010.html

Concerned Health Professionals of New York: Compendium of Scientific, Medical and Media Findings demonstrating risks and harms of fracking. http://concernedhealthny.org/wp-content/uploads/2014/07/CHPNY-Fracking-Compendium.pdf

Daniel W. Bromley and Jouni Paavola (eds), *"Economics, Ethics and Environmental Policy. Contested Choices."* Blackwell Publishing, 2002 a set of essays that debate the philosophical basis of economics thinking on the environment. Good to help understand the limits of benefit cost analysis and the utilitarian concepts at the heart of economics that turn nature into a human artefact.

Internet video Clive L Spash *"The Limitations and Dangers of Economic Valuation. Reflections on the 'New' Approach to Bio-Policy"* Videod lecture - shows the questionable logic and ethical issues involved in market approaches to protecting biodiversity
http://vimeo.com/20787185

Clive L Spash *Fallacies of economic growth in addressing environmental losses: Human Induced climatic change.* Article that does what it says on the tin.
www.clivespash.org/fgml.pdf

How to help create environmentally sustainable and self-reliant neighbourhoods
http://www.lifewithoutmoney.info/images/Achieve%20Now.pdf - Start living now as you may have to during energy descent!