

Economic Growth: The Wealth Creation Delusion

An Essay Paper by John Stockford Stone

Earth is the finite system which gave rise to us and which sustains our existence. Everything we do transforms this natural system in some degree. We cannot create or destroy Nature; we can only transform it for better or worse.

This paper is not an academic dissertation but a critique born out of my dissatisfaction with the economics I was taught at university and my inability to relate it to my experience of the real world; and latterly my concern over the alarming social and environmental consequences of the path that economic development is taking. The latter confirmed my earlier conviction that I needed to set aside the textbook “laws of economic behaviour” and delve into the belly of the beast to explore the reality which arises. After a long interval the paper started life in 1997 and has been progressively updated ever since.

It has been instructive to look back on its development over 20 years and read the increasing alarm as the clash between the world’s economy and its natural environment approaches its dénouement.

Contents

Foreword: The Elephant in the Room	P3
Introduction: Placing economics into context	P4
Economic History	P8
Wealth Creation	P8
Waste Creation	P16
Limitless Growth + Finite Planet = Transformative Disorder	P17
Economic Inflation	P18
Economic Debt	P19
Wealth Distribution	P20
Corporate Colonialism	P23
The Market Commons	P23
Universal Basic Income	P24
Comparative Advantage in International Trade	P25
Energy: Sourcing and Use	P26
Human Population Growth	P29
Gender Economics	P31
Sector Growth	P33
Essential Growth	P33
Gaian Economics: A Sustainable Future	P34

Foreword: The Elephant in the Room

The classic elephant in the room is one which is not seen.

Ask an economist what is the single most important requirement in economic development and the answer will almost certainly be the need to increase productivity (the ratio of output to input) in order to be competitive and achieve sustained economic growth. *And that is the point where the unseen elephant gets stuck in the room.*

David Attenborough has spotted it, but he's a naturalist and can be expected to spot an elephant. But if the room is an economic space why can't economists spot it also? The mind may play a trick when faced with extreme fear of an existential threat. It's a psychological mechanism termed displacement (identified by Sigmund Freud) which displaces fear of the threat by occupying the mind with more mundane activities. So a rabbit chased by a fox might suddenly stop and start grazing; and the fox having read-up on Freud knows it's onto a good thing. Likewise, economists faced with extreme fear of an existential threat to their esteemed status as "scientists" and their power as wealth creation gurus, "unsee" the elephant and go about their everyday displacement business of legitimising the folly of transforming Earth's natural wealth into money wealth in the misguided belief that it is the business of creating real wealth.

So how come I can spot the unseen elephant in the economic room?

Well, I happen to like elephants. But of course the unseen elephant is a metaphor; and therefore not a physical construct to be located by the senses but a metaphysical construct to be located by the mind.

Many others have spotted the elephant too. The trouble is that a world in thrall to the material wonders of economic displacement activity is not disposed to hear the message that the rationale which underpins it is fatally flawed and gives rise to a real existential threat. So rabbits will go on getting caught by foxes until they see the error of their ways and mug-up on Freudian displacement.

The Oxford economist Kate Raworth describes the unseen elephant in her new book "Doughnut Economics" and proposes a set of principles by which economics can be navigated to the point where the essential needs of the world population can be balanced by the Earth's capacity to provide for them. It takes determination and integrity to be a heretic in a world of economic orthodoxy blinded by the power of collective displacement. But how else do we progress?

So what is this unseen elephant which is crowding the room-space of political economy? It has existed since the beginning of time. It is logic. The laws of Nature are determined by logic; and whilst they give rise to the physical world the laws themselves are unseen and must be deduced by logic from physical evidence.

It follows that when we set out to argue a scientific case for laws governing social behaviour, as do economists – then go on to use those laws to set out a scientific path for greater prosperity – we must strictly adhere to the cast iron laws of logic; just as in the logical argument in a mathematical equation. Also, just as in mathematics we need to ensure that the premisses supporting the arguments are valid before we place confidence in the conclusions. Otherwise the unseen elephant inevitably crowds the room. And the clear and present existential danger to all of us is that the room is getting smaller while the elephant is growing larger.

Introduction: Placing Economics into Context

Contrary to what the text books leave out, economics does not exist in a vacuum; so a little contextual background is needed. Let's start with the beginning of time.

The universe is believed to have been created by a primordial event (big bang) some 13.8 billion Earth years ago. Hydrogen (H) was the first element, an atom with the simplest structure consisting of 1 proton + 1 electron. It is still the most abundant element in the universe; with the other elements arising from collisions and fusions in a volatile space. When two hydrogen atoms are forced together by the dense pressure within stars such as our Sun, their nuclei fuse together in a process which transforms the hydrogen elements into a single helium (He) element. This transmutation (nuclear fusion) releases huge amounts of energy in the form of solar (in the case of our Sun) radiation which, after a journey of 93 million miles strikes Earth's atmosphere.

Earth is thought to have been formed from clouds of gas and dust in the Milky Way some 4.6 billion years ago and has entered into cyclic rotation on a tilted axis and solar orbit giving rise to seasons, thermal transference and hot and cold regions. Hydrogen and oxygen combined to form the H₂O molecule, and the surface of ancient Earth became virtually all sea, together with an atmosphere which shielded it from lethal levels of solar radiation by reflecting part of it away via clouds and scattering the rest to light up our sky and enable plants to photosynthesise and us to get tanned at a beach resort (not too much exposure, please!).

Other chemical compositions were formed which together created the initial conditions for a biosphere. As the sea cooled it became shallower and a land mass emerged to form about 30% of Earth's surface today. The relationship between land and sea remains dynamic, with land as a crust (composed mostly of silicates) supported by rafts (Tectonic plates) floating on the volatile molten rock of Earth's mantle. The floating of the tectonic plates, bearing sections of landmass, gives rise to "continental drift" as they move slowly around the Earth in geological time. Plates coming together form "fault lines" (earthquake zones). One plate may

even dive beneath another (subduction). Landmasses colliding as a result of continental drift have caused them to crumple and form mountain ranges (Himalayas, Alps, Andes etc.). And continents are still drifting.

Along with the evolution of the planet's geology has come the emergence of the biosphere with distinct life forms. During the time that Earth was "water world" probably some form of refraction of sunlight in the murky water kick-started photosynthesis and primitive forms of biota which evolved into a complex food chain.

With the emergence of landmass, creatures such as reptiles (including precursors to birds) and mammals emerged from the sea to colonise it. Mammals have evolved superior cerebral powers to become top of the food chain, latterly (in evolution time) in the form of anthropoid apes. Evolving via a series of different hominids, Humankind (*Homo sapiens*) emerged to become top dog, and made serious steps to move from adapting their needs to the constraints of their natural environment to adapting their natural environment to suit their needs. However their early adaptive methods were severely restricted by the constraints of nature.

In subjectively rationalizing existential nature and its works it was perceived to have a supernatural origin which needed to be placated.

In terms of British economic history, come the 18th century AD the invention of steam power to drive machinery, fuelled by the mass extraction of coal, kick-started the industrial revolution with the ability to mass produce inexpensive goods; thus growing a low-cost market economy. At the same time, wealth accumulated by the owners of the capital required to produce the goods stimulated a parallel high-cost market in luxury goods. Thus the distinction between the owners of their labour and the owners of capital in the productive process was cemented into a new social order.

The power of machines also enabled the mechanised exploitation of natural resources, such as farming, extracting minerals from the land and fishing the sea. The mechanisation of transport (especially the early railways) enabled the rapid movement of goods and easy mobility of people; and steamships enabled trade to develop in a wider geographical economy. In this process, nature became increasingly seen as an industrial resource to generate human wealth. On a more sobering note, the power of machines also enabled the mechanisation of warfare, raising its possibilities to wreak havoc on Earth and its population by a previously unimaginable order of magnitude.

The age of enlightenment is defined as the period when a reasoned approach to nature emerged to supersede the previous supernatural perception. It is uncertain when that process began, but certain figures stand out as pioneers. Leonardo da Vinci (1452 -1519) undertook extensive dissections to gain empirical insight into the structure and systemic mechanics of the human body. He invented a remarkable array of devices, including a diving suit, a flying machine and robotic figures. So he was an accomplished scientist and engineer as well as a great artist. Galileo Galilei (1564 - 1642) is credited with a central role in the transition from natural philosophy to the scientific revolution; creating a telescope so that he could study the cosmos more clearly. Isaac Newton (1643 - 1727) mathematician and physicist, founded laws of gravity and motion. It might be said that they were among the founding fathers of scientific knowledge.

So along with the evolution of Earth's geological system, and the evolution of Earth's biological system, has come the evolution of the perception of nature in the form of an objective body of scientific knowledge; with the simplicity of supernatural certainty giving way to the complexity of scientific probability. Scientific certainty would require universal knowledge, which is impossible. So in the absence of universal knowledge we can never say for certain that there is one true explanation for any phenomenon with no viable alternatives.

The scientific method is a philosophy of empirically verifiable knowing; and knowledge can never be more than probability. So wisdom is holding to the most probable explanation until a more probable explanation comes along. That's progress!

What the heck does all this have to do with economics and the price of potatoes in the supermarket? Well it reminds us that Earth is a system which has evolved to give rise to us and all the natural resources which support us in our friendly home. So if we hope for existential longevity it is salutary to give proper regard to this awesome evolutionary process and our place in it before we act in ways which systemically change it. It is therefore wise to discard the hubristic notion that we can "master nature" in favour of the humble recognition that nature is the creative process we need to work with if we are to progress.

Complexity means that species and their environment are interdependent for their existence (viz. the nature of ecology). So when an environmental change arises which critically affects the existence of a species, it either adapts or it goes extinct. Adaptation may be a conscious behavioural change (implying a learning thought process) or an unconscious genetic modification.

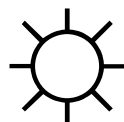
The evolutionary process depends to a large extent on species becoming extinct, thus making way for others to emerge and flourish as the environment evolves. So species become extinct when their environment reaches a critical tipping point and is transformed into one which no longer favours their existence. Therefore, if by our actions we humans deconstruct the ordered pattern of the natural system which supports us, we transform the interdependent evolutionary process to a more volatile state which may no longer favour our existence. So if we do not wish to join the long list of extinct species we must ensure that we fully understand the evolving ecological interdependence between us and our environment before we act in ways which change it.

Existence in nature is a cycle of birth, life and death (BLD). Our sun will eventually run out of hydrogen fuel and die, taking Earth with it. Even the universe itself is in a BLD cycle. There are billions of other planets in BLD cycles along with their stars; so it is highly probable that there are other planets in the universe where life forms may have evolved to successfully adapt their activities to harmonise with the evolution of their natural environment. It follows that there is nothing special about humankind that allows us to live forever and defy extinction. But let's not rush it! Let's be the best we can while we can, and truly live up to the title we have bestowed on ourselves: Homo sapiens (Wise Man).

As for the price of potatoes on the supermarket shelves. Climate change might well wipe out the ubiquitous spud whose existence we take so much for granted. If so it would become priceless. That's the economic reality of natural interdependence! Mother Earth is our home and we need to show her due respect for the life that she gives us if we want to hang around a bit longer.

Forever

There is only one who gives us birth
Father, mother, sister, brother
No other Earth-Mother
Mother-Earth
She who gives us nurture
must in return we nurture
For if the music of the spheres
falls forever on deaf ears
There will be no ears
Forever



Economic History

Recorded history depends upon who writes it, and for whom. The history of empire is written by the imperialists and tends to be the patriotic biography of power and the powerful to glorify their history and engender national pride. Just think of all the military leaders whose deeds and victories embellish the imperial history taught uncritically in British schools! Not too much written in favour of the struggles of colonised peoples to wrest their countries back; which have been reshaped socially and geographically by foreign occupation. The disruptive consequences linger on. So the substantive history of conflict is usually written by the winners; and competition to grow economies in an environment where possibilities are finite necessarily generates conflict (including wars). There is therefore predisposition in favour of the powerful winners and their methods when describing history, especially when it is perceived as patriotic and socially progressive. In that way history is written by and for the establishment; and since schools and colleges form part of that establishment – dependent upon it for their existence – curricular textbooks inevitably become a form of indoctrination into established ideas, values and “truths”. Teachers should not simply teach established beliefs; they should explore possibilities with their students to see if there are valid alternatives (and hopefully keep their jobs). That way pupils will learn to research for themselves and argue the case for their own conclusions. Too rebellious? A little rebellion keeps us on our toes! Political economy is just that: Economics which is determined by politics. So don't be fooled by economic history as necessarily charting the true path to wealth creation, distribution and a democratic polity. It is wise, when reading an historical account, to ask who wrote it and for whom. As the celebrated Native American musician Buffy Sainte Marie famously remarked in a 1977 TV interview: “October 12th 1492 was when the Native North American people discovered Columbus”.

Wealth Creation

Look up the meaning of Economics and you will find the term *oikonomia* or *oikos nomos* (household management) attributed to the ancient Greek philosopher Aristotle more than two thousand years ago. The modern economic household covers scales from the nuclear family right up to the global family.

Wikipedia describes economics as "a social science concerned chiefly with description and analysis of the production, distribution and consumption of goods and services". The production of goods and services is deemed to be wealth creating and a measure of the economic success of any country. So in academic terms:-

The raison d'être of economics is theory of the creation and distribution of wealth. It is therefore perceived as a duality and seeks to rationalize those two propositions.

The extent that governments should play a role in this creation and distribution process (free versus regulated markets) is the very stuff of politics, giving rise to the term *political economy*.

Economics defines assets as anything which can be traded in the market. Such things have value and, setting aside barter, sharing and altruism, money is the unit of measurement to establish asset value and facilitate trade. Money itself has no intrinsic value; it is just an IOU ("I owe you"): a signed document acknowledging a debt. In modern economic states the central bank issues IOU's in the form of promissory bank notes, coin or digital money; otherwise known as the legal currency of the state. Legal currency is therefore a state underwritten IOU which circulates and enhances trade. So in economic terms, wealth at any time is measured by the monetary value of assets and the legal currency in circulation.

The World Forum on Natural Capital defines it as "the world's stocks of natural assets which include geology, soil, air, water and all living things". It goes on to say "It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible". Natural capital when employed in the trading process is assigned value in accordance with the marketability of its productivity, thus earning money-wealth for its owners.

"All living things" must include human beings; so in economic terms people are classified as natural capital (i.e. potential producers/earners). In a free society, workers are deemed to be owners of their labour, and can negotiate the terms of its trade and market value. To deny them ownership of their labour is slavery; a social system where people are capital assets owned by others.

Aristotle's household management included slaves. He believed that people were naturally either slaves or non-slaves. I don't think I would have liked to work in his household – philosophically speaking that is! Sadly people can still be bound by oppression or criminality into some form of slavery in countries around the world – including illegally in advanced industrial civilizations. It can also be argued that workers forced by poverty into work for subsistence wages (or worse) are the victims of virtual slavery (serfdom). This is particularly the case where they have little or no powers of representation, recognised human rights or effective protection in law.

There is a fundamental problem with identifying Earth in terms of its capital stock of natural resources. For in doing so we are considering Earth solely as an economic factor, and neglecting proper consideration of its systemic health. Since we depend upon the health of our planet's

systems for the health of our own lives, this seems a mighty oversight, with the potential for a tragic oversight (think global warming). A more precautionary approach would be to consider economic activity as transformations of Earth's natural capital, and value them in terms of their overall impact on our welfare. In that way the vital recognition that humanity is constrained to live naturally within the finite resources of the planet would be incorporated into the theory and practice of economics. As it is, the orthodox development paradigm values people and other species, meadows, forests, rivers and seas etc. in accordance with their ability to add money value to an economy. The central proposition is that it is a process of wealth creation and, in the absence of any recognition of natural constraint, economies can grow without limit.

Growth in wealth creation is regarded as fundamental to the principle of economic development, and to challenge it is tantamount to heresy because challenging the principle of indefinite growth is to challenge the foundation on which the present social organization of industrial civilisation stands. Challenging the growth maxim challenges the status quo of the other part of the economic duality: the distribution of wealth. So long as indefinite growth can be posited, the wider distribution of wealth can be promised: more jobs, more money, better public services and greater security in old age. While the economy delivers growth, then seriously addressing the tricky question of relative wealth distribution can be deferred. Indeed, distribution favouring the rich is posited as an economic necessity since they are the investors in further growth necessary to create jobs, lift the poor out of poverty and drive forward new technologies and modernisation. However, experience is showing us that the logical contradictions of growth driven economic development are becoming exposed: to propose infinite growth on a finite planet is an oxymoron. The naturalist David Attenborough once famously commented that anyone who believes in infinite growth on a finite planet must either be mad or an economist. I would simply add that it is perfectly possible to be both mad and an economist.

Growth in a crowded, finite market can only be achieved by increasing market share, where one trader's gain is another trader's loss. As a result competition becomes extremely fierce. To increase market share suppliers' must make their products more attractive; mainly by reducing prices. Then in order to maintain unit profit they will seek to increase the productivity of the capital resources employed (especially human capital) which in money terms boils down to seeking more and more from less and less. This drive by suppliers for cost reduction has consequences across the wider interdependent sectors of the economy: Jobs become fewer or more poorly paid and less secure as employers seek to reduce

labour costs. Companies outsource abroad, or even move core production abroad to where resources (especially labour) are cheaper.

Reduction in the spending power of the employed (or the newly made unemployed) means they are able to buy less in the market, causing suppliers to cut back on their “wealth creating” activities. Thus a deflationary downward spiral is created, squeezing employment and the wider real economy. As a result the tax base is reduced, so key public services, such as universal education and healthcare, become more difficult to sustain. Austerity in the public sector leads to publicly owned capital assets being sold off and leased back to finance service delivery; or the services seek financial viability by moving into the market sector. When economies stagnate monetarists advise governments to increase the quantity of money in circulation by printing money and buying back their bonds (another kind of IOU). This is called Quantitative Easing, but success depends upon if and how the new money is spent. People could simply buy bonds in another country, which would be a balance of payments debit; or they could buy Krugerrands (gold coins) and leave them in bank safety deposit boxes. Keynesians would advise that, if governments want to ensure new money is spent in ways which boost the economy it is better to spend it directly on public infrastructure, thus rejuvenating the economy and restoring the tax base. Less enlightened governments respond with austerity measures, thus exacerbating the underlying deflationary spiral.

The failing economic growth model in these circumstances increases pressure on the public sector to increase expenditure to redress the imbalance in wealth distribution. This is matched by increasing unwillingness by the private sector, and indeed the private citizen, to pay for it in taxation. The outcome is wealth convergence in favour of a minority with concomitant wealth divergence in disfavour of the majority; and we see old age becoming longer (so long as the public health services can sustain it) but less financially secure. If this distributive imbalance is not redressed a large and growing section of the community becomes excluded and effectively disenfranchised from the society in which they live.

Thus we have the economic growth model increasing the gulf between haves and have-nots, and between private affluence and public deprivation in a self-defeating downward spiral.

(More on this subject in the Distribution of Wealth section later in this paper).

Economic theory has it that competition is essentially good for the economy because it stimulates innovation and efficiency, drives down prices and so produces better value-for-money for consumers. However,

increasingly we witness the incessant drive for growth resulting in mergers and take-overs offering fewer job opportunities, and markets dominated by large oligarchic corporations. Price reductions through economies of scale are misleading when they are achieved by externalising unaccounted environmental and social costs. Moreover, oligarchic producers and retailers are motivated to maintain profitability by fixing prices through covert cartel arrangements; thus reducing the benefits of competition.

Such is the power of huge oligarchic corporations and their representative bodies (employers' trade unions) that we can talk of the corporate *fourth estate* alongside the legislature, the executive and the judiciary; with the new fourth estate increasingly becoming the more powerful force.

The press used to be referred to as the fourth estate through its ability to influence public opinion by informing and commenting on major issues.

But the media generally has largely fallen into the hands of corporate ownership where its propaganda value can be exercised to promote corporate interests. These corporations exercise such power that to an increasing extent they are able to set their own agenda through aggressive purchasing, marketing, brand projection, political lobbying and sponsorship. The stakes are so high, and the pressures so great, that ethical value inevitably takes second place to money value-added.

It is no exaggeration to say that governments rise and fall on the patronage of corporate power. To that extent then democracy is becoming subordinated to the power of corporate interests; and economic liberalism takes priority over humanistic liberalism.

In classical economic theory (with its supply and demand curves, its consumption functions, its laws of diminishing returns, marginal-cost pricing and comparative advantage, its assumption of perfect knowledge by the market players, and open access to all would-be players etc) the free market would reach equilibrium, with small buyers and sellers, and prices determined by market forces. The reality is that nothing could be further from the truth. Competition motivated by growth in an unregulated market place leads to consolidation and oligarchy; and redistributes wealth towards the already wealthy at the expense of the rest.

Growth per se is the sine qua non of modern industrial economies, and the absence of growth would rapidly send the whole socio-economic system into rapid decline and turmoil. Dependence on growth makes it necessary to increase levels of consumption – hence a constant search for new products and markets, the incessant reformulation and repackaging of products; and the growth in advertising and PR industries to maintain and enhance consumption levels with a plethora of aggressive advertising

and other promotions which insult the intelligence but which have gained acceptance as part and parcel of a modern growth economy.

So, while ecological survival in the interests of all requires a premium to be placed on conservation, the economic machine requires consumption to be valued for itself. The fact that economics classifies potential buyers of goods and services using the term consumer as a collective noun says it all!

Abstract money wealth is grown at the expense of degrading the life-sustaining qualities of Gaia (Earth) – money convergence achieved at the cost of environmental dissipation! We can create a motor car by transforming nature. In spacetime the product outcome is convergent (i.e. the car) but the environmental by-product of producing, operating and final disposing of the car is overwhelmingly dissipative. Economically, we have assigned and distributed money value to the productive resources used, and assigned money value to the finished product. So, a process, which is dissipative in terms of the state of Gaia, and inimical to its ability to support human life, is termed wealth creation and assigned money value. If we valued wealth in terms of planet health (viz. real human welfare) we would term the creation of money wealth under such terms as an overwhelming loss.

We perpetuate the myth of wealth creation by false accounting. Globally we are exhausting the natural capital of Gaia at an increasing rate and calling it revenue growth. Even elementary accounting draws a clear distinction between capital and revenue. A company which sells off its capital assets and utilises the proceeds as revenue will go broke as its capital becomes exhausted. However, we fail to apply the same simple principles to the false accounting of Gaia plc as we would to dodgy company accounting. ***The inevitable outcome will be that the time will come when Nature will call in the receivers and Gaia plc is declared bankrupt. To enable sustainable transformations of natural capital we need to replace it through a process of regeneration.***

The social validity of modern economics is premised on the assertion that it is a science of wealth creation, whereas the bitter irony is that it is a system of wealth destruction; and the socially elevated wealth creators are the (perhaps unwitting) wealth destroyers.

The delusion of real wealth creation is underpinned by the measure of wealth in terms of money. Health, education and even life itself are assigned money value. Anyone, who is not valued as an economic factor does not feature in the calculus by which economic society values people, and by which they participate in the distribution of wealth arising from the dissipation of a common natural heritage (natural capital).

Money has become a gambling chip in the casinos of the economic market place, where speculation on the value-swings of nominal

commodities and assets is played out, including speculation on the relative value of the companies which participate in the dissipative process. So whole service industries are founded on speculation on the money value of assets and commodities, including the value of money itself: the creation of money wealth out of money wealth! It is this gambling on the abstract money wealth of assets which leads to their valueless overvaluation, giving rise to speculative market bubbles and crashes which destabilize modern growth economies with such devastating social consequences. As in all cases of competitive warfare (virtual or otherwise) it is the innocent victims who have to pay the cost and pick up the tab.

But there is an even greater danger arising from our gambling addiction. If humankind persists in the endless pursuit of economic growth, by transforming natural assets into natural liabilities, it will inevitably bring the casino roof down on all our heads. Like some biblical scale act of retribution for failing to obey the higher rule of law – only it is natural law which is being disobeyed and Nature which will take retribution. The Nobel awarded scientific Intergovernmental Panel on Climate Change (IPCC) has warned that human caused climate change poses the greatest threat to humankind. So retribution may not be too far off! The dislocation between money wealth and real wealth echoes the dislocation between the making of abstract money and the making of real things. The problem is not money per se, it is the way we assign money value to processes which exhaust natural capital and call it wealth creation. A common measure of economic growth is the gross domestic product (GDP) of a country in terms of the monetary value of the volume of goods and services it produces. Growth is therefore measured by an index of the rate at which natural wealth is transformed into products relative to the money rate at which they are valued by the market. Growth on these terms is therefore the monetary valuation of the degradation of the natural wealth of the planet. So ironically, GDP growth is really measuring the diminution of real wealth.

Of course we do need economic activity to realize the things we need to support life in a progressively emergent civilization. But it would be more accurate to call this economic activity resource utility realization (RUR): the organization and transformation of natural capital in order to realize its human utility value.

Given that the natural resources of our planet are finite, growth in their utility realization can only be achieved in one of three ways: (1) we can continue to use up the planet's natural capital and spend it like revenue; (2) we can transform natural resources more efficiently; (3) we can transform natural resources only in ways which are sustainable over the long term.

The world economy, as set out above, is currently firmly fixed on (1) the unsustainable economics of resource depletion through taking more and more from less and less. This is the convergent path towards a systemic black hole. To argue, as is done, that sustainable growth is possible in these circumstances, requires setting aside the logic of possibility in pursuit of the patently impossible. Moreover, resource depletion is necessarily waste creation (i.e. unwanted matter), with all the equally unsustainable problems of toxic pollution (more later). In particular, it is unsustainable in its wasteful sourcing and use of energy.

If we gradually turn to (2) as seems likely when the unsustainability of (1) can no longer be denied, then unless we can stop depletion of natural capital altogether, we shall have merely mitigated the problems of (1) and not solved them. We shall simply be sustaining unsustainability a little bit longer. ***Only if we achieve (3) where the transformational processes are metabolic (from Gk. Metabolē: change to sustain life – through chemical reactions, energy exchange, regenerative transformation of matter etc) can we have a sustainably enhanceable system of utility realization.*** That is to say, we can achieve sustainable growth in resource utility only by creatively growing in accordance with the governing rationale of Nature. The probability of achieving this lies in exploring the microcosmic world of atoms and molecules to see what ecologically sustainable forms of synthesis and transformation are possible. For example, synthesised nutrition at the molecular level would enable vast areas of the planet currently monopolised by food production to be released for wildlife and species diversity which are so vital to the planet's ecology; and at the same time feed the many whose hunger is not currently catered for. At the atomic level, materials such as graphene, a 2-dimensional matrix of carbon atoms, can be synthesised to replace metals which are dependent upon mineral ores torn from Earth at such great cost to environmental and human health. Even more intriguingly, the relationship between energy and mass at the quantum level can be explored to develop technologies not yet imagined. This is the ecologically sound alternative to the prevailing delusion within economic orthodoxy whereby we confuse the creation of abstract money wealth with the creation of real wealth; a delusion which with terrible irony is destroying the real wealth of our planet. ***So the bedrock of modern economics is founded on the quick-sands of false economic theory and practice; resulting in the creation of abstract money wealth from the destruction of real wealth.***

Waste Creation

The flip side to wealth creation is waste creation. Economic growth without regeneration transforms natural wealth (vital matter) into waste (unwanted matter) both in the process and when we throw away the things when we no longer want them.

Along with environmental degradation from transportation due to increasing geographical distances between producer, wholesaler, retailer and “consumer” in the growing economy, comes accompanying growth in packaging. With its ephemeral utility, the manufacture and application of packaging has become a major industry in itself; and once discarded the packaging becomes a major source of waste. Even where waste is recycled it consumes large amounts of resources and energy in the process; and waste which is not regeneratively recycled is pollution of the planetary system and potentially toxic to humans and other creatures. Waste matter is not just something which can be buried out of sight and safely forgotten: it has consequences. Landfill waste breaking down can leach harmful chemicals into the subsoil, toxifying vital Earth systems such as groundwater (aquifers). Organic waste releases gasses such as methane (a powerful greenhouse gas) which escape into the atmosphere. And some inorganic landfill releases deadly gasses, such as hydrogen cyanide, which must be closely monitored.

Radioactive waste from the fission process in nuclear reactors is a formidable problem, with some highly toxic substances requiring thousands of years to decay to safe levels. To quote Wikipedia: “Nuclear waste requires sophisticated treatment and management to successfully isolate it from interacting with the biosphere”.

Carbon dioxide gas from burning fossil fuels rises into the upper atmosphere where it adds to the greenhouse effect of raising the global temperature by trapping some of the radiation from the Sun which would otherwise be reflected back and escape into space. The resultant rise in mean global temperature makes Earth’s natural systemic processes more volatile, changing familiar patterns such as climate and weather. And far beneath Earth’s geological surface the movement of tectonic plates, giving rise to earthquakes and volcanic eruptions, are heat driven. Some manufactured chemical products, such as chlorofluorocarbons (CFCs) used as refrigerants or aerosol propellants, also rise up and deplete the stratospheric ozone layer which protects human beings from excessive ultra-violet (UV) radiation from the Sun.

So, if we are to avoid environmental suicide, through adversely transforming the natural systems which gave rise to us and sustain our continued presence on the planet, it is vital that we urgently reform our household management so that it aligns with the rationale of the natural regenerative processes of our planet home and move to zero waste.

Limitless Growth + Finite Planet = Transformative Disorder

The outcome of limitless economic growth on a planet with finite resources is an emergent pattern of events converging towards consolidated ownership of capital assets, converging towards fewer and larger production and retail units and converging towards urban living and the built environment. We should bear in mind that in Nature convergence (decreasing space and increasing intensity) if not balanced by diversity, is a path towards a tipping point transition: a critically transformative state for the current pattern of order, with subsequent dissipative disorder before any new ordered patterns can emerge. This is dramatically illustrated by convergent patterns arising from the multiple effects of global warming. Melting ice caps and warming oceans cause rising sea levels and coastal flooding. Warming oceans create changes in currents, sea life, local climates, rainfall patterns (monsoons and droughts) and threaten the survival of established flora and fauna and the viability of farming practice. Warming oceans give rise to more frequent and severe hurricanes (hurricanes, cyclones and typhoons are largely different names given to the same phenomenon: a huge, self-generating vortex made up of an accelerating mass of rapidly rising warm air, giving rise to severe winds and torrential rain).

The global pattern is convergence in the areas of habitable landmass able to support the world's growing population; followed by convergence of people desperate to escape its causes and survive. Contemporaneously there is convergence of refugees seeking safety from wars. Wars typically arise from competition over ownership of natural capital (such as territorial landmass) exacerbated by ethnic, tribal and cultural rivalries. This raises the question of how a growing world population can be humanely supported by a shrinking habitable landmass. The growing convergence of people seeking ecological or conflict survival in other countries is inevitably matched by growing movements in the populations of those countries to close their national borders to large numbers of refugees and defend their particular way of life. The bitter irony is that it is the very process by which they aggressively seek to grow their economies which is fuelling the causes of the global refugee crisis. It is tragically ironic that the need to expand markets in the drive for economic growth leads to the supply of arms to repressive regimes. So paradoxically the arms suppliers are generating the ultimate causes of social unrest (*viz.* refugees) in their own countries. How easily then can the much vaunted economic virtue of competition in the market place, a form of virtual warfare over the ownership of wealth, give rise to real warfare over diminishing natural resources in the fight to survive. It should be noted that warfare is the most ecologically destructive "household management" activity invented by humankind, which if the

causes are not proactively addressed will surely lead to the destruction of the global house and its human household.

So a vast political, social and economic edifice has been built on the unsustainable foundation of a false premise: limitless wealth creation. Growth, in the form of abstract money wealth, has driven the organization of economic society into convergent patterns fuelled by the degradation and dissipation of Gaia. Economic convergence bought at the expense of the naturally diverse systems of Gaia on which we depend for life. Clearly economics in its present form is unsustainable.

Economic Inflation

Economic inflation is defined as a sustained rise in the cost of living over a significant time period. A common measurement is the consumer price index which compares changes in the cost of a weighted basket of representative consumer purchases over time. However, inflation of an index of consumer prices does not adequately reflect or explain the causes of general inflation.

Economic inflation is increase in the money value of assets (all tradable entities, including human resources) reflected in their market prices which are relative to their utility and scarcity. So running down Gaia's finite stock of natural resources (assuming their utility does not also diminish – such as will fossil fuels in the near future) ultimately increases their scarcity and inflates their market value and that of all products which directly or indirectly come from them.

Bank lending creates money in the form of credit, increasing the purchasing power of their customers which can give rise to demand led inflation if it exceeds the supply of goods and services available; thus allowing suppliers to increase their prices. The economic paradigm assumes that this will attract new entrepreneurs to borrow from banks or shareholders to raise capital to invest in increasing the supply of goods and services, thereby rebalancing supply and demand at lower prices. However the paradigm tacitly assumes that there is always a ready supply of productive resources at little or no extra cost. Investing in new capital increases the demand for capital goods, such as buildings and plant, which tends inflate the cost of production and negates any hoped for price reduction.

Money as capital per se means we have a system in which money always tends to exceed real assets, so inflation is an upward trend irrespective of short-term fluctuations.

Control of money supply by varying central bank lending rates and mandatory controls of credit, are typical ways that governments seek to check *supply-side inflation*; while increasing taxes and stimulating savings are methods of controlling *demand-led inflation*.

These deflationary measures are reversed if the economy is seen to be stagnating, implying that a certain level of inflation is a prerequisite to economic growth in the modern economy to stimulate investment; and that growth in money wealth requires an underlying level of steady inflation. In effect, monetary and fiscal measures are attempts to maintain some degree of growth biased asymmetry in the abstract money economy. So modern economics has institutionalised a policy of persistent (hopefully low-level) long-term inflation.

Improved control of inflation could be achieved by restricting increases in money supply through bank credit lending to spending on investment and not consumption. In that way banks would become more interested in lending for investment in new businesses and for infrastructure projects which benefit communities.

Economic Debt

Growth driven economics requires endemic debt. In order to feed the insatiable, growth dependent market economy increasing numbers of consumers must be encouraged to borrow in order to spend. Moreover, people who are at the bottom end of the economic calculus must also be encouraged to consume beyond their means; including people without the wherewithal to pay their essential bills who go into debt by borrowing way beyond what they can ever realistically re-pay. So, along with growing debt goes growing bad debt, which is ultimately a burden on society as a whole as the cost of bad debt is passed on in higher prices or indirectly in higher taxes. Added to which debt burdened companies, who have been encouraged to borrow beyond their means in order to grow, cut jobs or hours, or become bankrupt. The newly unemployed, or underemployed, then borrow to make ends meet as they seek to readjust to their worsened economic circumstances. This growing debt burden is not confined to struggling individuals or companies, but is reflected on a macro scale by growth in unserviceable national debt, as whole countries are encouraged to follow the yellow brick road leading to the promised riches of the wealth creation delusion. Thus the interdependent fabric of the whole global economy is threatened; so creditor governments, backed by international institutions such as the IMF, demand that debtor governments pay their way by instituting austerity measures in the name of responsible fiscal management. This in turn threatens to undermine the economic and social stability of the countries concerned.

Toxic debt growth is therefore endemic to the delusory pursuit of wealth creation and perpetual economic growth.

Wealth Distribution

The complement to wealth-creation is its subsequent distribution.

If we are deluded into believing that we are creating wealth when in reality we are trashing the real wealth of the planet and attributing money value to it, how are the monetary spoils of despoiling our planetary home distributed?

Investigation into the historical origins of accumulated private wealth will reveal them to be rooted in some form of appropriation into private ownership of freely bestowed natural capital by the ruling order, such as dispossessing – through seizure and enclosure – indigenous and peasant peoples of their rights of access to common lands.

The roots of wealth accumulation also include extortionate tributes and taxes and levied by despotic rulers or warlords and their acolytes, the spoils of war and overseas adventures, piracy, slave trading, seizure of overseas territories for colonies and empire, multifarious merchant ventures of dubious probity including opiates and rewards for corruptly facilitating such nefarious practices. Overseas aid, when it is not itself exploitative, should be seen not just in terms of humanitarian concern, but also in terms of compensation to redress past and present exploitation.

The British industrial revolution was funded by the then principal holders of wealth: the landed gentry and the merchant class. The outcome was a new class of wealth holders: the captains and shareholders of industry. As land mammals, the greatest tangible asset we have is land and the things it produces. It is intrinsic to human life, and essential for any community. For ownership of this nature-endowed, communal asset to be commandeered by any one section of a community bestows unwarranted economic and political advantage on the owners at the expense of the dispossessed remainder of the community. One of the first things people do when they acquire wealth is invest in Real Estate; the greater the wealth, the bigger the Real Estate. This is because land, as an essential but finite commodity, is perceived to be a sound long-term investment which will always appreciate in value. But there is probably a more atavistic or primal resonance to land ownership; Land, along with water and air, is a naturally occurring spatial domain vital to human life, which accounts for human beings (along with most other living creatures) being intrinsically territorial. Historically human beings have arrogated to themselves exclusive ownership of domains of the planet contingent with the space they occupy, as clan or tribal territories – in modern times as nation states. These domains are then administered in the interests of the nation states by traditional rulers, despotic leaders, military dictatorships or varying degrees of democratic government (note the earlier reference

to the role that the power of global corporations play in determining governments and political decisions).

National interest is often a thin disguise for the interests of a ruling elite who then do deals with national or multinational corporations. So valuable natural assets, such as timber, oil or precious minerals have come under the ownership or control of individuals or corporations; and newly created money wealth attributed to those assets is distributed to those private owners. Thus, the owners of appropriated natural assets are rewarded as wealth creators, adding to the wealth accumulation of the inheritors of appropriation.

As a point of fundamental principle, the natural resources of the planet are an inheritance (common-wealth). No one has done anything to create them; therefore no one has a moral right to exclusive title or ownership of them. Neither do Homo sapiens (human kind) have a moral right to ownership of Nature over any other species.

Note that the appropriation referred to here is quite different from the expropriation of labour surplus value in the Marxist analysis.

Furthermore, the economic machine under common ownership, while in principle more egalitarian, would still be the same process of dissipating the vital resources of Nature. Moreover, the state Leviathan is too rigidly convergent, and lacks the diversity to achieve the necessary asymmetry to self-organize and creatively regenerate and maintain its development.

The drive for growth in a household with finite resources fritters away the natural wealth upon which the household depends for its existence, in the pursuit of money wealth. The outcome of which is a downward spiral of unjust distribution of all wealth within the household.

Those members of the household who have used force to appropriate the common-wealth of the household into private wealth become the owners of capital in the money-wealth creation process, and thereby control the household by exploiting their power to enrich themselves at the expense of the dispossessed members.

All this is not to deny the vital contribution of inventive genius and entrepreneurial skills made by individuals and organizations to the creative transformation of Nature into life sustaining and enhancing resource utility. But what is revealed is an economic system, rooted in appropriation into private ownership, which is socially divisive and environmentally dissipative, whilst being economically and politically convergent; enriching a minority while leaving the majority, as minor asset owners of their own labour to bear the major burden of the externalized environmental and social costs and loss of access to natural

resources. At the same time, all of us as consumers add to the degradation of Gaia. ***Hardly a formula for sustaining life or resolving world strife!***

Karl Marx, in his mid 19th century analysis of the political-industrial state, labelled religion as the opiate of the people which sedated them from rising up against the exploitative ruling order. Today's opiate addiction is consumerism, whereby people are encouraged to value acquisition and shop-till-they-drop. Shopping malls are the modern cathedrals where worshippers gather to commune with the spiritual god of consumption and Sunday is every day. Now online shopping effortlessly brings deliverance to our own front doors. Heaven on Earth!

Consumerism enables the ruling elite to colonise shopaholic public minds, holding them in thrall to the pleasures of consumption; and diverting them, on pain of withdrawal symptoms, from questioning the system which is giving them so much pleasure, or imagining and addressing the unconscionable consequences of catastrophic planetary systems failure. Just ask people if they are prepared to give up their cars to save the planet. That's the stuff of fictional disaster movies! And all this in the conduct of a respectable, orthodox economics!

The ruling order constantly offers another comforting pipe to dream in the opium den of consumerism. When the money runs out they can borrow, thus reinforcing the belief that consumption is a limitless source of pleasure.

There are of course a growing number of people who have become excluded from consumerist society and who struggle to gain access to the minimum resources necessary to sustain their lives. They are unable to participate in the game, so rather than offering them a comforting pipe the ruling order offers them the cold shoulder of indifference.

Consumerism is vital to the growth economy: without growth in consumption the production machine would quickly grind to a halt, and the whole social, political and economic system constructed upon it would collapse.

A growing cause of global conflict is competition for essential natural resources, and rising poverty as people and communities are driven from traditional patterns of self-reliance into the inability to support themselves. In such circumstances, people and other species become pawns in a system which determines the rules by which they live, and even who should live, and the overwhelming majority of approaching eight billion people on the planet is denied the possibility of full self-realization by the authoritarian rule of economic dictatorship.

Corporate Colonialism

The major appropriators of Nature are now the global corporations aided and abetted by the WTO, the World Bank and the IMF. In addition to the way that public utilities have been auctioned off to private companies and mutated into larger multi-service transnational corporations, nation states are required to open themselves up to international competition in the name of trade liberalisation. The result is that local producers are undermined by global strategic trading policies, and more common-wealth assets fall into the hands of the global corporations.

Now global corporations seek to colonise and exploit unflagged territory and non-terrestrial spaces e.g.:-

The Polar Regions which hold mineral reserves thought to be accessible to modern extraction methods;

Airwaves (a spectrum of electromagnetic radiation frequencies) with their ability to carry information, such as radio, television and radar signals;

The World Wide Web (www) with its potential for people around the world to freely communicate, educate, inform and share information via the internet.

As a result of this global takeover, the dispossessed citizens of the world are becoming the dependents of the confederation of Gaia corporations.

In effect, every space in the Gaian household, instead of being common-wealth for all, is being invaded by the corporate oligarchy in a process of corporate colonialism.

The Market Commons

Common-wealth as described in this paper is the natural capital (including human capital) freely provided by nature, which makes the human household possible.

Household management opens up spaces for human interaction. Such a space is the market – physical and abstract space in which trade is conducted. Market space emerges as community members develop the practice of exchanging, buying and selling goods and services. Market space is therefore common property (the market commons) of the community who form it, and cannot justly be privately owned by any section of the community or outside body. However as we have seen, corporations, some of them global, have increasingly cornered the market by appropriating it. For example supermarket chains have undercut and driven local shops out of business. They cut their prices by supposedly superior efficiency, but more often by exploiting their monopolistic position as buyers and squeezing their suppliers by passing down costs and controlling the prices they pay. Thus they damage the livelihoods of

small businesses in the supply chain by exploiting their Goliath versus David power advantage. In this case there can be no happy ending for David because Goliath is not only a big bully he also cheats.

Supermarket goods are transported back and forth between suppliers, distribution centres and the retail stores; thus severely wasting energy and creating environmental congestion and pollution. So their efficiency savings are achieved by externalizing unaccounted social and environmental costs.

Money generated by locally owned shops circulates locally as the lifeblood of the communities they serve. On the other hand, money generated by supermarket chains is sucked out of the communities to some remote head office from where profits are distributed to remote shareholders, some of whom may be based overseas; or profits may be squirrelled away in overseas tax havens. Thus market spaces (community commons) which give vitality to their communities are hijacked by outside corporations for profit. Napoleon's comment that the British are a nation of shopkeepers would be meaningless today!

So, the growth model of economic development has led not only to the appropriation of natural capital (common-wealth) into private ownership, but the same fate has befallen the market commons. Grand theft by the owners of the growth economy, redistributing wealth from the many to the few!

Universal Basic Income

Academic debate about the health of an economy assumes growth to be a given imperative and centres around how to get there. Improved competitiveness (unit price) in the market place via improved productivity (unit cost reduction) is identified as the key to unlock the door to sustainable growth. However, such argument falls at the first logical hurdle when the impossibility of extracting limitless growth from limited possibility is exposed.

As set out above, the drive to improve productivity and competitiveness is pushing more earners toward the lower end of the income scale. This has resulted in many incomes falling behind inflation, with increasing numbers of earners struggling to pay their bills for basic goods and services. Many low paid workers are effectively subsidising their employers' cost saving by borrowing and turning to charities such as food banks in order to live. Moreover, the inevitable trend to replace labour with automation in a limited growth environment reduces the job opportunities for a growing number of people. So the illogical drive for perpetual growth is leaving more people in need of income support, while at the same time eroding the government tax base to pay for it. One way

of resolving this dilemma is to redistribute income to ensure that no one falls below a minimum level.

There is growing movement calling for a universal basic income, whereby everyone – including those who don't need it – receives at least sufficient to cover basic needs. Such a scheme could absorb some existing benefits, such as unemployment benefit, and rationalise others. A guaranteed income would enable more people to take part-time employment, job share, re-educate/retrain or volunteer; and provide an income for the many people who perform essential services such as unpaid carers of the very young, sick, disabled and elderly.

It is argued that a significant basic income would be too expensive to the exchequer, even allowing for the absorption of some existing payments and the fact that a significant amount would be retrieved through the increased tax revenue that it would generate. However, the purpose of a basic income is to redistribute income so that people contribute according to their means via progressive taxation and everyone gets the same flat payment. In that way it would be self-financing with the wealthy paying a little more in tax. Put another way, it would go some small way to redressing the maldistribution of wealth which grossly favours the inheritors of appropriated common-wealth natural capital. So a universal basic income can be fully justified on the grounds of social justice. Social justice would be much further served if universal income were to be linked to the restoration of the natural realm of common-wealth (reversing the sequestration of natural capital into private ownership) then for example part of the income from land rental (similar to a land value tax) could contribute to the funding of local authority services (from which everybody benefits) while the rest could contribute to a universal dividend (UD). Moreover rent could be charged for the use of all other common-wealth natural capital, including water and air space, to contribute in part to vital public services such as health and education. Furthermore a transaction tax on trading floor dealing could both raise essential public service funds, whilst at the same time curb excessive gambling on asset value in the market place trading casinos which so easily destabilises an economy.

It can be argued that all business gains windfall benefits from having a civilised and educated society in which to thrive. So a fraction of GDP could be siphoned off to contribute to a Universal dividend payment. Thus a UD would come under the heading of earned income from common-wealth and could be substantially higher than a universal basic income.

Comparative Advantage in International Trade

According to the economics textbooks, the pattern of international trade will follow the law of comparative advantage. Stated simply, countries will concentrate on producing those things which they are most proficient at and import things which they are least able to produce (if at all). For example Caribbean countries will export bananas and import cars. In that way international trade will be optimised and all economies will grow to the benefit of all. That seems perfectly logical. But global corporations outsource production or assembly to poor countries where plentiful unskilled labour can easily be trained to perform repetitive tasks (typically on high tempo production lines). That leads to non-unionised labour being paid the lowest rates for the longest hours in bad or unsafe conditions. Even child labour is employed at risk to their health and development.

The global corporations avoid direct ownership of outsourcing abroad by contracting the work to local businesses. In that way the corporations can take advantage of powerful local elites and cultural traditions and seek to avoid international trade law pressures to introduce modern employment practice and workplace conditions. So when we buy trainers sporting a famous logo they are likely to have been manufactured in sweatshop conditions in the Far East. The price paid to the local business owners will most likely be spent on a luxury lifestyle, with little or none at all going where it should into a legitimate tax base to fund social health care, education and housing. And of course most of the overall profit goes to the global corporations when, after nominal taxation, it is likely to go into overseas tax havens to fund super luxury lifestyles of the wealthy corporate owners.

So it is apparent that the theory of comparative advantage, which is supposed to raise the standard of living of the communities throughout the world, in practice works to benefit global corporations who dominate the trade. This is sequestration of the global market commons and a manifestation of gross corporate colonialism!

The management of the global household is decidedly unfair and unjust when it comes to sharing out the wealth that the household produces.

Energy: Sourcing and Use

Einstein's famous equation $E = mc^2$ describes the relationship between the mass of a body and its equivalent energy. So a cricket ball at rest relative to Earth contains internal energy relative to its mass (its weight minus the downward force of gravity acting on the ball). It is symmetry of its internal forces (its total energy) which binds the ball together. If the ball is bowled, its energy (and equivalent mass) increases by the kinetic energy arising from its velocity. So if we want to move the ball (relative

to Earth) we harness the energy of the bowler. However human and other animal power is strictly limited when it comes to the energy needed to move things with large mass (especially where its resistance is increased by friction) so the ancients applied a bit of geometry and physics. The application of pulleys and levers harnessed to a large team of workers (slaves) enabled the Egyptians to achieve the monumental (quite literally) task of building the pyramids. And Archimedes of Syracuse (287-212 BC) knew a thing or two when it came to using mathematics to figure out how to measure and move things. He is also credited (maybe apocryphal) with inventing a heat ray device which used an array of large mirrors to focus the sun's rays and destroy invading enemy ships (the same principle is applied in a modern solar furnace). He is also credited with a public display of naked running whilst shouting "eureka" when he had made an important discovery. Thus he invented the Greek streak; another first for the ancients! This practise is strictly forbidden in our modern seats of learning, on threat of rustication.

If we could convert just a small part of the energy of the oceans into electrical power, we would have all the energy we will ever need. As it is, the wave and tidal energy we can harness combined with wind and solar energy will probably be enough to meet our future energy needs; provided we use it efficiently, and not wastefully as at present.

A major energy user is transport. Expansion of trade in the global household has led to exponential growth in the transportation of goods and people by air, sea and land. Added to which there has also been dramatic growth in travel for leisure.

The growth in land transport is coming increasingly from the use of road vehicles. This has led to severe congestion in the roads where people live and work, and pollution in the air that they breathe. So far as intercity transport is concerned, the strategic road network is also becoming severely congested at busy times despite road expansion (at the cost of valuable countryside).

Air, sea and land transport is almost exclusively powered by engines burning fossil fuels; where the emissions make a massive contribution to the causal link between CO₂ and the greenhouse effect on global warming and climate change. So transport is an area where the application of metabolic principles of transformation and regeneration are urgently needed.

There has been enormous growth in car ownership for personal journeys, contributing hugely to emissions and congestion. So vehicle growth is choking both our public highways and our human airways. And all the time global warming and climate change is ratcheting up! So radical change in modes and use of transportation is a matter of urgency for the welfare of the household!

There is currently a move towards electric cars. But if they are to reduce overall emissions the electricity needs to come from renewable sources such as photovoltaic cells (solar) or wind turbines. Electric vehicles also have to carry the burden of heavy storage batteries which take an inconvenient time to recharge. This takes us back in time to hydrogen (H) the archetypal element. Water (H₂O) can be split into its elementary components by electrolysis using renewable energy. Both gasses can then be liquefied under pressure. The oxygen can be supplied to hospitals etc. while the hydrogen can be pumped into the fuel tanks of vehicles (much the same as filling up with petrol at the pump). A hydrogen fuel cell (HFC) in the vehicle can then take oxygen from the air and recombine it chemically with the hydrogen into H₂O a process which causes an electric current to flow (effectively reversing the electrolysis). The electric current is then used to energise an electric motor to propel the vehicle. The only emission is a small trace of water vapour. There is something pleasingly clean and symmetrical about energy transformation using renewable energy and the HFC: Water to water. And I declare myself a fan.

A small number of HFC powered buses and cars are currently in use. An HFC railway train has been developed and is shortly to go into service in Germany. This will enable an electric train to run without all the expensive paraphernalia required for high voltage electrification of the track, along with its wasteful transmission loss. A clear pointer to the future for rail transport! An HFC tram has been developed in China with similar benefits in energy efficiency. In order to fully optimise energy use a vehicle needs to combine an HFC with fully integrated energy management and lightweight vehicle construction made possible by new materials such as carbon fibre composites (possibly using 3-D printing). Such a car (The Riversimple RASA) is just starting field trials in the UK. (I declare an interest).

Private car use, no matter how non-polluting it may become, will continue to create ever-growing congestion if we become even more car dependent. Integrated efficient and affordable public transport networks are needed to take most of the burden, including convenient and safe means of walking and cycling. And private cars don't need to be owned – especially when they spend most of their time parked and idle – they could be self-drive rented from a local rank when needed. Road pricing will become necessary, related to highway use and congestion times. A rapid shift to strategic rail transport could be facilitated by giving over some motorway bandwidth to double-decker electric trains (HFC powered of course).

A similar shift from fossil fuels is needed in aircraft and ships if we are to eliminate pollution and global warming. Again hydrogen will have a key

part to play. Above all, moving away from consumerism, together with focusing on localisation would massively reduce the transport of goods by air, sea and land.

As living animals we too need to manage our personal sources and use of energy to maximise our efficiency (our calorie output to input ratio).

Energy sourcing and its use is the key to achieving the essential goal of managing the global household sustainably.

Human Population Growth

This brings the paper to the “taboo” subject of the numbers of human beings Earth can support. Taboo because it is obviously an extremely sensitive subject which brings science, politics and profound cultural beliefs into direct conflict. As a result the subject is largely put aside or ignored altogether at our peril. The UN estimates that the world population will rise from 7.5 billion in 2017 to 11.2 billion by 2100.

So just as endless economic growth on a finite planet is a path to human disaster, so endless population growth on a finite planet is a path to human disaster. We are therefore compounding an economics of household management which is destroying the house with unchecked overcrowding of the household.

Human beings have evolved into the most successful species on Earth (with the possible exception of insects and microorganisms, which may yet rule the Earth). We have colonised every continent and virtually every bit of habitable landmass. In doing so we have driven to extinction (by deliberate or careless action) large numbers of other species; and we are crowding out most other sizeable mammals (including ocean creatures). Now we are crowding out each other.

Life on Earth is expressed as an interdependent complex system of biodiversity, whereby the different species live off each other through a food chain hierarchy. That is, every life form feeds off at least one other life form. In this way specie populations are kept in check by predation, and biodiversity is maintained through a natural system of checks and balances. There must be two exceptions to the predatory food chain: life forms at the bottom of the chain (generally plants) have by definition no life forms below them on which to predate; and life forms at the top of the chain have by definition no life forms above them to predate on them. Plant life forms at the bottom of the chain must therefore depend upon photosynthesis, the starter of life on Earth.

Homo sapiens reside at the top of the food chain without natural predators to control their population size, so giving rise to overcrowding the planet and driving other species to extinction. Since interdependent bio-diversity is vital to our living planet, its reduction threatens our place on Earth.

Nature culls the population of the top species, when it becomes too large for its life-support system to support, through disease and starvation. Also, the struggle to survive on a planet with diminishing resources inevitably leads to fierce fighting over them, with increasing loss of life. The alternative to this dystopian future is to use our evolving intelligence and powers of reason. If the human race is to flourish we have to address the difficult question of what numbers the planet will sustainably support and enable them to live peacefully and progressively in a civilized manner. That means world peace with each other and the planet. A massive challenge for humankind! However, as climate change kicks-in around the world with massive destruction of habitat, and as the number of refugees fleeing for their lives builds up, leaving ever greater numbers seeking to live on a decreasing habitable landmass, it will become increasingly obvious that global action needs to be taken. In order to gain universal consent to achieve it there needs to be global access to, and sharing of, natural resources and the vital manufactured renewable products arising from it. Tragically it will probably take more suffering before it becomes a matter of life and death and humanity wakes up to the obvious and acts like a truly human race. That will involve a massive change in mindset from competition and possession to cooperation and sharing.

So far as numbers are concerned the essential task is to move towards bringing them within what the planet will bear in a way which is universally acceptable and does not involve any kind of sanction or coercion. Having regard to this, we must make it possible for adults of childbearing age to have full control of their own fertility. Any form of imposed regulation would breach human rights so it must be down to informed choice. But having full access to life affirming resources is the best way to inform that choice. Thus we would address Thomas Malthus' prediction in his 1798 essay on the principle of population – where he stated that populations would invariably rise to the maximum that resources permitted – by demonstrating that we are mindful not mindless creatures. So we can escape from population culling through starvation and disease if we apply our minds to it as Homo sapiens should.

Gender Economics

If the system of household management by Homo economicus (economic Man) is an existential threat to the household and its occupants, we urgently need to reflect critically on the management structure and its decision making process; in particular the relationship between power and gender.

Humans are animals, so it is instructive to reference anthropology to zoology. In the animal kingdom, those which form social groups

generally adopt a patriarchal hierarchy. Evidence shows that this arises from competition between the males for dominance in terms of reproductive success; thus establishing a power hierarchy based on physical strength and aggression. So the social structures tend to be binary, related to gender:-

Dominant male/father/homebuilder/defender;

Subordinate female/mother/homemaker/nurturer;

In instinctive furtherance of the biological success of the group (viz. Richard Dawkins' "The Selfish Gene").

However, Homo sapiens (humankind) has evolved cerebral powers which enable it to develop skills and tools to radically transform the natural wealth of its environment into things it needs to further the success of its household. An evolving economic household requires diverse skills and teamwork which are only possible through a complex division of labour rather than a simple binary one. Therefore the social structure needs to evolve from its rigid gender based past if it is to meet the demands of the modern progressive household. Note the argument here is not making the moral case for gender equality, compelling though that is, but that patriarchy (and the qualities of masculinity it empowers) has become a barrier to progressive civilization. A progressive household requires a gender neutral system of management if it is to make full use of its evolutionary potential. Such a household needs to nurture all its members to ensure that they have access to the resources they need to fully participate in its sustainable running; whilst simultaneously nurturing the healthy state of the natural capital resources upon which it depends for its existence. Therefore long-term human survival requires systemic process for Peace on Earth and Peace with Earth.

We now know that gender qualities are not strictly binary (a simple matter of XY or XX chromosomes) but cover a wide spectrum. Equally the terms masculine and feminine used to describe those qualities cover a wide spectrum and are not definitively gender based. However, when it comes to deploying cerebral potential to address such existential issues as Peace on Earth and Peace with Earth the male of the species – no doubt weighted down by his zoological inheritance – displays a distressing predisposition to confuse his frontal lobes with his gonads; an orientational misplacement which threatens the future of the human race! When I jog in my local deer park during the autumn rut and hear testosterone charged stags bellowing their territorial claim to hareem rights, it gives pause to reflect upon the intrinsic connection between anthropology and zoology.

The modern economic household founded on power through competition and domination (surrogate warfare) bears the stamp of its zoological connections by favouring masculine qualities of strength and aggression;

and is painfully slow to slough off the dead weight of its dominant patriarchal hierarchy.

On the matter of humankind's subjective perception of existential reality, where that perception gives rise to monotheistic belief it invariably takes the form of a patriarchal figure, thus validating and reinforcing society's own temporal patriarchy. This strongly suggests that Man creates a deity to suit his purpose in his own image, rather than allegedly the other way around.

The power of superstition confers immense political power on those who claim to be its Earthly representatives. This gives rise to a priesthood as intermediaries between the deity and the people; a priesthood where the power rests in a patriarchal hierarchy.

The idea that a particular ruling order is ordained by an almighty deity is a strong force for conserving the status quo. A ruler who is deemed to be anointed by the deity is difficult to overthrow, on peril of a wrathful deity wreaking revenge upon the unfaithful. Conformity as an alternative to fire and brimstone is a persuasive argument. As a consequence, rulers and ruling elites seek to bring on board the power of the deity, through the priesthood, to endorse their temporal right to rule. So the paraphernalia of deity is a powerful conservative influence in any society and holds back evolutionary progress. Priests who bravely decide that their fidelity lies with the boss upstairs rather than the one downstairs usually come to a sticky end; as in the case of the little difficulty which arose between Thomas Becket, Archbishop of Canterbury and his sponsor King Henry II.

An absolute belief suffers a fundamental difficulty when there are perceptual differences in interpretation of a deity. This gives rise to conflicts within and between households which easily lead to wars between what are essentially different sects or splinter groups. Such wars cause devastating damage to households and their inhabitants. So differences in the supernatural interpretation of reality are regressive in terms of social development.

Interestingly, in the modern economic household, as spiritual belief in the priesthood has declined in the face of material belief in consumerism, some priesthoods' have, albeit reluctantly, admitted women to their order in the desperate hope of restoring their flagging influence on either the ruling elite or the people.

Is this important? Well, if we are to tackle the dual tasks of living in Peace on Earth and living in Peace with Earth, we shall increasingly depend on empirically validated scientific knowledge of nature before we act to change it. If we look to supernatural or unfounded explanations we shall assuredly perish.

To come back down to Earth, if the modern system of household management is to move from the growth driven model, which is dismantling its home and impoverishing its members, to one which nurtures both its natural home and the members of its household, it will require a transformation which is guided by scientific evidence and the predominance of feminine qualities of empathy and nurture. That means a division of labour and a hierarchy based on social and technical skills and managerial competence not gender; with males suppressing their atavistic masculine power traits in favour of their feminine nurturing side. An essential power shift in the household management team!

Sector Growth

Given the limited Natural Capital available to sustainably resource economic development we must prioritise its use so as to enable growth in sectors which meet strict criteria in terms of promoting social and ecological objectives and phase out sectors which do not; and withdraw resources completely, beyond cleaning-up, from sectors which are positively inimical. Growth sectors would include, inter alia, renewable energy, nutritious food, health and social welfare, education and research, public transport. Sectors which need to be phased out include inter alia, proliferation of private cars; products which incorporate planned obsolescence rather than genuine development; products which are not designed for zero waste and full end-of-use recycling. Sectors which need to be eliminated include, inter alia, energy from burning fossil fuels, unhealthy foods; products and practices which generally fuel consumerism.

An important growth sector is environmental conservation; especially in areas which promote natural wilding, wildlife and biodiversity. Prioritising sector growth and the equitable allocation of scarce resources requires a democratically planned economy based on principles of social justice and ecological sustainability; with the rejection of ideological polarities of authoritarian central planning (usually associated with some form of political dictatorship) and laissez faire where resources are theoretically allocated according to impartial “market forces”. In various forms they are the political economics which have brought us to the present state of environmental and social catastrophe addressed in this paper.

Essential Growth

There is one field where unlimited growth is essential to human development and survival, and being abstract it is not constrained by finite material limitations. It lies in the continued advancement of our

knowledge of holistic Nature which opens the door to our ability to transform Nature only in ways which conform to its life enhancing metabolic principles. Advances in medical science, technology and practice are obvious examples where transformational procedures applied to the human body must necessarily conform to Nature's holistic metabolic principles.

According to James Lovelock's Gaia Theory, the nature of Earth and its emergent biodiversity are locked together in self-regulating systemic interdependence, which means we should regard it as a living planet; thus affirming the concept of Mother Earth (the giver of life) with which it has been regarded by folklore since ancient times. As an objective scientist Lovelock was going to give his original hypothesis a technical name, when his friend the writer William Golding suggested he name it after Gaia the mythical Greek goddess of Earth. As he developed his initial hypothesis to full blown theory Lovelock came to realize that Gaia was indeed a truly self-sustaining entity. Gaia theory is now widely accepted by the originally sceptical scientific community. This means that we must treat Earth as a living entity when we carry out transformational procedures on the systems of its body. Otherwise, in terms of hosting human life the patient will die! *Happily the wealth of knowledge is the one form of indefinitely sustainable growth open to us.*

Gaian Economics: A Sustainable Future

Now returning to those economics text books I cast away because I could not relate them to the real world of my experience. I now know why, as I hope I have demonstrated in this paper.

We have evolved an overriding system of economics, given legitimacy by a flawed theory of wealth creation and distribution, which is degrading the true wealth of Gaia by transforming its life enhancing properties into those which are inimical to human life. This ultimately fatal anomaly arises through the wealth creation delusion whereby wealth is perceived in terms of abstract money rather than the real life affirming natural wealth of the planet.

Earth's natural wealth is the very substance of the global household, the realm freely bestowed by nature as common-wealth for all. With the evolution of Homo sapiens this common-wealth has gradually been appropriated by the wealthy into private ownership. Thus the global commons has been purloined by a small number of powerful household members – latterly global corporations – who virtually own the global household and control how it is managed.

In seeking to further increase their personal wealth the household owners misguidedly degrade its natural wealth as feedstock in the money-wealth creation process. So the inheritors of appropriated

common-wealth are the wealthy owners of capital in the wealth creation delusion and command the majority share of the money-wealth created. The rest goes to the disinherited majority of household members who labour in the household. No doubt Aristotle would approve!

The economically advanced households (nation states) built their dominant positions in the global household through exploiting natural resources at home and abroad. The expansion of the money-wealth creating process means that such resources are now massively reduced, whereby the externalised social and environmental costs of the process have drastically increased. All this while the world population, dependent upon a share in those resources, has dramatically increased. So it is no longer possible to ignore the life-challenging consequences thrown up, firstly by the appropriation of natural common-wealth, and secondly by the pursuit of the wealth-creation delusion.

The owners of different national households have their own political agendas, but they all seek further riches by following the same “yellow brick road” to the wealth-creation delusion.

Bridging the gulf between wealth and poverty in a growing world population blessed with finite resources requires global co-operation, the pooling of resources and enlightened ingenuity in how we deploy those resources. That essential level of cooperation within the global household will take a painstaking and painful process to achieve, but it is incumbent upon those households which possess the most, with the most exploitive history, to lead the way.

Households start with the nuclear family household, so it is not necessary to wait to take action until there is global agreement. Global agreement comes last not first. The process starts with the nuclear family household (grass roots) and then grows up through successive scales of extended household (local communities, cities, regions, nation states etc. etc.).

Our household economies need to emulate naturally regenerative metabolic systems of interdependent diversity to sustainably transform and optimise our use of resources with zero waste. We need to prioritise our resource use to grow in sectors which meet strict criteria in terms of promoting socially desirable and ecologically sustainable objectives; and eliminate areas which do not.

Our present system of economic development, which is in conflict with the fundamental interests of sustainable human progress, is not the solution to our needs but the cause of social and environmental disaster. Faced with systemic disaster we need systemic solutions. But not by seeking to replace a failed economic paradigm with a better one.

Paradigms are systemic straight jackets, they are too bounded and doctrinal for such a diversely complex evolving world, and inevitably

become trapped inside their own logic when faced by challenging real-life situations. By their dogmatic nature doctrines are fundamentally oppressive. What is needed is a set of scientifically informed philosophical principles to guide how we utilize natural capital to meet the oikos nomos (household management) needs of the world population without destroying the life sustaining oikos logos (ecology) of the planet. For global solutions to work they must get the world population on board by engaging and empowering all its members. Firstly, the principles must be shown to be clearly in the existential interests of the whole global household. That household is divided into a collection of nation states; and those states are run by ruling orders that are locked into the power and economic growth syndrome which is the very cause of global dysfunction. Pan national or supra national organizations such as The United Nations, or the lesser group of G7 (or G whatever) most developed industrial nations, get bogged down in the orthodox economic paradigm and the political self-interest that arises. So we cannot expect a dysfunctional system of household management, with all the qualitative flaws of a singularly masculine power hierarchy, to reform the household. Clearly what is needed is a global movement to peacefully subvert the failing monolithic superstructure and replace it with a network of diverse fertile economic practice, responsive to local needs and sustainable natural resources.

To enable peaceful planetary cohabitation, competition needs to be replaced by cooperation; and this will only be enabled through sharing natural capital resources. That is to say ***we must restore the global realm of common-wealth which has been appropriated as the source of corporate or state capitalist economics. Global common-wealth can then be utilized to provide, of right, a minimum income for all members of the household and ensure that no-one goes without the wherewithal to live.***

The metaphysical commons' ability to network via the World Wide Web, and share ideas in an open source forum, is the means by which the destructive economic model can be challenged and replaced by fertile and energetic applications of the fundamental metabolic principles of nature; to grow with nature in life enhancing ways rather than trashing our life-support system. There are already signs of this where towns and local communities are moving towards forming cooperatives such as renewable energy networks to largely replace national grids supplied by expensive central (fossil fuelled or nuclear) power stations, and literally start to regenerate dying communities by resurrecting local shops and pubs etc. and opening spaces for community interaction. Local housing needs can be met by releasing community managed common-wealth land to erect homes (using local and reused materials) by modular prefabricated

construction methods meeting high quality thermal standards, with locally manufactured panels.

The future for the global household does not look promising at this time; with wars adding immensely to planetary degradation and systemic change (global warming and changing climate may be just the tip of the iceberg when it comes to geothermal physics). ***So human progress depends upon addressing the vital interdependence of Peace on Earth and Peace with Earth.***

As set out above, the clash between economic growth and ecological sustainability can only be reversed by measures to restrain growth within parameters which can be met by the application of science (including novel forms of synthesis at the micro level). The growth based development paradigm needs to be replaced with a set of guiding principles, which allow us to steer our economies in the light of changing needs and the advance of science to sustainably meet those needs.

True wealth is the life giving processes of the planet; and the legitimate role of economics is theory and practice of managing resources to meet the present and future needs of all people consistent with the fact that the systemic health of people is inseparable from the systemic health of the planet. That means economics transformed to conform to the metabolic processes of Nature.

In his seminal book “Small is beautiful” E.F. Schumacher set out a compelling case for an economics “As if people mattered”. Now, reading the logic and principles governing systemic Nature makes it imperative that we urgently institute an economics as if life matters.

From its cosmological context to its quantum relationship between mass and energy, Earth is a holistically interdependent body, along with all its inhabitants including us. Earth is our living home and we need to conduct our household management with profound understanding and a loving embrace. That means transforming the theory and practice of economics, from the growth driven model of Political Economy, which results in blindly consuming our real wealth (natural capital) in the deluded belief that it is actually creating wealth, into Gaian Economics which utilises natural wealth whilst conserving it through regeneration.

On a planet with finite natural resources, the only sustainable economic growth, is growth in the cyclical use of those resources, coupled with evolutionary development, which mimics the economics of nature itself.

Gaian economics offers a challenging and richer experience of development through working together with nature.

If we define the maximum possible global economy as the maximum by which we may sustainably utilise natural capital, then the only way to

distribute utility equitably is for those who are consuming more than their share to reduce their consumption. That clearly means abandoning consumerism in favour of conserverism.

So we need to reject the false yellow brick road to endless material growth which trashes Gaia's gift and follow her path to life. Above all to give her the gratitude and love that is her due.

Seeking Gaia

**If we seek to possess her we shall not find her
For to do so is to seek not in love but in lust
Then Gaia, Salome like, will mock us
Casting aside one veil to reveal yet another**

**Gaia spurns the one-night-stand advances of cold suitors to win her heart and break it
She has no time for faithless lovers
For them an eternity of longing**

**To approach in conquest is to be lured into the labyrinth of her infinite mystery
Each new path leading to another puzzle
And each solution to another paradox**

**We who demand the right to choose
Must call upon the wisdom of the ages to guide us on Gaia's path
For there is no path *TO* Gaia
Only Gaia's path**

**Gaia is to be found
Not through the senses alone
But also through the soul
We who are the children of Gaia
Must look into our hearts for the lamp of love to light our way**

**Do not stand-up too close
For you do not apprehend a forest by gazing at a single tree
Stand back in wonder and behold the beauty of her form
Give her your love and she will reveal the beauty of her soul**

**Listen to the breathing of the wind and to the heartbeat of the waves upon the shore
Listen to the orchestra of life and learn to play in tune
But listen also to the symphony of silence which is the music of the soul
Then you will know Gaia's path**

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1997 (updated 28October 2018)**