

Chapter 2 Historical Overview of the Sustainability Debates and Discourses

As Chapter 1 showed, current unsustainable development patterns now have reduced the resilience of the earth's ecosystems significantly.¹ According to the 2005 UN Millennium Ecosystem Assessment², humanity is faced with significant risks of tipping points occurring beyond which irreversible loss of ecosystem services will occur. Chapter 1 highlighted how humanity has a small window of a few decades to transition global development onto a more sustainable trajectory. Debates about sustainable development in the media and even in many publications tend to talk about sustainable development and the environment movement as though it is a very recent developments starting with the publication of *Our Common Future*³ and Rachel Carson's *The Silent Spring*⁴ respectively. Certainly the modern environment movement and the institutional approach to sustainable development recommended by *Our Common Future* are historic. But there is a growing body of evidence which shows that there have been earlier efforts to create a more ecologically sustainable future. Twenty years on from the publication of *Our Common Future* there has been more historical research which shows that concerns and debates about the lack of sustainability of development have a long history.

To emphasize how important these debates about the sustainability of development are and how long they have been going on, this chapter begins by over viewing briefly Jared Diamond⁵ and Joseph Tainter's⁶ publications. Their publications show that the sustainability of development has been a significant issue for many past human civilisations. Their publications show that a failure to understand and identify environmentally unsustainable trends in development by past civilisations was a significant factor in their demise. This chapter thus begins by showing that concerns and debates about the lack of sustainability of development have been central to the history of many past civilisations. This chapter shows that the term sustainability was used in the modern sense as early as 1713. This thesis argues that this is very important because a major barrier, which undermines

¹ UN Millennium Ecosystem Assessment, (2005) *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC
 UNEP (2007) *Global Environment Outlook: Environment for development (GEO-4)* report. UNEP. Available At <http://www.unep.org/geo/geo4> Accessed 23.03.08

OECD (2008) *OECD Environmental Outlook to 2030*. OECD. Available At http://www.oecd.org/document/20/0,3343,en_2649_37465_39676628_1_1_1_37465,00.html Accessed 22.03.2008

World Bank (2003) '*World Bank Development Report 2003: Sustainable Development in a Dynamic World*', Oxford University Press, Oxford

² UN Millennium Ecosystem Assessment, (2005) *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC

³ World Commission on Environment and Development (WCED). (1987) *Our Common Future*. Oxford University. Press, Oxford.

⁴ Carson, R. (1956) *The Silent Spring*. Houghton Mifflin. Boston

⁵ Diamond, J (2006) *Collapse: How Societies Choose to Fail or Succeed*. Random House

⁶ Tainter, J. (1993) *The Collapse of Complex Societies*. Cambridge: Cambridge University Press.

progress on sustainable development today, is that the environment is still not something which the central agencies of government and enough CEOs see as core to the way they govern or do business respectively. One of the reasons why the environment and sustainable development are still seen as an add-on, by many decision makers, is that they are seen to be relatively new issues and concerns. Politicians and business leaders are able to excuse lack of progress to achieve sustainable development by arguing that sustainable development is something that is “new” that they are “working on.” On the other hand economic development, security, democracy, social justice, the need for education and health are seen as ideals and activities which have a long history. But, as this chapter seeks to show, the ideals of democracy and justice were not the only legacy left by ancient Greece. Unsustainable rates of deforestation were seen as a major concern in ancient Greece which used timber as its main source of fuel both for peaceful and military purposes. The changes from deforestation made a considerable impression on Aristotle’s biographer and botanical gardener Theophrastus of Erasia, Theophrastus, from his observations of local forest changes, developed a theory which firmly linked deforestation to the decline in rainfall, which he believed was taking place in Greece and Crete⁷. The Ancient Greeks pioneered passive solar design of their whole cities so all homes had access to sunlight during winter to reduce the need for wood to heat their homes and thus better sustain their timber resources. Evidence such as this, helps to move the sustainability debates forward by showing busy politicians and decision makers more generally that they cannot use the excuse that such ideals and concerns are relatively new.

This chapter will briefly overview recent publications⁸ which show that the environmental sustainability of development has been a central issue since at least 4000 BC for many human civilisations. This chapter does this because this relatively new environmental history is important to show decision makers that the issue of environmental sustainability deserves to be a central part of government and business decision making along with issues of social justice, economic development and security.

Another reason for considering the history of sustainable development ideas is because this thesis is about how to advance and resolve the great sustainability debates. Thus it is vitally important for this chapter to investigate when these sustainability debates began in a modern historical context. Taking an historical approach provides a rich empirical context from which this thesis can analyse and then discuss the common patterns and characteristics of sustainability debates. Taking an historical perspective enables an analysis of the relative merits of the different sides of the sustainability debates. In addition, there is much that can be learnt from this history of sustainability debates to better understand them and thus help to inform and progress the sustainability debates today.

⁷ Hughes, J.D (1985) ‘*Theophrastus as Ecologist*’, *Environmental Review*, 4, 296-307 see also Glacken, C.J, (1967) *Traces on the Rhodian shore: Nature and culture in Western Thought, From Ancient Times to the End of the Eighteenth Century*, Berkeley, California

⁸ Ibid.

Diamond's⁹ and Tainter's¹⁰ work shows that whether or not past civilisations avoided collapse often depended on whether they foresaw and acted in time to avoid passing ecosystem resilience thresholds and tipping points. Their work shows that civilisations which identify and pro-actively act to address unsustainable development trends early tend to be those that avoid such tipping points and the vicious cycles that lead to collapse.

As Chapter 1 showed, humanity has a small window of a few decades to transition global development onto a more sustainable trajectory. It behoves us then to learn, not just from the lessons of ancient civilisations, but also from more modern history the lessons of past debates about the sustainability of development. Thus this chapter then asks the question: when did humanity in more modern times have a chance to start on a global scale to define and pursue sustainable development? This chapter shows that these debates have not only been going on for a long time but have crucially mattered to the course of modern world history for over a hundred years. Taking an historical perspective also enables the thesis in Chapter 3 to ask: what factors have prevented a transition to sustainable development?¹¹ Appendix 2.1 of this thesis provides a detailed timeline of the history of sustainable development ideas to provide further evidence to support the thesis presented here in Chapter 2.

2.1 When did Concerns about the Sustainability of Development Begin?

Most of us think of the concerns about environmental degradation undermining development as a recent phenomenon, however, concerns about such issues goes back thousands of years. In trying to understand our current environmental difficulties, it is helpful to look at earlier civilizations that suffered environmentally induced economic decline. Our early twenty-first century civilization is not the first to face that prospect

Almost all past civilizations, even the very first civilisation, the Sumerians from Mesopotamia, have declined and eventually collapsed partly due to unsustainable resource management or unsustainable resource depletion or climate change or combinations of these. Indeed, a society's decline may begin only several decades after it reaches its peak population, wealth, and power. This is because peak population, power, resource consumption and, wealth, are accompanied by peak environmental impact from which declines of societies can follow swiftly.

Archaeological evidence reveals such courses of decline and eventual collapse in a diverse array of ancient civilisations as the Maya in the Yucatán, the Anasazi in the American Southwest, the Cahokia mound builders outside St. Louis, the Garamantian Empire of the Sahara, the Greenland Norse, the

⁹ Diamond, J (2006) *Collapse: How Societies Choose to Fail or Succeed*. Random House

¹⁰ Tainter, J. (1993) *The Collapse of Complex Societies*; Cambridge: Cambridge University Press.

¹¹ To the best of this author's knowledge no one has brought this evidence of the history of sustainability debates together in this way before.

statue builders of Easter Island, the Nazca civilization in Peru, Great Zimbabwe in Africa, Angkor Wat in Cambodia and even the great Roman Empire.

These past civilizations succumbed partly due to environmental degradation and resource depletion due to deforestation, flooding, soil degradation and salinity, exhaustion of water supplies, changes in weather patterns, overpopulation or combinations of these. These led to food shortages and overall the environmental degradation and resource depletion resulted in diminishing returns on investments in energy and resource extraction. Weakened by this, ancient civilisations became more vulnerable to foreign invasions and were taken over or simply collapsed and dispersed in search of more fertile and productive lands. Table 1 summarises a few examples of this vicious cycle which contributed to the decline of so many past civilisations.

Table 2.1: Patterns of Decline – Environmental Factors in Civilisations Collapse

Sumerian Civilisation	Agricultural irrigation systems were used in regions where underground drainage was not good. This raised the water table. As the water came close to the surface it evaporated leaving salt behind. Wheat yields declined as the salt accumulated. The Sumerians changed to a more salt-tolerant plant, barley. Doing so postponed Sumer's decline. As salt concentrations continued to build, the yields of barley eventually declined also. As land productivity declined, so did the civilization. Salinisation of agricultural lands combined with changes in the climate contributed to the decline in this civilization. ¹²
Garamantian Empire (Sahara) 500 BC – 300 AD	The Garamantian empire was made possible in the Sahara by a 3,000-mile network of underground irrigation canals to exploit ancient groundwater. Overexploitation of groundwater resulted in its collapse. ¹³
Roman civilization,	The Roman civilization was the most successful of the "Iron Age". To make iron, charcoal is needed to be burnt. Making charcoal requires significant quantities of timber resources. This resulted in deforestation and degradation of land, soils and water resources. The Roman Empire's expansion was largely driven by this need for more land for both wood resources and new fertile farming land. By the 3rd century AD in some parts of North Africa and

¹² Jacobsen, T et al (1958) Salt and Silt in Ancient Mesopotamian Agriculture. Science. Vol 128. p1251-1258 and Brown, L (2008) *Plan B. Mobilising to Save Civilisation*. The Earth Policy Institute Available At <http://www.earth-policy.org/Books/PB3/Contents.htm> Accessed 17.02.2008

¹³ Keys, D (2000) "Britons find ancient empire that made Sahara bloom". The Independent <http://www.independent.co.uk/news/world/africa/britons-find-ancient-empire-that-made-sahara-bloom-707504.html> . Accessed 17.02.2008

	through the Mediterranean, up to one half of the arable land had been abandoned due to environmental degradation. With half of the arable land abandoned by 300 AD neglect led to the spreading of swampland which became breeding grounds for diseases like malaria. These factors contributed to the weakening of the once greater empire making it vulnerable to attack and contributed to its eventual defeat. ¹⁴
Mayan civilization,	Loss of soil fertility and drought from deforestation and climate change led to a crisis from lack of sufficient food and rising levels of internal and external violence. ¹⁵
Ankor Wat, Khmer Empire. Cambodia	Deforestation to extend their farmland up to the slope of Kulen mountain, 80 kilometres to the north, led to flooding and huge amounts of sediment and sand were washed down to fill up their extensive canal water system – ruining the cities water supply. ¹⁶

Diamond found the following have been factors in the collapse of many civilisations:

- Environmental damage, such as deforestation and soil erosion
- Climate change
- Dependence upon long-distance trade for needed resources.
- Increasing levels of internal and external violence, such as war or invasion
- Societal responses to internal and environmental problems (which depend on whether or not the vested interests will be affected by environmental problems).

According to Diamond¹⁷ and other experts of ancient civilisation collapse, past civilisations have also suddenly collapsed because their economies, (and importantly the wealth and privilege of the decision makers of the day), depended on constantly physically growing in ways that the local natural environment could not sustain.¹⁸

Diamond is not the first to come to these sorts of conclusions. As far back as the first half of last century, famous environmentalist Richard St Barbe Baker was arguing in broad terms this overall thesis as well in his books. In his 1944 publication, *I Planted Trees* he writes,

¹⁴ McNeill, W. (1975) *Plagues and Peoples*, Anchor/Doubleday, Garden City, NY, p131

¹⁵ Diamond, J. (2005) *Collapse: How Societies Choose to Fail or Succeed*. Random House. New York

¹⁶ UNSW Climate Change Research Centre, “ Khmer Kings were architects of their own demise” (5 September 2007. http://www.ccre.unsw.edu.au/news/news/2007-10-05_khmer_kings.html . Accessed 17 October 2011

¹⁷ Diamond, J. (2005) *Collapse: How Societies Choose to Fail or Succeed*. Random House. New York

¹⁸ Tainter, J. (1993) *The Collapse of Complex Societies*; Cambridge: Cambridge University Press

“The great Empires of Assyria, Babylon, Carthage and Persia were destroyed by floods and deserts let loose in the wake of forest destruction. Erosion following forest destruction and soil depletion has been one of the most powerfully destructive forces in bringing about the downfall of civilizations and wiping out human existence from large tracts of the earth’s surface. Erosion does not march with a blast of trumpets or the beating of drums, but its tactics are more subtle, more sinister”.

One of the most respected academic publications in this field is Joseph Tainter’s book *The Collapse of Complex Societies*¹⁹. In this book, Tainter argued that societies that collapse usually adhere the following three models in the face of collapse:

1. The Dinosaur: The best example is a large scale society in which resources are being depleted at an exponential rate and yet nothing is done to rectify the problem because the ruling elite are unwilling or unable to adapt to said changes. In such examples rulers tend to oppose any solutions that diverge from their present course of action. They will favour intensification and commit an increasing number of resources to their present plans, projects and social institutions.
2. Runaway Train: An example would be a society that only functions when growth is present. Societies based almost exclusively on acquisition, including pillage or exploitation, cannot be sustained indefinitely. The society of the Assyrians and Genghis Khan and the Mongols, for example, both fractured and collapsed when no new conquests were forthcoming.
3. House of Cards: In this aspect of Tainter's model societies that grow to be so large and include so many complex social institutions that they are inherently unstable and prone to collapse.²⁰

Tainter argued that often these three models co-exist and re-inforce each other leading to civilisations collapse. Considering Easter Island as an example, it could be said that the leaders (the ruling elite) on Easter Island saw a rapid decline of trees but ruled out change (i.e. The Dinosaur). Timber was used as rollers to transport and erect large statues called moai as a form of religious reverence to their ancestors. Reverence was believed to result in a more prosperous future. So they intensified moai production (i.e. Runaway Train). Easter Island also has a fragile ecosystem because of its isolated location (i.e. House of Cards). Deforestation led to soil erosion and insufficient resources to build boats for fishing or tools for hunting. Competition for dwindling resources resulted in warfare and many casualties.

Jared Diamond argues that the history of these ancient civilisations has important lessons for civilisation today. The lesson from Diamond’s and Tainter’s theses is that advanced and complex civilisations, like our one today, stand the best chance of thriving long term if they identify and address unsustainable aspects of their development as early as possible rather than later. Thus their

¹⁹ Tainter, J. (1993) *The Collapse of Complex Societies*; Cambridge: Cambridge University Press

²⁰ Ibid.

research shows that it is wise to take a precautionary approach to development whereby warnings from scientists are taken seriously and acted upon.

Many are aware that scientists have been warning humanity about the consequences of unsustainable forms of development since the 1960s. It is almost four decades since the 1972 UN Summit on the Human Environment in Stockholm and the publication *Limits to Growth* issued global warnings to this effect. But few decision makers would be aware that in fact the first warnings from modern scientists about the unsustainability of different modern aspects of development go back over one hundred years. Even fewer would be aware that the first chance humanity had to define and pursue sustainable development globally was well before the 1972 UN Summit on the Human Environment in Stockholm.

2.2 When Did Humanity Have The First Chance To Define and Pursue Sustainable Development Globally?

In answer to this question, most would say 1992, when the nations of the world gathered in Rio for the 1992 UN Conference on Environment and Development. Some may say 1972 at the first UN Summit on the Human Environment in Stockholm. Most would assume that this period from the 1960s-1990s was the first time humanity had the necessary scientific knowledge, eco-technological solutions, political and community will and global communications to define and pursue sustainable development globally.

But humanity actually had its first real opportunity to strive to achieve global sustainable development as far back as 1909. In 1909, US President Theodore Roosevelt asked the leaders of the world to meet at the Hague to consider the conservation of the natural resources of the world.²¹ Echoing many of the key themes and actions recommended for each nation by *Our Common Future* and the 1992 Rio Earth Summit, between 1907-1909 US President Theodore Roosevelt:

- convened the first Conference of Governors at the White House to consider problems of conservation and develop a national plan of action for the USA²²
- set up a National Conservation Commission to look at the use, wastage and conservation of natural resources to prepare first inventory of natural resources for the entire USA.²³
- convened the first North American Conservation Conference at the White House.²⁴

²¹ Barney, G. (1982). *The Global 2000 Report to the President: entering the twenty-first century. Appendix A "Lessons from the past" in Volume Two The Technical Report*, Penguin Books. Harmondsworth, Middlesex, UK. p685-687 Available at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/2f/c1/41.pdf Accessed 1.July.08

²² See the *Full Proceedings of the 1908 Conference of Governors at the White House* Available at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCID+@lit\(amrvvgv16\)\):@@@SREF](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCID+@lit(amrvvgv16)):@@@SREF) Accessed 1 July 2008

²³ See a succinct overview at www.theodoreroosevelt.org/life/timeline.htm Accessed 30 January 2008

²⁴ Ibid.

- encouraged a regional approach to conservation of natural resources with the USA, Canada and Mexico²⁵,

In Roosevelt's opening address²⁶ (See Appendix 2.1) at the Conference for the Governors in 1908, he outlined many of the themes which were subsequently covered in the publications *Limits to Growth*, *Our Common Future* and the 1992 Rio Summit for Environment and Development many years later. Firstly, Roosevelt was clear that the conservation of natural resources should be seen as the highest national priority. He stated that;

"This Conference on the conservation of natural resources is in effect a meeting of the representatives of all the people of the United States called to consider the weightiest problem now before the Nation; and the occasion for the meeting lies in the fact that the natural resources of our country are in danger of exhaustion if we permit the old wasteful methods of exploiting them longer to continue...I have asked you to come together now because the enormous consumption of these resources, and the threat of imminent exhaustion of some of them, due to reckless and wasteful use, once more calls for common effort, common action. We want to take action that will prevent the advent of a woodless age, and defer as long as possible the advent of an ironless age."²⁷

He went on to highlight the problem of exponential physical growth in humankind's use of natural resources. He made it clear in this speech that the current development trajectory was unsustainable stating;

As peoples become a little less primitive, their industries, although in a rude manner, are extended to resources below the surface; then, with what we call civilization and the extension of knowledge, more resources come into use, industries are multiplied. With the rise of peoples from savagery to civilization, and with the consequent growth in the extent and variety of the needs of the average man, there comes a steadily increasing growth of the amount demanded by this average man from the actual resources of the country...The mere increase in our consumption of coal during 1907 over 1906 exceeded the total consumption in 1876, the Centennial year. This is a striking fact: Thirty years went by, and the mere surplus of use of one year over the preceding year exceeded all that was used in 1876--and we thought we were pretty busy people even then. The enormous stores of mineral oil and gas are largely gone; and those Governors who have in their States cities built up by natural gas, where the natural gas has since been exhausted, can tell us something of what that means. Our natural waterways are not gone, but they have been so injured by neglect, and by the division of responsibility and utter lack of system in dealing with them, that there is less navigation on them now than there was fifty years ago. Finally, we

²⁵ Barney, G. (1982). *The Global 2000 Report to the President: entering the twenty-first century. Appendix A "Lessons from the past" in Volume Two The technical Report*, Penguin Books: Harmondsworth, Middlesex, UK p685-687 Available at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/2f/c1/41.pdf Accessed 1.July.08

²⁶ See *Proceedings of a 1908 Conference of Governors: Opening Address by the President* at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCLID+@lit\(amrvvgv16div19\)\)](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCLID+@lit(amrvvgv16div19))) Accessed 1 July 2008

²⁷ Ibid.

began with soils of unexampled fertility, and we have so impoverished them by injudicious use and by failing to check erosion that their crop-producing power is diminishing instead of increasing. In a word, we have thoughtlessly, and to a large degree unnecessarily, diminished the resources upon which not only our prosperity but the prosperity of our children and our children's children must always depend.²⁸

Roosevelt emphasized his generation's responsibility to future generations to conserve natural resources. The importance of leaving a good legacy to future generations to ensure intergenerational equity runs throughout his speech.²⁹ Roosevelt interpreted the idea of a democratic society to include both present and future citizens. His belief was that a democratic society should protect and conserve natural resources for future generations. He argued that it was undemocratic to exploit and squander a nation's natural resources for present profit. Roosevelt emphasized the ability of humankind to use its unique foresight to conserve these resources for future generations and responsibility to do so:

One distinguishing characteristic of really civilized men is foresight; we have to, as a nation, exercise foresight for this nation in the future; and if we do not exercise that foresight, dark will be the future! We should exercise foresight now, as the ordinarily prudent man exercises foresight in conserving and wisely using the property which contains the assurance of well-being for himself and his children. We want to see him exercise forethought for the next generation. We need to exercise it in some fashion ourselves as a nation for the next generation.³⁰

Until the turn of the 20th century, Roosevelt explained, the United States had built its economic and political strength by exploiting the nation's natural resources. But Roosevelt, like other leading conservationists of the time, no longer believed that these natural resources were infinite in their abundance. In this speech he even distinguished between those resources which are renewable and non-renewable

The natural resources I have enumerated can be divided into two sharply distinguished classes accordingly as they are or are not capable of renewal...The minerals do not and can not renew themselves. Therefore in dealing with the coal, the oil, the gas, the iron, the metals generally, all that we can do is to try to see that they are wisely used. The exhaustion is certain to come in time. We can trust that it will be deferred long enough to enable the extraordinarily inventive genius of our people to devise means and methods for more or less adequately replacing what is lost; but the exhaustion is sure to come. The second class of resources consists of those which can not only be used in such manner as to leave them undiminished for our children, but can actually be improved by wise use. The soil, the forests, the waterways come in this category. We began with soils of unexampled fertility, and we have so impoverished them by injudicious use and by failing to check erosion that their crop-producing power

²⁸ Ibid.

²⁹ See *Proceedings of a 1908 Conference of Governors: Opening Address by the President* at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCID+@lit\(amrvgvg16div19\)\)](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCID+@lit(amrvgvg16div19))) Accessed 1 July 2008

³⁰ Ibid.

is diminishing instead of increasing. In a word, we have thoughtlessly, and to a large degree unnecessarily, diminished the resources upon which not only our prosperity but the prosperity of our children and our children's children must always depend. We have become great in a material sense because of the lavish use of our resources, and we have just reason to be proud of our growth. But the time has come to inquire seriously what will happen when our forests are gone, when the coal, the iron, the oil, and the gas are exhausted, when the soils shall have been still further impoverished and washed into the streams, polluting the rivers, denuding the fields, and obstructing navigation. These questions do not relate only to the next century or to the next generation.³¹

The end of the nineteenth century brought the closing of the US frontier and the near extinction of the buffalo and the passenger pigeon. Both species had been symbols of America's seemingly endless natural abundance. Their parlous state caused many Americans to question that myth. Among them was Roosevelt who felt that the nation's dependency on its natural abundance could become the nation's weakness if its reckless and wasteful exploitation continued. To ensure the future availability of the nation's natural resources, it was necessary as a matter of urgency to conserve and manage them. Roosevelt went on to say in his speech to the Governor's conference on conservation, "*It is equally clear that these resources are the final basis for national power and perpetuity.*"³² Roosevelt saw the land as an economic resource. It should be conserved and managed to ensure the economic and political strength of the nation in the long term. While President of the USA, he created five National Parks, , fifty-one National bird Reservations, four Game Refuges and the National Forest Service.

Roosevelt believed that environmental conservation was critical to achieve sustained economic growth. Roosevelt was also aware of the barriers to achieving this. For instance he highlighted the problem of how cut off from nature many people had become by living in cities;

And yet, rather curiously, at the same time that there comes that increase in what the average man demands from the resources, he is apt to grow to lose the sense of his dependence upon nature. He lives in big cities. He deals in industries that do not bring him in close touch with nature. He does not realize the demands he is making upon nature.³³

Roosevelt was not alone in presenting such a complete and sophisticated case for environmental conservation and intergenerational equity around this time. Svante Arrhenius wrote in 1919 a publication called *Chemistry in Modern Life*³⁴ where he clearly identified the sustainable

³¹ Ibid.

³² Roosevelt, Theodore (1990) *Publicizing Conservation at the White House*. American Environmentalism. Ed. Roderick Nash. New York: McGraw Hill.

³³ See *Proceedings of a 1908 Conference of Governors: Opening Address by the President* at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCLID+@lit\(amrvvgv16div19\)\)](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCLID+@lit(amrvvgv16div19))) Accessed 1 July 2008

³⁴ Arrhenius, S. (1926) *Chemistry in Modern Life* Van Nostrand Publishing. New York.

developments concerns of intergenerational equity, the finiteness of resources and the need for a new form of environmentally sustainable development. Arrhenius argued that the industrial world had given rise to a new kind of international warrior, who Arrhenius called the “Conquistador of waste.” Arrhenius wrote eloquently

“Like insane wastrels, we spend that which we received in legacy from our fathers. Our descendants surely will sensor us for having squandered their just birthright...Statesman can plead no excuse for letting development go on to the point where mankind will run the danger of the end of natural resources in a few hundred years.”³⁵

Having lived against a backdrop of rampant imperialism and the First World War, Arrhenius, then in a position of scientific authority as the Director of the Nobel Institute in Sweden, was deeply concerned about the direction that the European economies had taken as a result of WW1. He feared after the end of the First World War a return to dark times. Arrhenius writes:

“Concern about our raw materials casts its dark shadow over mankind. Those states which lack [them] throw lustful glances at neighbors, which happen to have more than they use. Still more tempting is the desire for gain from lands on the other side of the seas, inhabited by uncivilized natives, with interest unawakened in guardianship.”³⁶

Arrhenius invoked the chemist’s commandment “Though Shall Not Waste” to argue that legislation be enacted aimed at both reducing consumption and promoting conservation. Arrhenius’s political hero was Theodore Roosevelt. If Roosevelt had managed to hold the world’s first environmental summit in 1909 then no doubt Svante Arrhenius would have attended, as a huge fan of Roosevelt and at the time head of the Nobel Institute in Sweden. Arrhenius also outlined in this book a clear vision for eco-innovation through engineering sustainable development. Arrhenius argued that

“Since half a tonne of coal is lost during the burning of energy to transport the coal the building of power plants should be in close proximity to the mines. All lighting with petroleum products should be replaced with more efficient electric lamps, while aluminium, the virtually limitless metal should be substituted for iron, whose ore reserves are finite and rapidly dwindling. Engineers must design more efficient internal combustion engines capable of running on alternative fuels such as alcohol, and new research into battery power should be undertaken. Wind motors and solar engines hold great promise and would reduce the level of CO₂ emissions. Forests must be planted...”³⁷

Arrhenius above all believed in humanity’s capacity for innovation and foresight to solve these problems

³⁵ Christianson, G.E (1999) *The 200 Year Story of Global Warming* Constable Press. London p143

³⁶ Ibid. p143

³⁷ Ibid p144

“Doubtless humanity will succeed eventually in solving this problem....Herein lies our hope for the future. Priceless is that forethought which has lifted mankind from the wild beast to the high standpoint of civilized humanity.”³⁸

Unfortunately, this first world summit on the environment did not happen in 1909. Roosevelt had promised to resign after two terms in office and he was true to his word.³⁹ There was no coup, no sense at all that his views on environment were too radical for the Republican Party of the time. Unfortunately the subsequent President, Taft, did not share Roosevelt’s environmental passion and dismantled Roosevelt’s environmental programs. Roosevelt was so disappointed with this that he ran again for President in 1912 gaining a significant percentage of the vote to come a reasonably close second to Woodrow Wilson whilst significantly outpolling Taft who came third in the poll.

Since few today receive any environmental history education, few today realise what a lost opportunity it was when the world leaders did not take Roosevelt up on his idea to have the first world summit on environment in 1909. Environmental history shows that by 1908 many of the key understandings that inform the call for sustainable development and many of the necessary sustainable solutions and eco-innovations were available and being actively promoted and discussed. Consider the following evidence of this;

The word “sustainable” appears to have been coined in 1713 by Hanns Carl von Carlowitz, head of the Royal Mining Office in the Kingdom of Saxony, when the challenge arose of a predicted shortage of timber. The term “sustainable development” itself originated 1713 in a paper by Carlowitz.⁴⁰ The roots of that concept can be found in the early ‘European Enlightenment’, when, inspired by the English author John Evelyn and the French statesman Jean Baptist Colbert, German Kameralists, began to plan their dynasties’ woodlands with a view to handing them on undiminished to future generations. Central ideas and understandings that inform the call for sustainable development like “the tragedy of the commons”, which was discussed in Section 1, were first articulated not in 1968 by Hardin⁴¹ but in 1833 by William Forster Lloyd in his Oxford lectures.⁴² Economists like John Stuart Mill articulated the desirability to decouple economic growth from physical throughput of the economy in his writings on the stationary state economy in the 1850s.⁴³ Other economists articulated the need to address problems of market “externalities” such as environmental degradation as early as the 1880s when the term externality was first used⁴⁴. There was

³⁸ Ibid. p144

³⁹ The statutory two term limit was not in place at this time.

⁴⁰ Carlowitz, H. C. von : (1713) *Sylvicultura oeconomica – Anweisung zur wilden Baumzucht*, Leipzig, (Reprint, bearb. von K. Immer u. A. Kiessling, mit einer Einleitung von U. Grober, Freiberg, 2000, p. 84).

⁴¹ Hardin, G. (1968) *The Tragedy of the Commons*, Science, vol 162, issue 3859, 13 December, pp1243-1248

⁴² Lloyd, W.F. (1833) *Two Lectures on the Checks to Population*, Oxford University Press, Oxford, England.

⁴³ Mill, J.S. (1848) *Principles of Political Economy with Some of their Applications to Social Philosophy*, Longmans, Green & Co., London

⁴⁴ Sidgwick, H. (1883) *Principles of Political Economy*. London.

even an understanding of the economic value of natural resources and ecosystem services which nature provided evidenced by books like *Economics of Forestry; a Reference Book for Students of Political Economy and Professional and Lay Students of Forestry*, published by Bernhard E. Fernow in 1990⁴⁵ and Edward Howe Forbush's *Useful Birds and Their Protection* published in 1907. Forbush's book discussed the economic value of birds and strategies for their protection.

Economists of the time were also focused on social sustainability issues too. Professor Alfred Marshall, founder of the Cambridge University School of Economics, mentor to the great economist John Maynard Keynes, and undisputed leading economist of his generation in England in the early 20th century chose economics as his field of study out of a desire to better understand and reduce poverty. Marshall was impelled to economics because '*the study of the causes of poverty is the study of the causes of the degradation of a large part of mankind.*'⁴⁶

2.3 Debates about the Need for a Precautionary Approach.

Another key understanding, from which the call for sustainable development has partly come, is the fact that environmental pressures can push ecosystem's resilience past a threshold and into irreversible decline. This was understood and articulated in 1864 by George Perkins Marsh who emphasized that some acts of destruction exceeded the earth's recuperative powers and thus, implicitly, humankind needs a precautionary approach:

"The ravages committed by man subvert the relations and destroy the balance which nature had established between her organized and her inorganic creations; and she avenges herself upon the intruder, by letting loose upon her defaced provinces destructive energies hitherto kept in check by organic forces destined to be his best auxiliaries, but which he has unwisely dispersed and driven from the field of action. When the forest is gone, the great reservoir of moisture stored up in its vegetable mould is evaporated, and returns only in deluges of rain to wash away the parched dust into which that mould has been converted." He continued, "The earth is fast becoming an unfit home for its noblest inhabitant, and another era of equal human crime and human improvidencewould reduce it to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the deprivation, barbarism and perhaps even extinction of the species."⁴⁷

⁴⁵ See Fernow, B.E (2008) *Economics of Forestry; A Reference Book for Students of Political Economy and Professional and Lay Students of Forestry*. New York: Thomas Y. Crowell Company Publishers. Available at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCID+@lit\(amrvvgv36\)\)](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCID+@lit(amrvvgv36))): Accessed 1 July 2008

⁴⁶ Pigou, A. (1920) *The Economics of Welfare*, London. MacMillan & Co. p3. In this publication and in his *Wealth and Welfare* (1912, 1920), Pigou brought social welfare into the scope of economic analysis. In particular, Pigou is responsible for the famous distinction between private and social marginal products and costs and the idea that governments can, via a mixture of taxes and subsidies, correct such market failures - or "internalize the externalities." Arthur Cecil Pigou (1877-1959) developed earlier work by fellow English philosopher Henry Sidgwick (1838-1900) and economist Alfred Marshall (1842-1924) into externalities.

⁴⁷ Marsh, G.P. (1864) *Man and Nature: Or, Physical Geography as Modified by Human Action*. Edited, with a new introduction, by David Lowenthal. Foreword by William Cronon. Weyerhaeuser Environmental

Marsh could also see that now that humankind had explored the world, there were no more new Edens to migrate to if humankind continued such destruction of nature.

“...Man, who even now finds scarce breathing room on this vast globe, cannot retire from the Old World to some yet undiscovered continent, and wait for the slow action of such causes to replace, by a new creation, the Eden he has wasted.”⁴⁸

The idea of needing a precautionary approach to complex systems is not new. By the 1860s in medicine the Hippocratic Oath⁴⁹ – which is analogous to the precautionary principle through its notion of “First, Do No Harm” had been mainstream medical practice for hundreds of years. The principle comes from the recognition that when dealing with a complex system such as a human body, despite the best of intentions, there are risks of negative side effects with any action. But the Hippocratic Oath does not simply acknowledge that with complex human health one or two things can go wrong, it acknowledges the fact that when one thing fails there can be a cascade of functions of the body failing leading to death. This precautionary approach in medicine when dealing with a complex system could easily have been translated and applied to complex natural systems and humankind’s interaction with them. The EU 2002 study “Late Lessons from Early Warnings: the Precautionary Principle 1896–2000”⁵⁰ shows that there have been many early warnings over a hundred years ago calling for a precautionary approach.

2.4 Debates about Deforestation.

Most of us think of the concerns about the environment as a recent phenomenon, however, concerns about these issues go back thousands of years. Deforestation was seen as a major concern as far back as ancient Greece which used timber as its main source of fuel both for peaceful and military purposes. The changes from deforestation made a considerable impression on Aristotle’s biographer and botanical gardener Theophrastus of Erasia, Theophrastus, from his observations of local forest changes, developed a theory which firmly linked deforestation to the decline in rainfall, which he believed was taking place in Greece and Crete⁵¹. Hence the first theories of human induced climate change were articulated over 2000 years ago. By 1760 this theory had been proven to be true by a broad consensus of the Academies of Sciences of the day. Scientists had been gathering knowledge about botany and nature systematically for a century by then. In 1681 the Dodo became extinct on Mauritius. This was

Classics Series. Seattle and London: University of Washington Press, reprint 2003.

⁴⁸ Ibid p228

⁴⁹ See Hippocratic Oath at <http://news.bbc.co.uk/2/hi/7654432.stm>

⁵⁰ Harremo, P., Gee, P., MacGarvin, M., Stirling, A., Keys, J., Wynne, B., Vaz S.G., (2002) *Late Lessons from Early Warnings: the Precautionary Principle 1896-2000* Environmental issue report No 22 European Environment Agency. ([//reports.eea.eu.int/environmental_issue_report_2001_22/en](http://reports.eea.eu.int/environmental_issue_report_2001_22/en))

⁵¹ Hughes, J.D (1985) ‘*Theophrastus as Ecologist*’, *Environmental Review*, 4, 296-307 see also Glacken, C.J., (1967) *Traces on the Rhodian shore: Nature and culture in Western Thought, From Ancient Times to the End of the Eighteenth Century*, Berkeley, California

widely reported in Europe. The awareness that humankind's activities could lead to extinction of species especially on islands, like Mauritius that have relatively unique species, was already widely acknowledged in Europe. This emerging consensus on the science of desiccation and the growing understanding of the threat of extinctions lead to the first comprehensive environmental policies to conserve forests, soil and fisheries being adopted implemented in 1767-1772 in Mauritius. The British, based on this scientific consensus, also implemented forest conservation and other environmental policies in the Caribbean from the 1780s.

Numerous countries adopted forest conservation laws based on this new scientific knowledge and consensus concerning desiccation and threat of extinctions. The British, for instance, enacted sweeping Forestry Conservation legislation in India by the 1850s which inspired the USA from the 1870s to investigate and implement extensive forest conservation from the early 1880s onwards. F.B. Hough⁵², the main consultant and advisor on this topic in the US, proposed German, French and above all Indian methods of forest conservation as models that were worthy of imitation. Gilford Pinchot, another key US campaigner for North American Forest conservation, was similarly influenced by the Indian example and the India Forest Service. Pinchot then went on to be instrumental in helping Roosevelt to develop his understanding of the need for conservation. Importantly by 1872, already in the USA. Yellowstone National Park had been declared, the first national park in the world. This was the start of many new national parks being created by 1909. Yellowstone National Park is now a World Heritage Site.

2.5 By 1900 Many of the Great Environmental Sustainability Debates Had Begun.

If world leaders had taken up Roosevelt's call for a world summit on environment this may have created the political will for such a shift earlier. Already by 1908 the risks of asbestos (first warning 1898), PCB's (first warning 1899), benzene (first warning 1897), and radiation (first warning 1896) were known and being debated. In addition by 1908 the risks of extinctions (1681), tragedy of the commons (1833), over-fishing (1865), pushing beyond ecological thresholds (1864), dry-land salinity (1864), soil degradation (B.C), deforestation (~300 B.C), damming rivers (1906), acid rain (1872) were known and whether action should be taken was being debated. Other evidence that the world was ready for the challenge of achieving sustainable development by 1909 comes from the fact the Sierra Club had formed. The Sierra Club was formed in 1892 and was dedicated to the preservation and expansion of the world's parks, wildlife, and wilderness areas. From 1903-1913 the Sierra Club

⁵² Hough, F.H (ed) (1874) *Report of the Committee on the Preservation of Forests*, U.S Congress, House of Representatives, 43rd Congress, 1st Session, House Report 259, Washington DC, pp 43 Hough quotes frequently in his paper from a report written on the Madras forests by C. Walker (1873) *On the Duty of Governments in the Preservation of Forests*, Proceedings of the American Association for the Advancement of Science.

campaigned, for instance, to stop the damming of the Hetch Hetchy valley within Yosemite National Park. Roosevelt's chief forester, Gifford Pinchot, argued,

“the object of our forest policy is not to preserve the forests because they are beautiful or the habitat of wild animals; it is to ensure a steady supply of timber for human prosperity. Every other consideration comes as secondary.”⁵³

But others viewed nature as an aesthetic resource that should be preserved simply because it looked good and represented a unique natural environment that would be lost with the intrusion of human beings. The chief advocate of this view was John Muir, a respected writer and naturalist and Sierra Club founder. Pinchot's pragmatic view of conservation collided with Muir's instinct for preservation over the fate of the Hetch Hetchy valley within Yosemite National Park echoing debates normally associated with more recent times.

Other sustainability debates, which matter today, also have their origins over one hundred years ago. As early as 1811 the social movement known as the Luddites questioned the blind faith of the time in technological progress.⁵⁴ In 1865 Jevons warned of the risks of rebound effects from industrial efficiency gains.⁵⁵

Jevons asserted that the more efficient use of coal in engines doing mechanical work actually increased the use of coal, iron and other resources, rather than “saving” them⁵⁶. Jevons, in *The Coal Question*, showed that cutting the amount of coal used to produce a ton of iron by over two thirds, was followed, in Scotland, by a tenfold increase in total consumption, between the years 1830 and 1863. This has become known as the Jevons Paradox. History has shown Jevons to be correct. As George Monbiot writes,

“(Greater efficiency of processes, products and services has) two effects. The first is that money you would otherwise have spent on energy is released to spend on something else. The second is that as processes, which use a lot of energy, become more efficient, they look more financially attractive than they were before. So when you are deciding what to spend your extra money on, you will invest in more energy-intensive processes than you would otherwise have done. The extraordinary result is that, in a free market, energy efficiency could increase energy use.”⁵⁷

Many assume that a 50 per cent improvement in energy efficiency will result in a 50 per cent reduction in energy usage and greenhouse gas emissions. Yet this is not what tends to happen in practice. In

⁵³ Hays, S. P. (1959) *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920*. Harvard University Press. Quoted in pp. 42-42,

⁵⁴ Fox, N. (2003) *Against the Machine: The Hidden Luddite History in Literature, Art, and Individual Lives*, Island Press.

⁵⁵ Jevons, W.S. (1865) *The Coal Question: an Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of our Coal-mines*. 3rd edition 1905, Ed. A.W. Flux. Augustus M. Kelley, New York

⁵⁶ Alcott B (2005). *Jevon's paradox*. Ecological Economics 54,9-21

⁵⁷ Monbiot, G. (2006) *Heat: How to Stop the Planet Burning*. Penguin Press.

practice what tends to happen, as Jevons pointed out in 1865 and Monbiot more recently, is that as efficiency increases, people or companies can use the same amount of energy to produce more services. This is because greater energy efficiency has reduced the cost of energy for any one service. Therefore, a major misconception made by some engaging in sustainable development today is to assume that the level of an efficiency saving is equivalent to the net reduction of energy and materials used. It is therefore an important part of the sustainability debates today. For instance, The Stern Review⁵⁸, has been criticised for ignoring the Jevons Paradox.⁵⁹ Jevons, back in 1865, provided an important insight, which once understood, enables business, government and the community to use economic incentives, policy tools, market mechanisms plus incentives for behaviour change to reduce negative rebound effects significantly. This will be discussed in detail in Chapter 7.

Despite the wealth of evidence for the Jevons Paradox and a wealth of literature on how to address it, almost 150 years on, few governments formally recognise, let alone have explicit policies to address the Jevons Paradox. As the UK Energy Research Centre states in 2007

“Rebound effects tend to be almost universally ignored in official analyses of the potential energy savings from energy efficiency improvements. A rare exception is UK policy to improve the thermal insulation of households, where it is expected that some of the benefits will be taken as higher internal temperatures rather than reduced energy consumption.⁶⁰ But the direct rebound effects for other energy efficiency measures are generally ignored, as are the potential indirect effects for all measures. Much the same applies to energy modelling studies and to independent estimates of energy efficiency potentials by energy analysts. For example, the Stern Review of the economics of climate change overlooks rebound effects altogether, while the Fourth Assessment Report from the Intergovernmental Panel on Climate Change⁶¹ simply notes that the literature is divided on the magnitude of this effect.”

Table 2.1 highlights the significant time lag between the first authoritative scientific warnings of the lack of sustainability of an aspect development and an adequate political response to each specific early warning. It is important to note that there is an inevitable communication lag between one person realising something and it becoming widely known, understood and acted upon politically. But Table 2.1 shows that debates on these sustainability topics failed to be resolved sufficiently over many decades for political action to be taken. This suggests that other explanations are needed, such as

⁵⁸ Stern, N. (2007), 'Stern Review: The Economics of Climate Change', HM Treasury, London.

⁵⁹ Sorrell, S *et al* (2007) The Rebound Effect: an assessment of the evidence for economy-wide energy savings from improved energy efficiency. UK Energy Research Centre. A report produced by the Sussex Energy Group for the Technology and Policy Assessment function of the UK Energy Research Centre. Available at <http://www.ukerc.ac.uk/Downloads/PDF/07/0710ReboundEffect/0710ReboundEffectReport.pdf> Accessed 1.02.08

⁶⁰ DEFRA, (2007), 'Consultation document: energy, cost and carbon savings for the draft EEC 2008 -11 illustrative mix', Department of Environment, Food and Rural Affairs, London.

⁶¹ IPCC, (2007), 'Climate Change 2007: Mitigation of Climate Change', Working Group III contribution to the IPCC Fourth Assessment Report, Intergovernmental Panel on Climate Change.

potentially the role of vested interests, to explain why it has taken so long for purposeful political action to take place on sustainable development.

The history summarised in Table 2.1 also provides evidence for the cost benefits of a precautionary approach to development. The costs of inaction on asbestos and other chemicals alone have been significant to the environment and humanity the last century. Similarly inaction on the tragedy of the commons, deforestation, and over-fishing, have pushed many ecosystems passed the point of irreversible collapse, impoverishing the poor and vulnerable now for future generations. Yet as Table 2.2 shows scientists have been trying to warn of such risks and move the debate forward to achieve political action on such issues for over one hundred years.

Table 2.2: Not Believing Cassandra. Early Warnings, Late Action.

Issues of Ecological Sustainability	First warning of a threat to ecological or human health and resilience.	How long before effective action was taken?
Deforestation	During the Peloponnesian War 431 B.C – 421 B.C large tracks of forested countryside were transformed into barren waste and there are indications that much increased soil erosion and flooding resulted. These changes made a considerable impression on Theophrastus of Erasia, Aristotle's biographer and botanical gardener. Theophrastus was led by his observations of local forest changes to develop a theory which firmly linked deforestation to the decline in rainfall, which he believed was taking place in Greece and Crete. ⁶²	Botanist Pierre Poivre, Commissaire-Indendant of Mauritius from 1767-1772, was responsible for initiating and implementing the most complex and integrated environmental policy to date.
The Precautionary Principle	Another key understanding, from which the call for sustainable development has partly come, is the fact that environmental pressures can push ecosystem's resilience past a threshold and into irreversible decline. This was understood and articulated as early as the 1864 such as George Perkins Marsh. The notion of needing to take a precautionary approach has existed in medicine since The Hippocratic Oath – First do no harm.	Many countries in the EU have embraced the precautionary principle in the post 1987. In Australia, the 1992 Intergovernmental Agreement on the Environment adopted the precautionary principle as one of its four guiding principles.
Threat of Extinctions	1681 The Dodo becomes extinct on Mauritius. This was widely reported in Europe. The awareness that humankind's activities could lead to extinction of species especially on islands like	1973: Convention on International Trade in Endangered Species of

⁶² Hughes, J.D (1985) *Theophrastus as ecologist*, Environmental Review, 4, 296-307

	Mauritius that have relatively unique species is widely acknowledged. ⁶³	Wild Fauna and Flora (CITES).
Tragedy of the Commons	Aristotle observed, "what is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest." William Forster Lloyd ⁶⁴ in his Oxford lectures of 1833 describes the Tragedy of the Commons idea, describing what happened to pasturelands left open to many herds of cattle. Lloyd pointed out that, with a resource available to all, mutual ruin was just around the corner ; for the greediest herdsmen would gain initially, but demand would grow and, as it grew (along with population) supply remained fixed, and a time would come when the herdsmen would be trapped by their own competitive impulses, and helpless to prevent the ruin of the unmanaged commons by overgrazing.	1911: Fur Seal Treaty was developed in response to severe over harvesting of fur seals from the North Pacific. 1931: Convention for the Regulation of Whaling signed in Geneva.
Fisheries	1865: In 1865 James Bertram documented ⁶⁵ inshore Scottish herring catches between 1818 and 1863, when the catch fell from 125 to 82 crans (barrels) while the area of drift nets carried per boat rose from 4 500 to 16 800 square yards. He wrote 'I have always been slow to believe in the inexhaustibility of the shoals, and can easily imagine that overfishing, which some people pooh-pooh so glibly, could easily be possible....'	1995: FAO Code of Conduct for Responsible Fisheries and the UN Agreement on Straddling Fish. Stocks and Highly Migratory Fish Stocks are negotiated and published.
Acid Rain	1872: Robert Smith, Britain's first air pollution officer discovered that the rain approaching his town contained sulphuric acid. He coined the term "Acid rain".s . In his book "Air and Rain" ⁶⁶ , he outlined the effects acid rain might have on the urban fabric, writing: "When the air has so much acid that two to three grains are found in a gallon of the rain-water, or forty parts per million, there is no hope for vegetation... galvanized iron is valueless... stone and bricks of buildings crumble". ⁶⁷ 1881: Norway tracked the first signs of acid rain on its western coast	1994 Second sulphur protocol, adopted to reduce sulphur emissions to that required to be ecologically sustainable.

⁶³ Strickland, H.E., Melville, A. G (1848) *The Dodo and its Kindred*, vol 1, London p26.

⁶⁴ Lloyd was also clear that this meant that Adam Smith's invisible hand did not work in this instance: The commons will be doomed by overgrazing. The argument was used by Lloyd to dispute Adam Smith's idea of the "invisible hand".

⁶⁵ Bertram, J. G. (1865) *The Harvest of the Sea*, John Murray, London.

⁶⁶ Smith R.A. (1872) *Air and Rain*. Longmans Green & Co., London.

⁶⁷ Smith R.A. (1872) *Air and Rain*. Longmans Green & Co., London.

<p>Salinity and Dry Land Salinity in Australia</p>	<p>1864: Salinity was first identified as a problem in Australia. Problems of rising water tables and soil emerged soon after the establishment of the first irrigation schemes: along the South Australian Murray in the 1890s; in parts of the Murrumbidgee Irrigation Area in the 1920s; in the Curlwaa Irrigation Area, NSW, in the mid-1930s. Now, few irrigation areas are free of the problems and all the indications are that, without major remedial measures, they will get worse</p>	<p>On 3 November 2000, the Council of Australian Governments (COAG) endorsed 'Our Vital Resources: A National Action Plan for Salinity & Water Quality' to target some of the worst affected areas.</p>
<p>Radiation</p>	<p>1896: Thomas Edison, Tesla and Grubbe noted eye and skin injuries and the former, particularly, cautioned about excessive exposure to X-rays.⁶⁸ In 1899 John Dennis, a New York journalist, campaigned for controls by state licensing on radiologists and radiographers, and argued that injury to a patient was a criminal act.⁶⁹ It was many decades before action was taken</p>	<p>1961 UK publishes regulations covering the use of radioactive substances. 1990 ICRP concludes in Publication 60 that the risk of radiation-induced cancer is 4-5 times greater than estimated in 1977.</p>
<p>Benzene</p>	<p>1897: Benzene has been known to be a powerful bone marrow poison since the 1897 report of Santessen⁷⁰ He observed aplastic anaemia among young women engaged in the manufacture of bicycle tyres in Sweden. In the same year, LeNoir and Claude⁷¹ reported the observation of haemorrhaging in a young man engaged in a dry-cleaning operation in France,</p>	<p>2001 Petrol still contains benzene, giving public exposure risk.</p>
<p>Asbestos</p>	<p>1898: The earliest account of the health hazard of working with asbestos was provided by Lucy Deane, one of the first Women Inspectors of Factories in the UK. Writing in 1898, Deane observed that: 'the evil effects of asbestos dust have also instigated a microscopic examination of the mineral dust by HM Medical Inspector. Clearly revealed was the sharp glass-like jagged nature of the particles, and where they are allowed to rise and to remain suspended in the air of the room in any</p>	<p>1998–99 EU and France ban all forms of asbestos 2000–01 WTO upholds EU/French bans against Canadian appeal 2005: Australia, James Hardie Ltd still negotiating settlement with victims of</p>

⁶⁸ Edison, T. A. (1896) *Effect of X-rays upon the eye*, Nature Vol. 53, p. 421.

⁶⁹ Dennis, J. (1899) *The roentgen energy today*, Dental Cosmos Vol. 41, p. 853.

⁷⁰ Santessen, C. G., (1897) *Chronische Vergiftungen Mit Steinkohlentheerbenzin: Vier Todesfalle* Arch. Hyg. Bakteriol. Vol. 31, pp. 336–376.

⁷¹ LeNoir, Claude, (1897) *On a Case of Purpura Attributed to Benzene Intoxication*, Bul. Mem. Soc. Med. Hop. Vol. 3, pp. 1251–1261.

	quantity, the effects have been found to be injurious as might have been expected. ⁷²	asbestosis.
PCBs	1899: Polychlorinated biphenyls (PCBs) are chlorinated organic compounds. They were first synthesised in a laboratory in 1881. By 1899 a painful disfiguring skin disease that affected people employed in the chlorinated organic industry. was identified and named chloracne IN the late 1930s Monsanto, the US producer of PCBs, was certainly aware of adverse health effects in workers exposed to PCBs; for in 1936 several workers at the Halowax Corporation in New York City exposed to PCBs), and related chemicals were affected by chloracne. Three workers died. Autopsies of two revealed severe liver damage.	1972 Sweden bans 'open' uses of PCBs. 1996 EU directive to eliminate PCBs, with phase-out by 2010.
Rebound Effects	In 1865 Jevons warned of the risks of rebound effects from industrial efficiency gains. Jevons asserted that the more efficient use of coal in engines doing mechanical work actually increased the use of coal, iron and other resources, rather than "saving" them ⁷³ . Jevons, in <i>The Coal Question</i> , showed that cutting the amount of coal used to produce a ton of iron by over two thirds, was followed, in Scotland, by a tenfold increase in total consumption, between the years 1830 and 1863. This has become known as the Jevons Paradox.	The Jevons Paradox is still not acknowledged explicitly by government policy today.

2.6 Debates about Reducing Inequality, Social Capital, Trust and Democratic Participation.

Achieving sustainable development involves much more than simply achieving environmental sustainability. Another key goal of sustainable development is the reduction of global inequality and ending extreme poverty. Debates about what causes inequality and extreme poverty and what are the most effective methods of alleviation are not new. Governmental action in Britain for the welfare of the poor goes back to the 16th century. The first UK statute dealing specifically with poor relief was that of 1601, which gave local justices the power to license "aged and poor persons" to beg within their own neighbourhood⁷⁴. These "Poor Laws" were the forerunners to the welfare state.⁷⁵ The slavery debates famously achieved resolution in 1807 in Britain when the British Parliament passed an

⁷² Deane, L. (1898) *Report on the Health of Workers in Asbestos and Other Dusty Trade*, in HM Chief Inspector of Factories and Workshops, Annual Report for 1898, pp. 171–172, HMSO London (see also the Annual Reports for 1899 and 1900, p502).

⁷³ Alcott B (2005). *Jevons paradox*. Ecological Economics 54,9-21

⁷⁴ See *English Poor Laws* at http://eh.net/encyclopedia/article/boyer_poor_laws_england Accessed 30 January 2008

⁷⁵ See London School of Economics' *The Poor Laws and the Origins of the Welfare State* at http://www.lse.ac.uk/library/pamphlets/SocialPolicy/socialpolicy/pamphlets/the_poor_and_origins_of_the_welfare_state.htm Accessed 30 January 2008

Act prohibiting British subjects from engaging in the slave trade after March 1, 1808—16 years after the Danes had abolished it.⁷⁶

Rev. Thomas Malthus 1798 *Essay on the Principle of Population* arguing that poverty and famine would be the result of man's overproduction of offspring was partly a response to the implementation in Britain in 1796 of the Speenhamland System which declared that wages below what was considered to be an absolute minimum should be supplemented by local parishes up to the appropriate level, according to the number of children that the individual had and the price of bread. Malthus's essay was arguing against such welfare to the poor because he argued it would lead to a population explosion which would undermine the original goal of the increase in welfare to the poor. In 1830, Tory MP Michael Thomas Sadler, published *The Law of Population*⁷⁷, arguing against Malthus's population doctrine, argued that fertility actually declines with rising income and greater security of economic welfare.

Understanding of the benefits and importance of equity to community trust, social capital, civic participation and the health and vibrancy of society also has a long history. Interest in the links between social equity, social trust, strength of community life and civic participation rates goes back at least to Alexis de Tocqueville's *Democracy in America*, in which he describes his visit to the US in 1831.⁷⁸ Academics and social commentators writing on the now very popular issue of social capital often quote his book and its coverage of the strength of community life in the US at the time. Pre-empting Putnam's writings on social capital in the late 20th century, Tocqueville's *Democracy in America* introduces the notion of "American Associationalism." This concept highlights the role played by institutions of civil society—such as families, voluntary associations, schools, businesses, churches and other religious organizations—and their connection to democracy. Tocqueville writes that

"the strength of free peoples resides in the local community. Local institutions are to liberty what primary schools are to science; they put it within the people's reach; they teach people to appreciate its peaceful enjoyment and accustom them to make use of it."⁷⁹

⁷⁶ Clarkson, T. (1808) *History of the Rise, Progress and Accomplishment of the Abolition of the African Slave Trade by the British Parliament*, Longman, Hurst, Rees, and Orme, London,

⁷⁷ Sadler, M.T. (1830) *The Law of Population: A Treatise in Six Books, in Disproof of the Superfecundity of Human Beings and Developing the Real Principle of their Increase*, Irish University Press. Shannon, Ireland, 1971. Reprint Of 1830 London Edition. Hardback. No Dustjacket. 2 volumes. 8vo's. pp xvi, 639 & xii, 690. Tables. ISBN 0716515792. From the 'Development of Industrial Society' series; social, political and economic upheavals in nineteenth century England. 2 volumes.

Seeley, R.B. (1842). *Memoirs of the Life and Writings of Michael Thomas Sadler, Esq.*, R.B. Seeley and W. Burnside. London. Harper. New York,

⁷⁸ Tocqueville, A de (1835 and 1840) *Democracy in America (Volume I, Volume II)* Gosselin Publishing. Paris.

⁷⁹ Ibid.

However, they often fail to acknowledge that de Tocqueville made this linkage explicitly with the importance of reducing inequality, even though he does this on the first page of the book where he writes:

“Among the new objects that attracted my attention during my stay in the United States, none struck me with greater force than the equality of conditions. I easily perceived the enormous influence that this primary fact exercises on the workings of the society. It gives a particular direction to the public mind, a particular turn to the laws, new maxims to those who govern and particular habits to the governed.”⁸⁰

Tocqueville elucidated why he believed that greater equity led to a stronger civic life:

“When the chroniclers of the Middle Ages, who all, by their birth or their habits, belonged to the aristocracy, report the tragic death of a noble, they express infinite sorrows; whereas they recount in one breath and without batting an eye the massacre and tortures of the common people... [However,] [w]hen ranks are almost equal among a people, with all men having more or less the same manner of thinking and feeling, each of them can judge in an instant the feelings of all the others. There is thus no misery that he cannot easily conceive of and whose dimensions are not revealed to him by a secret instinct. It does not matter whether it is a question of strangers or enemies: his imagination puts him immediately in their place. It mixes something personal into his pity and makes him shudder himself when the body of his fellow man is torn apart.”⁸¹

Wilkinson notes the fact that today’s commentators ignore this part of Alexis De Tocqueville’s work

“is particularly ironic given that the growing interest today in social capital is itself the result of a decline in the quality of social relations and in community life reflecting in large part the effects of increasing inequality.”⁸²

Wilkinson also discusses how early Christian socialists advocated greater equality not, as now, simply on the grounds that it is a fairer sharing-out of goods between people whom we have come to see as self interested consumers, but because they saw it as a crucial step on the road to greater human harmony and a fuller realisation of our inherent sociality. Often calling each other “brother” “sister”, they saw differences in wealth and income as a major cause of social divisions in society.⁸³

Also by 1909, Herbert Croly’s important work *The Promise of American Life* was published, which emphasized many ideas in harmony with the current modern literature on social capital. Croly’s book profoundly influenced two generations of political leaders such as Presidents Theodore Roosevelt, Woodrow Wilson and F.D Roosevelt with its rejection of Jeffersonian individualism and its argument that in an age of corporations and industry, continued American progress required a stronger federal

⁸⁰ Ibid., p. 249.

⁸¹ Ibid., p.251.

⁸² Wilkinson, R. (2005) *The Impact of Inequality: How to Make Sick Societies Healthier* The New Press p36

⁸³ Ibid p35

government, a sense of community, and loyalty to a shared vision of nation. The term “social capital” first appeared in print in 1916 in the context of academic debates on the decline of America’s cities and close-knit neighbourhoods⁸⁴.

2.7 What Capacity, Knowledge and Enabling Technologies Existed to enable Ecological Modernisation by 1920?

The most compelling evidence that by the early twentieth century humanity had the potential to achieve sustainable development and embark on ecological modernisation derives from the clear capacity and knowledge assembled by this time of how to achieve sustainable development in practise. By the early 20th century the world had most of the scientific understanding, enabling technologies and methodologies needed to start to achieve sustainability. It was mentioned earlier that many of the key ideas in the field of economics needed to tackle the sustainable development questions were understood. Already there were many books on what we would call sustainable agriculture by this time. George Washington Carver published *How to Build Up Worn Out Soil* in 1905 promoting the use of peanut trees to rehabilitate soils.⁸⁵ At the same time F.H. King was writing prolifically on sustainable agriculture issues. In 1912, King, a US Department of Agriculture official, published a study called *Farmers of Forty Centuries*.⁸⁶ King had been sent to China by the US government on a fact-finding trip between 1907-1909 to learn how Chinese methods of farming had stood the test of time. Thus the West had documentation of farming methods that showed that if you farm in certain ways, and obey certain basic rules you can farm the same piece of land sustainably for thousand’s of years. It outlined how farmers can practise intensive agriculture over thousand’s of years sustainably. The Chinese farmers knew what their inputs and outputs were and had a 5000 year old system that balanced the two. When landscape is converted into a cropping landscape to bring about a change the productivity, one has to do it in certain ways. Across East Asia everyone understood and implemented this much for thousand’s of years. FH King’s book, without calling them as such, described most of the principles of sustainability in agriculture. King had been sent forth to learn from the rest of the world how to better manage soils because serious problems were already emerging in the USA. Shortly after this Steiner⁸⁷ developed biodynamic farming in 1924 and Lady Balfour began her work on sustainable agriculture.

⁸⁴ Roosevelt Malloch, T (2003) *The Roosevelt Group Social, Human and Spiritual Capital in Economic Development* Templeton Foundation, Working Group of the Spiritual Capital Project. Harvard University. Available At www.metanexus.net/spiritual_capital/pdf/malloch.pdf

⁸⁵ Carver, G.W. (1905) *How to Build Up Worn Out Soils*, Tuskegee Experiment Station, Bulletin Six, Tuskegee, p. 4

⁸⁶ King, F.H. (1911) *Farmers of Forty Centuries*. Madison, WI. F.H King published prolifically on these issues for further information see www.soils.wisc.edu/soils/people/poets/fh_king.htm Accessed 30 January 2008

⁸⁷ Steiner, R. (1924). *Spiritual Foundations for the Renewal of Agriculture. A course of eight lectures*. M. Gardner (ed) (1993). Bio Dynamic Farming and Gardening Association, USA.

In the case of energy, wind-driven mills were operating in Persia from the 7th century AD for irrigation and milling grain. Wind powered all sea faring ships and transport for thousands of years. Clarence Kemp⁸⁸ patented the first solar water heater in 1891. By 1897, solar water heaters serviced 30% of houses in Pasadena, California.⁸⁹ In 1895 Rudolf Diesel (1858-1913) developed the first ‘diesel’ engine to run on peanut oil. This was featured in 1900 in Paris at the World Exhibition. Diesel famously stated around this time that,

"The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in the course of time as important as the petroleum and coal tar products of the present time."⁹⁰

France and Great Britain were the first nations to support the widespread development of electric vehicles in the late 1800s. In the USA, in 1899 and 1900 electric cars outsold all other types of cars. At the turn of the twentieth century, they were produced by Anthony Electric, Baker Motor Vehicle, Detroit Electric, Woods Motor Vehicle and others. Electric vehicles had several advantages over gasoline cars at the time. They did not have the vibration, smell, and noise associated with gasoline cars. Changing gears on gasoline cars was difficult, while electric vehicles did not require gear changes. Later in 1916, Woods invented a hybrid car that had both an internal combustion engine and an electric motor.⁹¹

All major cities at this time of 1909 had train and light rail systems connecting the suburbs to places of work. Cars were a novelty at this stage. As early as 1892 Ebenezer Howard published “Garden Cities of To-Morrow” which launched the Garden City movement.⁹²

As mentioned above, the Ancient Greeks pioneered passive solar design of their whole cities so all homes had access to sunlight during winter. Many green buildings today are actually modelled on 19th century building design that needed to keep buildings cool in summer and warm in winter without air conditioners and heaters to assist. The famous 60L Green Building in Melbourne is modelled on a 19th Century English arcade in many of its design features. 19th century engineers and architects knew how to design buildings to stay at roughly the same temperature without today’s powerful air-conditioning and heating systems.

⁸⁸ See *A Brief History of the American Solar Water Heating Industry* At http://www.ecssolar.com/Solar_Articles/briefHistory.pdf Accessed 30 January 2008

⁸⁹ Perlin, P. (1999) *From Space to Earth - The Story of Solar Electricity*, Aatec Publications. Michigan.

⁹⁰ Tickell J. (2000) *From the fryer to the fuel tank: the complete guide to using vegetable oil as an alternative fuel*. Tallahassee, FL: Tickell Energy Consulting. and Moon, J (1974) *Rudolf Diesel and the Diesel Engine*. Piory Press, London. Cit in Stauffer, E. Byron, B (2006) *Alternative Fuels in Fire Debris Analysis: Biodiesel Basics* J Forensic Sci, March 2007, Vol. 52, No. 2 at <http://www.swissforensic.org/publications/assets/biodiesel.pdf>

⁹¹ David A. Kirsch, (1996) *The Electric Car and the Burden of History: Studies in Automotive Systems Rivalry in the United States, 1890 - 1996* (Ph.D. diss., Stanford University, 1996), UMI 97-14137.

⁹² Howard, E. (1892) *Garden Cities of Tomorrow* MIT Press (March 15, 1965) Originally published in 1898 as *To-Morrow: A Peaceful Path to Real Reform* and reissued in 1902 under its present title, *Garden Cities of To-Morrow* holds a unique place in town planning literature. The book was responsible for the introduction of the term Garden City, and set into motion ideas that helped transform town planning

A major area of current activity to help create green buildings is the re-discovery of geo-polymers⁹³ which are a low carbon dioxide producing form of cement. Geo-polymers were the main type of cement used by Ancient Rome. Hence the knowledge of how to create and use low carbon cements is ancient.

Another important area of sustainable technology innovation in the 21st century is Biomimicry-innovation inspired by nature. The idea being that, since nature has evolved over 3.4 Billion years, it is wise when considering an engineering or architecture problem to ask: how would nature do this? There is already a great deal of evidence to suggest that asking this question and investigating it will help develop more sustainable technologies. Again biomimicry is not a new idea or practice. Leonardo Da Vinci stated that

“Human ingenuity may make various inventions, but it will never devise any inventions more beautiful, nor more simple, nor more to the purpose than Nature does; because in her inventions nothing is wanting and nothing is superfluous.”

Aristotle saw biomimicry as the ultimate path stating that

“If one way be better than another, that you may be sure it is Nature's way.”

The famous architect Antonio Gaudi in the late 19th century and early 20th century practiced biomimicry deliberately in his designs of buildings and cathedrals. The columns, inside his famous Sagrada Familia, look like trees and its bell-towers are shaped shell-like spirals. The exterior balconies of Casa Mila undulate like the ocean's waves, as does the bench above the room of columns in Park Güell. Surrounded by the geometric, hard-edged shapes of most architecture, Gaudi's organic forms stand out as a reminder of the natural world. He consciously integrated nature's organic shapes and the fluidity of water into his architecture.⁹⁴

In the case of health, already by 1908 there had been the significant public health movement of the 19th century where doctors and educated middle class managed to convince the wealthy that investment in public health for the poor was needed, just as today scientists and NGOs try to convince the rich and governments to invest in sustainability.⁹⁵ The 19th century saw a revolution in water sanitation and treatment in many European cities greatly improving public health and well being. Louis Pasteur and other bacteriologists in the 1870s and 1880s discovered the role of micro-organisms in infectious diseases, thus laying the scientific basis for water sanitation and sewerage management. In the 1890s further impetus for better sanitation arose from interdisciplinary research that showed that typhoid was partly due to pathogens in sewerage water.

⁹³ See Geopolymers at <http://www.abc.net.au/catalyst/stories/2244816.htm> Accessed 29.06.08

⁹⁴ Roth, Leland M. (1993). *Understanding Architecture: Its Elements, History and Meaning*, Boulder, CO: Westview Press, 452-4.

⁹⁵ Boyden, S. (1987) *Western Civilization in Biological Perspective: Patterns in Biohistory*, Oxford: Clarendon Press,

Also by 1908, the Occupation, Health and Safety movement was well underway having been led by pioneers such as Amédée Lefevre (1798-1869), and many regulations had been enacted. Today almost 100 years later sustainability experts argue that a way to mainstream sustainability is to embed it in OH&S programs which are now often called Occupation, Health, Safety and Environment programs (OHS&E). There is no reason why this could not have been done 100 years ago as well.

In the 21st century, ethical investment is looked to as one of the major potential leverage points through which to help drive the shift to sustainable development for the 21st century. The roots of modern ethical investment may be traced to the anti-trust and 19th century child labour debates which hinged on the same basic issues. It can be also traced back to the 19th century Quaker and Methodist Church movements.⁹⁶

In the early 1900s the Methodist Church in North America decided to invest in the stock market, having previously viewed it as a form of gambling.⁹⁷ However, they wished to exclude certain types of companies, specifically those involved in alcohol or gambling. Laws and rules on how to invest ethically go back to biblical times and were a part of Jewish Law. Rabbi Yossi Ives has brought together remarkable evidence to show that many modern sustainable development ideas are actually enshrined in the Jewish Torah thousands of years ago.⁹⁸ This is significant because both the Christian and Islamic faiths build on from the Jewish tradition of Torah law.

2.8 Corporate Social Responsibility

The debate about corporate social responsibility (CSR) has been said to have begun in the early 20th century, amid growing concerns about large corporations and their power. The ideas of charity and stewardship helped to shape the early thinking about CSR in the US. Ida Tarbell's 1904 work *The History of the Standard Oil Company*⁹⁹ led to the Supreme Court of the United States decision to break up the company on anti-trust grounds. This eventually led to the break-up of the Standard Oil Company in 1911. Tarbell revealed, after years of research, the illegal means that John D. Rockefeller used to monopolize the early oil industry. The significance of *The History of the Standard Oil Company* is shown by the fact that it was listed number five among the top 100 works of twentieth-century American journalism by the New York Times in 1999. Similarly, Upton Sinclair's 1906 book

⁹⁶ Friends of the Earth (2003) *Briefing: Investing in a better future Ethical pensions, insurance and investments*. Friends of the Earth See http://www.foe.co.uk/resource/briefings/investing_better_futureII.pdf Accessed 30 January 2008

⁹⁷ EMG (2002) *The Good Shopping Guide*, EMG, London, UK.

⁹⁸ Ives, Y (2004) *Are We Behind on Green Issues? Judaism Offers a Balanced and Reasoned Approach to the Environment*. The Jewish Bulletin Available at <http://www.jewishbulletin.ca/archives/Feb04/archives04Feb06-07.html> Accessed 30 January 2008. Rabbi Yossi Ives is rabbi of Richmond Synagogue in London, England. This article is published as part of a Tu b'Shevat learning campaign co-ordinated by Canfei Nesharim (On the Wings of Eagles), an organization of Orthodox Jews working to educate the Orthodox community about the ideas, inherent in halachah, which today can be labelled as "environmental" in nature see www.canfeinesharim.org Accessed 30 January 2008

⁹⁹ Ida Tarbell, I (1904) *The History of the Standard Oil Company* Available at <http://www.history.rochester.edu/fuels/tarbell/MAIN.HTM> 2 vols., Gloucester, Mass: Peter Smith, 1963

*The Jungle*¹⁰⁰ led to the passage of the Pure Food and Drugs Act and the Meat Inspection Act by the United States Congress. These can be seen as early attempts to mandate socially responsible corporate behaviour.

Given this, it begs the question why humanity made such little progress to achieve ecological sustainability and social sustainability in the last one hundred years? It was not that people of the early 20th century did not have a clear vision of what sustainability could look like. It also was not because people did not understand the role vested interests can play in holding back progress which benefits the majority. .

2.9 What understanding was there of how to Overcome Vested Interests and Blocking Coalitions at the Start of the 20th Century?

Machiavelli summed up the essential problem of vested interests blocking efforts to achieve genuine progress in chapter 6 of *The Prince* in 1513 stating that

“There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order, this luke-warmness arising partly from fear of their adversaries ... and partly from the incredulity of mankind, who do not truly believe in anything new until they have had actual experience of it.”

Already by 1908 there was a significant history of social change and social movements that had created and spread parliamentary democracy, ended slavery, enabled female suffrage and ensured water sanitation for increasing parts of Europe. Stephen Boyden¹⁰¹ and others have written eloquently on how much the modern environmental movement can learn from the water sanitation movement of the 19th century.

Any social movement going up against powerful vested interests also needs the help of at least some of the leading writers, playwrights and journalists of the day to raise awareness, interest and understanding of the need for and overall benefits of change. As far back as 1882 Henrik Ibsen wrote a world famous play entitled *The Enemy of the People* which elegantly illustrates how, if a precautionary principle is not applied, and developers do not address environmental risks at the design phase, then it is very costly to retrospectively address environmental problems. The play is set in a small coastal town in Norway. The central character of the play is Dr Stockmann, a scientist and brother of the Mayor of the town. He and his brother led a project to develop baths with healing powers in the town. A large amount of public and private money was invested in the hope that it

¹⁰⁰ Sinclair's, U. (1906) *The Jungle*. Doubleday, Page & Company. Available today in the original at <http://www.seesharppress.com/books1.html#jungle>

¹⁰¹ Boyden, S. (1987) *Western Civilization in Biological Perspective: Patterns in Biohistory*, Oxford: Clarendon Press

would lead to an increase in tourism and greater prosperity for the town. The baths started to succeed but Dr. Stockmann discovered that waste products from the town's tannery were contaminating the baths and causing serious health problems for visitors using the baths. Dr Stockmann produced a detailed report containing a proposed solution, which would be costly for the town and sent it to his brother, The Mayor.

He was surprised that there was no follow up and that it was difficult to speak to his brother or to talk to the authorities. The Mayor and the authorities appeared unable to appreciate the seriousness of the matter and unwilling to acknowledge or address the problem because they believed that it could financially ruin the town. The Mayor eventually warned his brother to drop the issue. Dr Stockmann declined and organised a town meeting to convince the people to close the baths.

The townspeople turn on him and denounce him as an "Enemy of the People." In this play, Dr. Stockmann is defeated by corporate and government interests, the press turns against him, as do the citizens fearing higher taxes to fix the problem. Even though he was revealing the "truth," Dr. Stockmann was condemned. It is significant, however, that the "truth" that is rejected is a scientific truth. The play therefore has very modern overtones about how vested interests combined with a lack of general scientific literacy can get in the way of environmental and public health. Ibsen's play illustrates well the importance of undertaking comprehensive environmental risk assessment before development projects are undertaken. The play highlights how often it is costly to make changes to development projects after they have been built to retrospectively address and environmental pollution problem. The play provides many insights into why it takes generations for some "early warnings" to be acted upon politically. If a literary giant of the time such as Ibsen was writing plays such as this in 1882, it begs the question of what were other popular fiction and social commentaries of the time saying about sustainable development issues and aspirations. Since this thesis is mounting the case that by 1908 enough was known to begin to pursue and define sustainable development it is important to see if there was real passion for sustainable development aspirations reflected in the popular literature of the time.

2.10 Were aspirations for sustainable development reflected in pre-1908 literature?

Many of the core ideas and aspirations of sustainable development were reflected in the popular literature, poetry and art of the period leading up to 1908. The most popular book in England in 1908 was the classic tale Kenneth Grahame's *Wind in the Willows*, which warns of the potential negative effects on community and the environment, from people's obsession with having the latest technology, irrespective of personal, social or environmental cost.¹⁰²

¹⁰² The tension in the story is created due to the fact that Toad of Toad Hall is obsessed with having the latest automobile, Having crashed six cars, been hospitalized three times, and spent a huge sum on fines, Toad's friends feel they must protect

Beatrix Potter was the other most popular and famous children's writer in the UK in the first decades of the 20th century. Beatrix Potter is the most commercially successful ever English speaking children's writer, selling 155 million books. But Beatrix Potter is remembered also for the fact that she used the profits, from the sale of her books, to purchase farming land in the Lake District of England that would have otherwise been sold to developers. In her will, Potter left almost all of her property interests to the National Trust — 4,000 acres thus ensuring that the beauty of the Lake District will be sustained forever as the Lake District National Park.

To this day, *Wind in the Willows* and Beatrix Potter's books can lay claim to being still the most beloved books. Sotheby's recently estimated that the most valuable first edition books are Beatrix Potter's *The Tale of Peter Rabbit* (1901) and Kenneth Grahame's *Wind in the Willows* (1908), which could both fetch £50,000.¹⁰³

Not just in children's books were concerns for the environment expressed. The 19th century romantic artistic movement tried to raise awareness of the risks to the environment of the first industrial revolution. There was also a keen awareness of the value of sustaining cultural diversity and heritage. Vaughan Williams, one of the great English composers of the turn of the last century, travelled all of England recording and writing down British folk music and songs to ensure that they were not lost and were kept alive during the mass migration to the cities. Percy Grainger, Australia's greatest composer of this period, did the same thing in Australia at the time. He travelled throughout Australia recording Australian folk tunes and songs to ensure they were not lost.

Aspirations for greater social justice motivated some of the greatest writings in English literature in the century before 1908. Some of the great social commentators and literary giants pre-1908 included Johnathon Swift, Jane Austin, Charles Dickens and Mark Twain.

- In the 1700s, Swift exposed and decried the appalling poverty in Ireland at the time.
- Jane Austin, writing from 1790-1814, filled her books with social commentary combined with a sense of social justice and reform. Austin was staunchly anti-slavery.¹⁰⁴
- Charles Dickens, (1812–1870), was the foremost English novelist of the Victorian era, as well as a vigorous social campaigner. Considered one of the English language's greatest writers, he achieved

him from himself, since they are, after all, his friends. They make him a prisoner in his own house. But Toad is obsessed and escapes and steals a car only to be caught by the authorities and thrown in goal for 20 years. Toad finally realises the error of his ways and peace is restored as Toad, once released from goal, spends the rest of his life making an effort to atone with everyone that he had ever caused harm to. Concern and love for the environment is explicit in *Wind in the Willows*, which is widely regarded as a pantheistic novel, devoting a whole chapter simply to describing the wonders of the environment and its spirit.

¹⁰³ Oliver, M. (2003) *Potter leads, but not Harry*. The Guardian. Available at <http://books.guardian.co.uk/news/articles/0,6109,1033962,00.html> Accessed 18 February 2007

¹⁰⁴ Despite the value of her work as a historical document, much of it is still relevant to readers today. Austen is one of the most effective writer's ever at ridiculing what she considered reprehensible traits in her generation - hypocrisy, avarice, impiety, overindulgence, materialism, elitism, fashionable pretences and pride. Like Mike Moore today, Austin understood that one of the most powerful tactics of a reformer is humour.

massive worldwide popularity in his lifetime. Dickens's novels were, at one level, works of social commentary. He fiercely criticised the way the poor were treated and the social stratification of Victorian society. His novel, *Oliver Twist*, shocked readers with its images of poverty and crime and led to the clearing of Jacob's Island, the London slum that was the basis of the story. If Dickens was regarded as the foremost English novelist of the 19th century, then Mark Twain was regarded as such by many Americans.¹⁰⁵

- Mark Twain embodied many values and beliefs one hundred years ago normally associated with more modern times. He was a vegetarian who believed that no sentient being should be made to suffer for another without consent. He was pro-unionist who campaigned for the end of slavery and the emancipation of African Americans. From 1901 until his death in 1910, Twain was vice-president of the American Anti-Imperialist League, which opposed the annexation of the Philippines by the United States, and had tens of thousands of members. He describes his transformation and political awakening, in the context of the Philippine-American War, from being "a red-hot imperialist":

"I wanted the American eagle to go screaming into the Pacific ...Why not spread its wings over the Philippines, I asked myself? ... I said to myself, here are a people who have suffered for three centuries. We can make them as free as ourselves, give them a government and country of their own, put a miniature of the American Constitution afloat in the Pacific, start a brand new republic to take its place among the free nations of the world. It seemed to me a great task to which we had addressed ourselves. But I have thought some more, since then, and I have read carefully the treaty of Paris [which ended the Spanish-American War], and I have seen that we do not intend to free, but to subjugate the people of the Philippines. We have gone there to conquer, not to redeem. It should, it seems to me, be our pleasure and duty to make those people free, and let them deal with their own domestic questions in their own way. And so I am an anti-imperialist. I am opposed to having the eagle put its talons on any other land.

2.11 Was World War One Inevitable?

1908 was also a time where the world should have pursued peace. Many experts at the time argued that the global economy was already so integrated that there was no longer any rational justification for war between nations. In 1908 certainly no rational European leader would ever consider taking their nation to war. In 1910, British economist and lecturer Norman Angell wrote *The Great Illusion*¹⁰⁶. Angell argued that national economies had become so interdependent; so much part of the global division of labour, that war among the economic leaders had become unimaginably destructive. His central argument was that war between modern powers was futile in the sense that no matter what

¹⁰⁵ American author William Faulkner called Twain "the father of American literature."

¹⁰⁶ Angell, N. (1913) *The Great Illusion*, G. P. Putnam's Sons. New York and London.

the outcome, he thought both the losing and the victorious nations would be economically worse off than they would have been had they avoided war. Angell reasoned that thanks to deepening economic ties among powers, war would cost the aggressors more than any hoped-for gains. States, understanding this, would conclude that war was not a worthy option. Global peace would now ensue. In *The Guns of August*, Barbara Tuchman¹⁰⁷ described the remarkable impact *The Great Illusion* had on contemporary European intellectuals and statesmen. The book became, in Tuchman's words, "a cult." It was circulated at universities and inspired study groups "devoted to propagating its dogma." In a testament to its surreal power, the book's most "earnest disciple" was Viscount Esher, an advisor to the King of England and Chairman of the War Committee charged with rejuvenating the British army after the Boer war. Tuchman recounts that Escher even believed that Germany was "as receptive as Great Britain to the doctrine of Norman Angell." As Jeffrey Sachs writes,

"It is especially sobering to realize that before August 1914, globalization and the march of science seemed assured, as they seem to many today. A bestseller of the time, *The Great Illusion*, had correctly emphasized that war as a tool of European policy was passé because no country could possibly benefit from outright conflict. Yet distrust and failed European institutions brought war just the same, with cataclysmic effects that reverberated for the rest of the century. The war itself was unmatched in ferocity and death. And in its wake emerged bolshevism, the 1919 flu epidemic, the Great Depression, the rise of Hitler, the Chinese civil war, the Holocaust, and consequences that extend til now. The world was truly torn asunder in 1914, it still has not fully healed. It may seem impossible to conceive of such a cataclysm today, yet the widening arc of war and vituperation, often pitting U.S. foreign policy against global public opinion, reminds us daily of a growing threat to global peace...In future years the rising power of China and India could further wound US pride and self-confidence, and further ratchet up global tensions."¹⁰⁸

Clearly then, 100 years ago in 1908 the world leaders had a chance to choose environmental sustainability and peace but within 6 years most of them had chosen war. Also, given that most of the most advanced ancient civilisations have collapsed partly due to environmental factors, it is important to investigate why humanity continues to make such little progress in achieving sustainable development. Only through understanding our history can we ensure that we do not repeat it. Through understanding these patterns of past civilisations and past generations we may hope to empower our generation to not repeat these mistakes in this century.

Our well being depends, not just on our financial wealth, but our quality of life and our relationships, the vitality of our communities and the health of our environment. Achieving multiple goals such as improved economic, social and natural capital simultaneously with no major trade offs is clearly a

¹⁰⁷ Tuchman, B. (1962) *The Guns of August*, Random House.

¹⁰⁸ Sachs, J. (2008) *Commonwealth: Economics for a Crowded Planet*. Penguin. New York.

noble goal worthy of humankind's aspiration. Yet today the assumption that major trade offs exist between jobs, the economy and the environment are still remarkably common. Why is it that today the same debates seem to have evolved so little despite the fact that today we are told that we live in the information age? Today more people are more highly educated than ever globally and so why is it that the level of informed debate on these topics seems to have progressed so little in the last 100 years ago? Chapter 3 now addresses these questions.
