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Of Metaphors, Morals and Memories
Reflections on Socio-environmental Action from a Temporal Perspective

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Green is fashionable. Green is cool. Green is profitable. Being green is considered sound economics. Ever since the Brundtland Report (World Commission on Environment and Development 1987) the marriage between economy and ecology has been sanctified, their interdependence officially acknowledged. How that marriage is conceived and consummated, however, makes a crucial difference to the way environmental degradation and the production of hazards are responded to. As one would expect, money plays a central role in those relations and, much less expected, so does the socio-economic relation to time. In this paper I want to establish a link between economic and temporal assumptions that underpin this marriage and relate these habits of mind to socio-environmental practices. The purpose is not to come up with a blueprint for environmental action but to reflect on the setting and conditions to those actions and consider what, if anything, may be required to improve the current socio-economic conditions on the basis of which sustainable futures are to be achieved. Three central and interdependent metaphors – the 'clockwork universe', 'rational man' and 'spaceship earth' – will serve as the backcloth against which the analysis is developed.

The metaphor of the clockwork universe dates back to the very beginning of modernity. It entails an understanding of time and temporal relations that fundamentally altered what had hitherto been the accepted norm. It changed what had been unalterable facts of human time, that is, finitude, transience and rhythmicity. With the invention of the clock, time became subject to human design. With clock time as source of socio-economic organisation and regulation the emphasis shifted from finitude, ephemerality, irreversible change, uncertainty, context dependence and rhythmicity to endless repetitions of the same irrespective of context. Time in the clockwork universe is circular, linear-spatial and decontextualised. As long as its external energy source is in tact, it runs invariably along a predetermined path. Its direction is tied not to the irreversibility of human existence but to the convention of the number system whereby the number two follows the number one and not the other way around. It is infinitely divisible with, it seems, no lower limit to its 'units'. Time encoded in number becomes amenable to quantification and measurement. As machine time it is principally knowable and as such open to prediction and control. Clock time with its very specific temporal characteristics is central to the social relations and institutions of the industrial way of life. It underpins all economic activity and forms the unquestioned base upon which environmental policy and regulation are framed and developed.

The pedigree of 'rational man', the second metaphor, dates back almost as far as that of the clockwork universe to the age of science and reason. Rational man is *homo economicus*. He acts with impeccable selfishness and economic self-interest. He commodifies and colonises, controls and calculates. As consumer he uses cost-benefit analyses to come to decisions. This means, he makes his choices on the basis of a known past and a discounted future. He is the key actor in Garrett Harding's *Tragedy of the Commons* (1968/1992) where individual freedom in a commons, brings ruin to all. As independent, rational, free enterprise agent, rational man ends up fowling his own nest, consuming and polluting his way to extinction. Harding uses as his example a piece of communal grazing land, a common asset that can support only a strictly limited number of animals before the 'resource' is overgrazed and deteriorates to a point where everyone loses out. From the collective's perspective it makes sense to keep to the optimal number of grazing animals that maintain the health and reproductive capacity of the land. From the perspective of self-interested individuals,

however, it is rational and economically prudent to maximise the number of their own animals feeding on that free resource. This brings the highest profit to them now – in the present and the immediate/short-term future – at minimum expense, since the costs of this action are going to be carried equally by all members of the collective and are not to be paid for until some time in the future. The individuals' profit, moreover, can be invested and thereby increase personal wealth. For rational man, concern for the collective good makes no economic sense; it is simply irrational. Prevention of the collective demise is therefore to be achieved through externally applied constraint and made possible on the basis that rational man follows a rule-governed set of selfish actions, which makes his behaviour not only knowable and predictable but controllable.

In contrast to the above, 'spaceship earth' is a much more recent metaphor that emerged in the second part of the twentieth century. It arose in response to an accumulation of environmental problems that were no longer amenable to the established ways of dealing with natural limits and resource issues. The metaphor conveys a world in which there are no more open frontiers to be conquered, a densely populated world of limited space, precarious resource base and restricted capacity to absorb the waste products, a world in which imperialism, colonialism and migration are no longer viable answers to the problems associated with the industrial way of life. As with the clockwork metaphor, earth is a *man*-made machine, a technological creation constructed from separate, interchangeable parts. It assumes that scientists and engineers are able to establish why things go wrong since in technologically produced artefacts cause-and-effect links are traceable through the system in both directions, that is, forwards and backwards in time. It implies that as a socio-technological creation spaceship earth is principally knowable, that associated actions and reactions are quantifiable and ultimately predictable and that it is amenable to techno-scientific control and technological fixes. As a bounded system spaceship earth is encased and hermetically sealed. This means, on the one hand, that it is safeguarded from outside atmospheric incursions and, on the other, that its clearly definable, quantifiable and measurable internal resources are limited and finite. Protection of those finite and thus limited resources is to be achieved through tight public control and their distribution to be collectively organised. Key elements of the assumptions associated with the metaphor can be found in much of the economic debates around environmental protection and guide discussions on environmental cost-benefit analyses and pollution credits.

When looked at in isolation, these three metaphors seem no more than overdrawn caricatures, burlesque exaggerations that bear little resemblance to the way contemporary environmentalists and environmental economists view the world and socio-environmental activity. In this paper I want to show how the assumptions associated with the three metaphors have become taken-for-granted habits of mind that have entered the deep structure of social understanding and to demonstrate how they are acted out as environmental knowledge practices. As social theorist and time scholar I will want to give a temporal slant to the analysis of these issues before I identify some practices that contradict those assumptions, that currently operate in the shadows of the time economy of environmental relations. My argument is that habits of mind and practices form a powerful and inseparable union and that some of these unacknowledged and unquestioned assumptions need to be changed if environmental actions and policies are to become more appropriate to the contemporary condition. As such I draw and build on the path-breaking work of Adelheid

Biesecker and her colleagues from the German Network *Vorsorgendes Wirtschaften*[1] who have been tireless in their efforts to effect such change in habits of heart and mind.

1. Clocks, Bodies and Networks

Clocks represent a technological time created to human design. Their function is precise, their time quantifiable and predictable, unitary and standardized, decontextualised and abstracted from processes and change phenomena. With clock time, the variable times of nature – of day and night, seasons and change, growth and ageing, birth and death – are objectified, constituted independent of life and cosmic processes, of human activity and social organisation. In the public world of economic and political transactions, this techno-time is superimposed on the embodied and multi-dimensional times of social life, organisms, ecological interdependencies, the solar and planetary systems. Clock time envelops the multiple features of socio-cultural and natural times: the time frame, sequence and duration, the now point and timing, tempo and synchronisation, process time and rhythmicity. Clock time is the prism through which much of the lived temporal relations are refracted. Moreover, the abstract, standardised form of time allows or the integration of all levels of reality – cosmic, physical, biological, and cultural – as well as all known historical periods (Elias 1992) and it serves as a base to translate one quantity into another: labour can be translated into money; risks can be calculated for insurance purposes; historical periods can be related to each other. Created externally, clock time can function as a symbol for orientation, regulation and control.

This clock time is the foundation for temporal relations that characterise the industrial way of life: the equation of time with money; the link between speed, efficiency and profit; the globalisation of clock time as standard and economic norm; and more generally the control in all spheres of economic activity and public life. A slower, measured pace had to give way to the speeding up and general acceleration of daily life and work. Times when nothing happens, breaks and pauses, waiting and rest came to be considered unproductive, wasteful, lost opportunities. Time became equated with money, which is possible only on the basis of 'empty time', a time separated from content and context, disembodied from events. Only as an abstract, standardised unit can time become a medium for exchange and a neutral value in the calculation of efficiency and profit; only in this form can time become commodified.

In societies where time is equated with money, faster means better, increased speed constitutes progress: a faster aeroplane is considered more advanced than a slower one. A fast worker is seen as an asset to a company, a slow one considered a drain on its resources. Crucial to the contemporary speed valorisation is the economic investment-return-profit cycle, that is, the payment of interest for the time of money borrowed. In addition to profit and interest as motivating forces for the high value of speed, competition plays a central role. This applies whether the ‘product’ is a news story, a new drug, a new invention or a new fashion trend. Thus, when time is money and speed is equated with efficiency and competitiveness then time compression and intensification of processes seem inevitable.[2] This quest for time compression has reached its zenith with electronic communication where

[1] For an early publication of the Network see Busch-Lüty et al. 1994; also Biesecker 1998.

[2] This argument was first presented by Karl Marx 1867/1976 in Capital Volume I where he argued that in a context of competition the commodified labour time as abstract exchange value had to be intensified in order for business to stay competitive and profitable.

process times have been reduced to zero whilst the reach across space has become unlimited and instantaneous.

This instantaneity and simultaneity of communication technology underpins the globalisation of time. Colonisation *with* time has been achieved with the aid of standard time, time zones and world time, the globally organised time system that began to be implemented towards the end of the nineteenth century. Colonisation *of* time, in contrast, relates to the time values associated with the industrial way of life. In the latter case it is the time values and the social relations of industrial time that are being adopted as well as imposed on a worldwide basis as unquestioned norm.[3] This industrial norm, as I suggested above, is fundamentally rooted in clock-time and underpinned by naturalised assumptions about not just the capacity but also the need to commodify, compress and control time.

Closer inspection makes apparent that the unifying clock time economy of money divides as it unites: not everyone's time is of equal value. While the money rich tend to be time poor, they can exchange their money for time. They can buy labour saving devises and they can purchase the time of others in the form of skills and services to make up the short fall of their own time. For the time rich and money poor, in contrast, the equivalent exchange tends not to be an option. The time of children and the elderly, (unremunerated/unemployed) single parents and carers, women subsistence farmers and those locked into bartering relations tends not to provide them with a basis for economic wealth creation. As 'unproductive' labour, their unremunerated work in household and school, care relations and food production is rendered invisible, their time decreed 'worthless'. Outside the charmed circle of the tightly delimited time economy, their time gets positioned at the bottom of the hierarchy of temporal relations[4]. As long as the underpinning assumptions remain naturalised, taken-for-granted and unquestioned, unwilling recipients will find it difficult if not impossible to make their protests heard and understood, let alone accepted as meaningful and legitimate. Only when fault lines in the logic become exposed and irresolvable contradictions begin to destroy the system from within can alternative visions take hold and openings for change be operationalised.

This is precisely what happened with the rise and accumulation of environmental problems. In agriculture the consistent application of the logic has given rise to sick animals, and new diseases such as Mad Cow Disease (BSE) and Creutzfeld Jakob Disease (CJD), to the genetic modification of crops that threatens the entire organic food sector, to practices in animal husbandry of unparalleled cruelty. In transport it works against a wider range of initiatives towards more sustainable modes of mobility. Regarding social organisation in the widest sense, it underpins the inexorable move towards acceleration and the 24/7 society. In business and the corporate world it is implicated in downsizing and the externalisation of costs to society, in hostile takeovers that raid pension funds and extract unproductive wealth from taxpayers and the productive economy.[5] Businesses are going bankrupt and employees are being made redundant on an unprecedented scale. Responsible and environmentally sound businesses are declared inefficient while corporate raiding is decreed virtuous, aided with tax incentives and rewarded with massive bonus payments. With communication at near the

[3] For example, for Japan see Nishimoto 1997, for Russia see Castells 1996.

[4] For am more detailed argument on this point, see Adam (2002)

[5] On corporate cannibalism and predatory finance, see Korten (1995): 183-257. For a link to temporal relations and socio-environmental hazard production, see Adam (1998).

speed of light, finally, the gap necessary for creating a competitive edge has been lost and entirely new sources for gaining economic advantage have to be sought.

Wherever the logic of the clock-time based time economy is rigorously applied it leads not only to the by now familiar successes of the industrial system but also to its excesses: the global quest for economic growth is accompanied by an absolute increase in poverty and destitution not just in the majority (third) world but also amongst the poor of industrialised nations. The rise in speed and efficiency is accompanied by gridlock, stress and *un*productivity. The more embodied time is transcended and controlled, it seems, the more the future is open, unpredictable and beyond control. It means that increase in time control goes hand in hand with a decrease in control over outcomes (Adam 2004).

Focus on one of these contradictions gives us an insight into the complexities and opens a window on the paradoxes involved. The network time of information and communication technology (ICT) can serve as an example. This network time is superimposed on and interacts with the dominant clock time relations, which in turn have supplanted embodied times, that is, the rhythmic times of nature and cosmos, the irreversible times of life and the finite time of human existence. We may summarise the differences in the following way:

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Time
embodied
is contextual
is interdependent
is being and becoming
is duration, succession & cycle
is birth and death, growth and ageing
is all of past & future gathered up in the present
is rhythmic repetition with variation: invariability is death
is re/production, regeneration and repair/healing
is temporality, timing, tempo, intensity
is internalised memory & history
is finite & transcendent
is multi-layered
is creative
is life

Time
of clocks
is artefactual
is linear-spatial
is infinitely divisible
is quantified and measured
is empty, neutral, decontextualised
is counting oscillations represented by number
is repetition of the same irrespective of when and where
is invariable (variation is clock going wrong)
is creation of time to human design
is naturalised as time *per se*
is imposed circularity
is externalised
is machine
is dead

Time
of ICT
is diverse
is interconnected
is system-transcending
is ephemeral and enduring
is instantaneous and simultaneous
is all of present, everywhere and nowhere
is internalised memory of space transcending now
is non-sequential and non-chronological
is undifferentiated & fragmented
is immediate & timeless
is beyond control
is real time
is flow

The three time systems cannot be mapped onto each other; yet, we tend to move between them with ease, giving little thought to the matter. We deftly negotiate their incompatibilities, embrace their contradictions, take the paradoxes for granted and leave accompanying problems mostly unquestioned. While we are competent in knowing how to proceed, reflection on the implications of those structural dissonances seems to be in short supply. When looked at in relation to each other, clock time seems irrelevant for globally networked information processes at the speed of light; yet, it has lost none of its relevance for the context in which those processes take place just as embodied time has lost none of its pertinence as the context in which the contradictory interdependence of the clock and network time is played out. All three timescapes are interdependent and mutually implicating. All three have their contradictory logics enacted on a daily basis when we activate the net, deal with employment matters, engage in environmental debates, take a train or an aeroplane to attend a conference. Since temporal perspectives and relations do not exist in a vacuum, we now need to connect them to assumptions encoded in the 'rational man' and 'spaceship earth' metaphors respectively.

2. Economic Rationality and the Question of Morals

For economists who subscribe to a Hobbesian view of human nature – that people are selfish and rationally pursue their own best interest unless curbed by socio-political regulations – there is an inescapable need for economic, political and legal instruments to counter human nature and market forces. Since 'rational man' will pursue his happiness and economic wealth to the detriment not just of the wider community but ultimately himself, it is the responsibility of the collective or its representatives to impose regulations that curb this destructive potential and guide it instead towards productive ends.

The instruments available to impose such curbs are many and diverse. They can be of an economic, a legal and a political nature; most measures however are based on a combination of these. For analysts with a strong commitment to economic principles and ideals, it is important that the collective measures are designed in such a way that they do not interfere at the micro level in the successful operation of the market yet effectively curb the excesses of the market forces. For Michael Jacobs (1991: 125) this means, 'choosing the macroeconomic *outcomes* of economic activity, not the laying down of its microeconomic *methods*'. He wants this approach differentiated from the traditional one which took a far more individualistic stance where specific kinds of pollution such as car exhaust emissions were targeted at source rather than with reference to the overall level of pollution, degradation or hazard. The difference, he argues, is crucial since fitting of catalytic converters to cars, for example, will not reduce the overall level of pollution as long as the numbers of cars and their use keep rising. When the focus of attention is on the overall problem, so his argument goes, the understanding of the causes will change and the proposed solutions will consequently differ substantially from those that seek to tackle the problem at source. On the face of it, this approach seems to be the only meaningful way to reduce overall pollution, environmental degradation and the production of hazards.

Yet, when emphasis on macroeconomic outcomes is combined with economic reasoning and the full cluster of clock-time assumptions it brings forth such bizarre regulations as pollution credits which are attached to the US Clean Air Act of 1990 and more recent legislation on

water purity. Like milk quota, these credits can be bought and sold on the market. There is, however, a difference: pollution is not like milk. While the principle makes sense at a quantitative level it fails miserably when we acknowledge the qualitative and temporal dissimilarity between the two 'products'. Under such a scheme, everyone is given an upper ceiling for pollution, which means companies that are heavy polluters have to buy extra credits, whilst low polluters can sell theirs and thus make money on the basis of their 'virtue'. The argument is that the rational economic response is to pollute less and less because it costs money. So far so good. But what are we to make of the notion of *under*-pollution, and where is the inequality in wealth between nations to come into this? Economists argue that this measure works in the favour of Third World countries: they can swap their pollution credits for hard currency! Since they desperately need money to pay off their debts to the First World, they are deemed extremely fortunate since, as 'under-polluters', they can now exchange their debts for pollution, that is, trade a bad future for a more acceptable present. A second conundrum emerges when we consider that the implicit message might *not* be the need to be frugal with pollution but rather that pollution (by industrial nations) has become a *right*, a right for those who can afford it, a right upon which money, even fortunes, can be made, a right upon which political leaders can trade their citizens' physical well-being as well as the basis of existence of future generations of humans and other species.

Implicated in any of the macro economic solutions to environmental problems are Cost-Benefit Analysis (CBA) and discounting, two economic measures that form an integral and unquestioned part of the economic tool kit. Both rely on calculation with its associated dependence on quantification and measurement, on visible surface phenomena and linear causality, on past-based knowledge and the pursuit of certainty. Furthermore, when these premises are unquestioningly coupled with assumptions encoded in the metaphor of the clockwork universe, that is, with 'time is money', 'speed means profit and productivity', 'standardization increases time control', 'the export of commodified time and its adoption across the world is an unmitigated good thing', then those good intensions often materialise in strange and environmentally dubious forms. Let me explain.

At the simplest level, CBA is the comparison between costs and benefits of an action and/or its effect. With respect to the environment, CBA starts from the assumption that solutions to environmental problems involve costs. The action might be pollution control or prevention, the development of cleaner technology or less harmful chemicals; it may be not felling a rain forest, re-routing a planned road or pipeline or re-siting an urban development. Costs are assumed to occur for both action and non-action, for development and lost opportunities since non-exploitation automatically means a loss of money and opportunity costs. It is further presupposed that both costs and benefits can be established by asking people: ask the car manufacturer what it will cost to take out all the harmful substances from diesel fuel, ask asthma sufferers what it is worth for them to have the cleaner air. The comparison of costs with benefits, it is argued, allows us to make rational decisions about which actions make economic sense and which do not. The benefits of CBA are considered self-evident: once we begin to start paying for the resource, i.e. nature, we not only treat it with more care and reverence but we also do our best (because it is in rational man's self-interest) to avoid the pain of having to pay for the damage. Therefore, if this method is extensively applied, so the argument goes, environmental protection will be immeasurably enhanced. Since I am concerned here to critique some of the central assumptions that underpin economic measures

like CBA rather than CBA as an environmental policy per se, a few examples of the problems associated with the practice will suffice to support the argument.

Critics have rightly pointed out that while it may be reasonably straightforward to establish the financial costs of pollution abatement to the polluter, it is far more tricky to calculate the benefits to the recipient. First there is the substantial difference between people being asked how much they are willing to pay for a clean 'resource' such as air or bathing water and being questioned about how much compensation they should be paid for the polluted air and water. Then there is the small issue that people's capacity to pay differs widely, leading to the obvious conclusion that it is far more cost effective to pollute the environments of the poor. Next, there are a number of pertinent, if inconvenient, questions: 'What if the benefit is priceless?' 'What if the effects cannot be known due to the vast time-distantiation of the processes involved?' 'What if we cannot ask those affected because they live on the other side of the globe or are not even born yet?' And, finally, 'how do you establish equivalencies between death in degrees through radiation, asbestos or hormone-disrupting chemicals; the loss of ozone; your child crippled by asthma; beaches covered in faeces and/or oil globules; and the loss of a rare snail, a heath-land or an ancient peat-bog?'

If we take as our example the globally dispersed hormone-disrupting chemicals, which do their damage at the embryonic stage of foetal development but do not emerge as symptom until adulthood, it will quickly become obvious that the dependence on calculation, quantification, and measurement and the practice of asking people to express their choices in monetary terms is not only impracticable but also impossible. As soon as we are dealing with non-linear, non-proportional, time-space distantiated processes, the assumptions underpinning the clockwork universe and the rational man metaphors respectively become meaningless. That is to say, with hazards such as hormone-disrupting chemicals, the principle assumptions become inoperable long before we encounter the impossibility of asking embryos about the price they would put on their future health and fertility; long before we could consider what price could possibly be put on the slow invisible destruction of the capacity to regenerate and reproduce life on earth; long before we could ask what price tag would be appropriate for the 'lost resource' of future generations of humans.

The second unquestioned tool involves the relationship to the future. Rational man discounts the future, which means according the future less value than the present[6]. This devaluation of the future makes perfect sense within a scheme that assumes that individuals act to maximise their self-interest. Given the choice, it is argued, a person would prefer to have £1000 in their hands today rather than in ten years time. This money could be invested now and would therefore be worth much more in ten years than £1000. This means, by today's value and at a discount rate of 10% per annum over a period of ten years, the future £1000 is calculated to be worth a mere £386 today. From the standpoint of the present, projected into the future and back again, the future is less important than the present and, given a long enough time span, it is in this scheme of things worthless. This logic is proving particularly troublesome when it is applied to the long-term problems associated with environmental hazards. As the devaluation of the future increases with temporal distance – £1,000,000 of a hundred years hence are calculated to be worth a mere £75 today; a few more years and this huge sum of money it is

[6] For an excellent detailed economic treatise on this subject see Price 1993; for a more general introduction see Jacobs 1991; for a time-ecological perspective, see Adam (1998).

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worth nothing from today's perspective. That is to say, for *homo economicus*, the present of future generations who will have to cope with the legacy of hormone-disrupting chemicals, radiation, genetically modified organisms and industrial farming practices is of zero value, thus of no concern. Only the benefits accrued from today's innovations and economic prosperity are entered into the equation.

When the combined logic of the clockwork universe and rational man is consistently applied a number of anomalies arise that put great strain on the system and first signs of imploding tendencies can be observed. Deforestation, the result of unsustainable logging, has adverse effects not just on local communities but the global environment. The pursuit of competitive advantage in the chemical industry affects by now every living creature on this earth, disrupting the hormonal system and impairing fertility. The petrochemical and fishing industries between them have ensured dwindling fish stocks, with many species having declined beyond points of no return. Since Growth National Product (GNP) is a measure of economic activity, the growth of waste, pollution and associated diseases, as well as environmental hazards, accidents and disasters are all counted as (positive) measures of GNP. The industrial way of life has begun to affect the absorption and regenerative capacity of air, soil and water, with damage to the ozone layer, erosion and loss of topsoil, and chemical pollution of oceans and ground water being pertinent examples.

Moreover, the transnational institutions created to safeguard communal interests on a global scale from an all too zealously applied economic logic at the individual, company or national level have turned out to protect not the global commons but the corporate interest. We are dealing here with an ideological confederation of institutions and practices that comprises transnational corporations and international trade agreements, globalised financial markets and global institutions such as the World Bank and the World Trade Organisation. Despite their powerful roles in our lives, however, these institutions are neither accountable nor liable for their socio-environmental effects. Far from being democratic in the political sense of social accountability and responsibility, they are answerable only to the authority of money. In the economic pursuit of unimpeded flow and accumulation of money, they function on the basis of rationalised, de-contextualised socio-environmental irresponsibility. It means, this ideological confederation is marked by a common commitment to the creation of money and an explicit non-allegiance to people and places. Money is both the lifeline and the exclusive measure of value. The potential for maximum profit dictates where corporations, for example, place their operations and deposit their pollution. Concern for environmental sustainability becomes a source of economic inefficiency and weakness. Equally, when environmental regulations stand in the way of maximum profit it tends to be cheaper to up the operation and move it to a country that has less stringent environmental protection laws than to comply with the regulations. Environmental commentators have designated this a 'race to the bottom', a downward spiral where the financially optimal and socio-environmentally worst condition becomes the baseline for economic relations and modes of production: lowest wages, lowest safety standards, lowest company expenditure, lowest environmental protection and concern, elimination of barriers and regulations. In light of the current condition, Michael Jacobs (1991: xiii) and numerous others have argued that environmental damage and the manufacture of environmental hazards are not 'an incidental consequence of economic activity', rather, they are a 'central feature of the ways in which production and

consumption are currently organised'. Moreover, this production of hazards feeds and breeds on the assumptions that underpin rational man's economic activities.

At the same time, however, there is a world beyond rationally calculated action in pursuit of economic self-interest, beyond abstraction and decontextualisation, beyond the quest for mastery and control. Contrary to expectation this 'other' to the clockwork universe of 'rational man' is not the 'natural' world of 'irrational woman'; rather, it is the trans-gendered world of morals and spirituality, of care and compassion for fellow humans beings and creatures, a world in which relations, interdependencies and indeterminacies are acknowledged and multiple time worlds with their associated contradictions embraced. Here people of all ages and ethnic origin group together to protest against the excesses of the World Bank, the International Monetary Fund (IMF) and Corporate capitalism. They take up the cause of laboratory animals and organic farmers, protect trees and support endangered communities and species. Importantly, in the context of this discussion, they combine their academic and political prowess to work towards a socio-economic system of greater equity and long-term sustainability. The question to be addressed next is whether or not 'spaceship earth' is the appropriate metaphor for this endeavour.

3. Spaceships and Timescapes

In his classic essay *The Economics of the Coming of Spaceship Earth* (1968) Kenneth Boulding argued that we no longer have limitless open frontiers to colonise and inhabit, that the contemporary world is instead one of too any people, not enough resources and insufficient capacity to absorb our waste and pollution. He developed the image of a spaceship and its crew to get across his points about interdependence and the need to live within our means, to recycle and to find ways not to externalise the problems and costs. The appeal is to our rational self-interest. Once we understand ourselves as part of a closed system, so his argument goes, the absurdity and destructiveness of our actions will become apparent and this realisation will help us on the path to more sustainable environmental relations.

The metaphor is powerful and appealing. It presents complex issues in a simple and thus manageable form. It gives out messages about 'can do' as long as we are willing. The belief in the capacity to deal with and control the problems is never questioned. Boulding's spaceship is a closed system involving people and things encased in and aided by technology. Thus, emphasis is on space and matter. As for time, it is there in form of the ticking clock, counting us down, every minute getting us closer to the point of self-destruction – if we don't change our ways. This means that key temporal features of socio-environmental hazards are excluded from the image since closed systems negate the immanent time of change and transience, of contingency and potential, of entropy and creative regeneration. Closure is problematic, moreover, since earth is inseparably dependent on the sun's energy and the sun-earth-moon system in turn tied to the solar system and from there indefinitely to the furthest reaches of the universe. The boundaries, in other words, are arbitrary and are relative to the applied theory and perspective. An important point to appreciate here is that from a temporal perspective closed systems are dead systems. For there to be life and change, systems have to interact, transact and exchange as integral aspects of wider wholes: they have to be open and

their processes contextual and contingent. This, of course, makes the assumption of control based on sound management more problematic.

Let us consider this issue. The capacity to manage is dependent upon a number of essential preconditions. Central among these is the boundedness of that which is to be managed, that phenomena and their effects are delimited not just in space but also in time, that they occur in a known place and have a discernible beginning and end – note the link here to the spaceship earth metaphor. Equally fundamental is a reliance on the ability to establish causal connections and identify causal chains of events, which means, unambiguous relationships across time and space. Third, and closely allied, is the expectancy that cause and effect are proportional, that small causes have small effects and big events have proportionally large impacts. A fourth crucial prerequisite to management is the accessibility to measurement, quantification and control. Finally, 'solutions' are constructed on the basis of a known past projected into the future. All but the most simple environmental problems put these presuppositions into question. Whether we are encountering the impact of synthetic chemicals, ozone depletion, air and water pollution, radiation, or a new disease such as BSE, the defining features seem to be spatio-temporal *un*boundedness, *non*-proportionality, time-space distantiation, contingency, and a high level of indeterminacy. Moreover, industrially produced and induced environmental hazards and degradations tend to be characterised by invisibility and periods of latency after which outcomes are no longer traceable with certainty to original sources. Often problems are only recognisable as such after they have been identified through the mediating loop of science and once they have been brought to public attention through media representation.

The socio-environmental conditions are at odds, therefore, with base assumptions that underpin the 'management' of the environment which include the belief that visible symptoms can guide ameliorative action and that clock-time and linearity exhaust the range of temporal facets. Time lags, latency periods and broken event chains as well as the gap between perception and impact, between *Merk*- and *Wirkwelt*, transform the quest for certainty, calculation and control into an impossible dream. Moreover, since the interaction of rational technological systems with open, generative ecological processes creates inescapable indeterminacy, the future cannot be managed on the bases of past experiences. At the same time, however, environmental hazards are always symptoms of past actions that require responses. Furthermore, since effects cannot be delimited, that is, since they extend potentially globally into an open-ended future, it is difficult if not impossible to establish meaningful objectives and targets. We tend to be able to ignore these difficulties as long as we conceive of the environment in spatial terms. That is to say, the environment as spaceship, as a global realm of dwelling, gives the illusion of conventional manageability and control. As soon as we re-focus and re-conceptualise the issues in temporal terms as a *Wirkwelt,* however, what had previously gone unnoticed becomes obvious.

4. Memories of the Future

When the modernist project of mastery fails we enter the realm of morals and values, of care and responsibility. That is to say, when the conceptual tools of classical economics, science and politics become inappropriate, alternative assumptions begin to come to the fore. Examples of these new knowledge practices can be found across the world both within and

outside industrial and industrialising societies in self-help groups and communal actions, in social movements and non-governmental organisations, in political debates on the cosmopolitan future and efforts to apply the precautionary principle, in networks of citizen groups and academics. All had to suspend the metaphors discussed in this paper and reach beyond the knowledge encoded in the 'clock-work universe', 'rational man' and 'spaceship earth'. All struggled to find more appropriate bases for understanding socio-environmental and socio-economic relationships as well as their own role in the scheme of things. Implicitly or explicitly they are grappling with the temporal complexities involved: with the incompatibilities rooted in the timescapes of bodies, clocks and information networks, with time lags and multiple contingencies, with uncertainty and indeterminacy, with time-space distantiation and irreversibility, with memories, hopes and fears. All take their responsibility to the future seriously. Thus, in their very different ways, all can be regarded as guardians of the future.

Looking back in history we find that first of all the future belonged to gods/God. Much later it was entrusted to priests and sovereigns as gods/God's representatives on earth. Where the rule of gods/God has receded and society is organised in a largely secular way, it is individuals and their elected representatives which are entrusted with the future. In industrial societies, the future is understood with reference to its use value for the present. Accordingly, individuals are charged with the construction, control and colonisation of the future, to exploit it for their benefit in the present. This approach, as I have shown, makes environmentally sustainable action virtually impossible. It is therefore helpful to explore assumptions that are shared by people and groups who see themselves as guardians rather than asset strippers of the future.

Whether tree huggers, road protesters or members of the women's Network for Vorsorgendes Wirtschaften, these people see themselves not as engineers controlling a mechanical world of finite resources but as connected in a seamless, interdependent, dynamic whole to fellow human beings, animals and plants past, present and future. They understand their environmental concerns primarily as moral and spiritual matters and argue that the economic and political solutions have to arise from this primary base. Moreover, they are aware that problems caused by science and technology are rarely best served by techno-scientific fixes just as problems that originate from a particular economic logic tend not to be solved with more of the same. Responsibility is foregrounded in an attitude of care and compassion. In their effort to render the opaque open to their concerns, they use their imagination to achieve a kind of 'memory of the future' necessary to work towards time-sensitive sustainable socio-environmental solutions.

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