

Arts in ecology: Questions of foresight

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ABSTRACT

First, to reflect upon the title, *'Music and Arts in Action'*. We might, for certain purposes, consider a coming together of art forms and disciplines. Not the crossovers, mergers and interdisciplinary dialectical fusions we are familiar with, but a convergence or, as the biochemist E. O. Wilson (1999) termed it, a 'consilience', a leaping together of different knowledge. Perhaps this is akin to the Nobel physicist David Bohm's 'Dialogue – A proposal' (Bohm, *et al*, 1991), in which processes, forms and structures synthesise as a creative act?

And so we move from the co-joining action of the word 'and' to the dynamic agency of 'in'. Here we may find meaning in '*...in Action*', the act, or intervention that provokes and evokes a new culture, or a new society, perhaps as the artist Joseph Beuys (1990) aimed for in his concept of 'Social Sculpture'. Furthermore, that notion of dynamism embedded in '*in Action*' introduces the ideas of movement, change and transformation – from one place to another, from one time to another, or from one state of being to another. 'Far from equilibrium' (Prigogne and Stengers, 1984), this relational interdependence may be understood as that embodied by whole systems ecology, or the process, pattern and structure of Music and Arts.

Here and now is where this paper starts, by considering the ways in which this dialogue with and between Music and Arts might, in Action, create questions of foresight and 'ennobling questions' (Haley, 2008) that may contribute to many futures becoming. The key message is that environmental, social and cultural sustainability require creative, imaginative and positive approaches, and that the arts can contribute to these.

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QUE SERA, SERA

Sung by Doris Day in Alfred Hitchcock's 1956 film *The Man Who Knew Too Much*, the song *Que sera, sera* (What will be, will be) touches one of humankind's most deep-rooted preoccupations - the future, or fear of the future. As the song suggests, 'the future's not ours to see' and this uncertainty is beyond our ability to consider the odds and take risks. In his book *From Certainty to Uncertainty: The Story of Science in the Twentieth Century*, F. David Peat writes:

Quantum theory introduced uncertainty into Physics: not an uncertainty that arises out of mere ignorance but a fundamental uncertainty about the very universe itself. Uncertainty is the price we pay for becoming participators in the universe (Peat, 2002, p. 24).

And yet the Nobel Laureate in Chemistry, Illia Prigogine, celebrated the fact that the future is not predetermined. He wrote:

The inclusion of irreversibility changes our view of nature. The future is no longer given. Our world is a world of continuous "construction" ruled by probabilistic laws and no longer a kind of automaton.

We are led from a world of "being" to a world of "becoming" (Prigogine, 2003, p. 36).

From the notion of becoming and the future, to the concept of sustainability and the role of art, I pose the following question:

From space, looking back at earth, we may see three key issues: the accelerating increase of the human species, the accelerating decrease of other species and the accelerating effects of climate change. We might ask how are we to cope with these changes, creatively? (Haley, 2003, p.39).

Given the acceleration of global warming, it is probably too late to consider Sustainable Development as a viable concept, so what are our possible futures? How might creative notions of re-invention, adaptability and resilience make new forms of well-being, or acceptable lifestyles? Here, science in the form of ecology touches art.

ECOLOGICAL PRINCIPLES

The word 'ecology' was first coined by the German biologist Ernst Haeckel in 1866. Taking the Greek word *oikos*, meaning house or dwelling, the concept of ecology was later developed as a science by the Danish botanist, Eugenius Warming through his textbook (1895) on plant ecology. The basic definition of ecology is: the study of organisms, their relationship to each other and their relationship to their environment. From *oikos*, we also get the word economics: concerned with the production, consumption, and transfer of wealth – the household budget. And we get economic: a way of doing something correctly, without fuss or elaboration – aesthetically, if you will.

Whole systems ecology, however, offers a much deeper understanding of living in relation to other life forms. The integral, inter-related principles of this concept are:

- Diversity – species richness
- Interconnectedness – interdependence
- Finite resources – non-equilibrium thermodynamics, entropy, time

And this brings us to Deep Ecology, a philosophical understanding of ecology that considers human beings integral to and interdependent on the environment. This understanding considers our ethical responsibility to recognise and promote all species as having egalitarian rights and not to be viewed as a mere resource for human consumption. Fritjof Capra in *The Web of Life: A New Synthesis of Mind and Matter* (1996) describes Deep Ecology as a means of asking deeper questions about ‘how’ and ‘why’ humans are related to the whole biosphere.

EMBODIED MIND, EMBODIED ECOLOGY

Let us view this notion of human/environment interconnectedness from the perspective of second-generation cognitive science. Developed from Francisco Varela’s term, embodied mind (Varela 1991), George Lakoff and Mark Johnson established the idea that we evolved as whole beings with bodies and brains evolving simultaneously, not separately:

‘At the heart of embodied realism is our physical engagement with an environment in an ongoing series of interactions. There is a level of physical interaction in the world at which we have evolved to function very successfully, and an important part of our conceptual system is attuned to such functioning. The existence of such “bas-level concepts” – characterised in terms of gestalt perception, mental imagery, and motor interaction – is one of the central discoveries of embodied cognitive science.’ (Lakoff and Johnson, 1999, p. 90)

And just as our brains are integral to our whole body, so we evolved as an integral part of the whole environment, not separately from it. Interconnectedness and interdependence are central to understanding whole systems ecology.

In short, second-generation cognitive science is in every respect a cognitive science of the embodied mind. Its findings reveal the central role of our embodied understanding in all aspects of meaning and in the structure and content of our thought. Meaning has to do with the ways in which we function meaningfully in the world and make sense of it via bodily and imaginative structures. (Lakoff and Johnson, 1999, p. 78)

Making art, in its deepest sense, may be considered an expression and an exploration of our meaning in the world – a means of understanding our relationship with other organisms and our environment. As Paul Klee wrote in the forward to the *Pedagogical Sketchbook*:

For the artist communication with nature remains the most essential condition. The artist is human; himself nature; part of nature within natural space (Klee, 1919-1923, p. 7).

SYMBIOTIC FUTURES

Indeed, a key factor in evolutionary development was when one (mitochondria) cell entered another to live symbiotically. Two cells living as one organism, completely dependent upon each other, not just for their own existences, but also for their potential to promote multi-cellular organisms, such as ourselves. Culturally and socially we may think that we come from different pasts, but we are brought together in the present to view the future. Not one future, but many diverse futures.

Richard Slaughter's book, *Futures Beyond Dystopia: Creating Social Foresight*, expands on this concept:

Integral Futures, thus, does not take a singular perspective; rather it recognises a plurality of perspectives. It is not confined to a single tool or methodology; rather it is aware of the existence of an entire (indeed, infinite) tool kit. It recognises that there are many ways of knowing – many paradigms, practices and methodologies of knowledge seeking – and that no single paradigm can be assigned pre-eminence ... Integral Futures welcomes, embraces and values all careful and sincere approaches to knowledge seeking in all spheres of human activity to which they are both appropriate and adequate – including analytical rationality, intuitive insight and spirituality. (Slaughter, 2004, p. 166)

RE-INVENTION – ART AND ECOLOGY

Living things constantly re-invent themselves to stay alive. As dissipative structures, far from equilibrium (Prigogine and Stengers, 1984), our cells know how to reproduce through autopoiesis (Maturana and Varela, 1998), or self-making. Now, as an artist, I find the idea of this capacity for making or creating very interesting. Indeed, I am reminded that the root of the word Art is 'rta'. Coming from the Indian *Rg Vedas*, this means the dynamic process by which the whole cosmos continues to be created virtuously (Pirsig, 1991).

Additionally, let us consider global warming and sustainability. Until very recently, these were regarded as belonging, purely, within the domain of the natural sciences, thereby denying access and opinion to most people. Then, in October 2006 Sir Nicholas Stern published the 'Stern Review Report on the Economics of Climate Change' (Stern, 2006), which demonstrated that these formerly 'scientific' issues were also substantial sociological, or 'lifestyle', concerns, driven by economic considerations. Global warming and sustainability, therefore, became recognised as cultural phenomena and legitimately entered the sphere of art's influence.

So maybe through art, in continuity and contiguity, sustainability has the potential to find its immense scale and ethical value. And in evolutionary ecology we find the process of redundancy (not waste) that creates a context and a capacity for new forms to emerge - diversity.

The narratives are themselves important. All art tells stories and the 'art' is in how those stories are told – the poetry, the process of making¹.

I don't believe you can own a piece of art. The painting on the wall, the sculpture in the park, the words in a book, or the melodies on a CD are **not** the art. They are just things – fetishised objects. The art is how they are made – the process, the practice,

¹ Poetry, from the Greek word *poiesis*, means to make.

the act of making. If we let them, the objects provide a focus for our attention and we may be able to evoke, or recreate, the art from them – as cognitive experiences.

That is why art is so important – it is not the material value of the artworks themselves, but their ability to tell the story. The importance of that story is down to the subject matter, the context and the power of the poetry transforming all the elements - the metaphor, perhaps?

And so we may consider the function of ecological art as a synthesis of art and ecology *in* action, through relationships, transformations and metaphors. It is at this point of convergence that each discipline is given meaning by the other.

THE HARRISONS

For me, the work of Helen Mayer Harrison and Newton Harrison, the pre-eminent ecological artists, is exemplary in that they transgress the scales of other disciplines in their ecological reclamation and re-empowering use of maps, or ‘sustainability icons’ (Mayer Harrison and Harrison, 1998). As an art form and visual metaphor their mapping processes combine with written and performative art forms to envision sustainable landscapes and bring new understanding to pattern recognition. But the sum of their art posits itself in the form of “conversational drift” – the infectious, continuing discourse of their interventions.

In our eco-arts project, [*Greenhouse Britain: Losing Ground, Gaining Wisdom*](#), the Harrisons assert that language carries the determinant cultural metaphor and potential paradigm shift from ‘development’ to ‘settlement’. The distinction is apparent in the difference between the Government’s strategy of ‘managed retreat’ from rising sea levels and the Harrisons’ term, ‘graceful withdrawal’. The first appropriates the language of engineering and war in its assertion that we are still in control. The latter responds with an ethical aesthetic of ‘becomingness’. The strategies may at first appear to be similar, as they both recognise the efficacy of not defending the indefensible from the inevitable. But they differ greatly in *how* we may proceed and what questions need to be asked. What do we want to sustain? Is development itself our desire, or ‘a new culture in which problems give way to capabilities’ (Paolozzi, 1985, p.7). Do we want sustainable development, or the development of sustainability?

Let us then consider new understandings for what art and ecology might be. Not by means of reductive definitions, but with the potential for expanded diverse meanings – a capacity from which further possibilities might flow, or as Robert Pirsig writes in *Lila: An Inquiry Into Morals*: "The most moral activity of all is the creation of space for life to move onward" (Pirsig, 1991, p. 437).

SELECTED CURRENT PROJECTS

The following project and proposal outlines are examples of some of the many approaches to ecological art. Each makes some form of creative intervention and is intended to raise questions of foresight.

(I) A DROP IN THE OCEAN, A TRACE OF LIFE

The first project has not yet been realised. It initially proposes, a touring² gallery exhibition (nine-minute video and installation) that will, itself, form the basis of a proposal (hypothesis) for a subsequent 'live' artwork that will trace the journey of one water-born bacterium from the source of the River Mersey as it flows into the Irish Sea, to the North Atlantic Drift, where it flows west past Greenland before vaporising into a cloud and being blown south over Canada and the USA to fall as rain on the Appalachian Mountains, forming the Chattahoochee River, flowing through Atlanta and down to the Gulf of Mexico, passing Bermuda to float east across the Atlantic Ocean in the Gulf Stream, drifting by Portugal and Spain, to vaporise again into a cloud and precipitate on the Pennines and rise again as the Mersey.

Sightings of the bacterium, named *Ulysses species nova* (Haley, 2003), will be attempted by established weather stations and environmental research institutes on the route of this trans-Atlantic Odyssey.

RESEARCH QUESTIONS

1. Water and the sun's energy offer the potential for life on Earth. Bacteria represent the possibility for new life to evolve. The Atlantic Ocean is one eco-system that offers habitat for such hope. How will global warming and climate change affect this situation?
2. Can a bacterium survive changing states of water (liquid, solid, vapour, fresh, saline)?
3. Does the presence of bacteria in water, with their ability to swap genes and evolve according to need, suggest that the weather is a biological phenomenon?
4. If the weather is a biological phenomenon, does this suggest that 'climate change' is an expression of evolution?

The exhibition will initiate the creation of a trans-Atlantic 'footprint' of partners and collaborators from diverse disciplines to participate in this extended live artwork. The artwork presents a series of critical futures narratives drawn from the dialogue of diverse perspectives, to make new metaphors of understanding.

Taken from the idea of Homer's Odyssey: 'homecoming' - coming home - becoming home - evolving - arriving home - homebecoming – *eco-ontogeny*. And so, the idea itself evolves.

As the journey of a migrating bird might reveal its story to science, our 'tagged' bacterium will generate data on a trans-Atlantic weather cycle as a multi-media epic tale. The analysis and performance of sighting this bacterium will create an enquiry of poetic rigour, a dialogue to determine the biological nature of the weather and contribute to our understanding of climate change as an expression of evolution. Perception and understanding of these issues will form a contemporary creation myth, questioning our relationship to micro/macro-biotic life.

² Venues for this exhibition would be museums and art galleries, on major rivers that flow into the Atlantic.

The project starts with current knowledge about the life and behaviour of bacteria in the context of evolution and then views this in climate eco-systemic terms. The 'dissipative structure' of water (Schwenk, 1996), the 'autopoietic' nature of bacteria (Maturana and Varela, 1998) and the possibility of inherent cognitive processes present in the weather (Margulis, 1998) provide the background.

Charting the path of prevailing currents and winds, the artwork will plot our understanding of the ability of microorganisms to survive changing states of water. It will also develop methods of sampling, isolating, visualising and identifying microorganisms in twenty-eight (or more) trans-Atlantic sites – foregrounding the ocean and the dynamic processes of water.

DRAFT EXTRACT: A DROP IN THE OCEAN - A TRACE OF LIFE

A homecoming

A drop in the ocean

A trace of life

Drawn from the source

Named and cast back to flow

Under the sun

Water, sand, time

Life drawn in the mingling

Mud, mist and scum

Preserving cultures

In extreme environments

Draw breath, mark time

Singing a round

Of fish, storms, clouds and mountains

Time to question

We are the landscape

Embodied evolution

Of our making

Being and knowing

Towards the sixth extinction

Water as life

Connected in water

Where the seas touch the sky

Tears bring forth oceans

Homecoming: ‘... drifts with

The rise and fall of the surf ...’

Phytoplankton blooms

© DH, August 2005

The essence of this proposal was devised in 1997. More than ten years later, scientific reports on the state of the world’s oceans and of the connections between the biotic world and climate are being published. Sometimes art can imagine things that science dare not dream of. But together they may stimulate each other in the dialogue towards understanding as well as knowledge.

(II) RIVERS FROM THE FUTURE

Rivers From The Future focuses on the cultural power of freshwater, referencing the history of its ecological form in ‘Pennine Lancashire’ – from Enclosure, through industrialisation and the Green Revolution to the new suburbia. Here the ‘natural’ rhythms of watershed ecology will be considered in relation to the proposed economic transformation and development. The creativity and imagination of increasingly culturally diverse communities will be explored as the dystopian dream further distances us human beings from our physical environment.

River forms and processes evolve in time and spatial scale, and in turn demand new methods of understanding and modelling. Conventional mapping and the use of GIS and GPS seem inadequate means of envisioning and conveying the complexities of landscape change in culturally or ecologically meaningful ways. In particular, the ecological scale of water will become increasingly important as freshwater becomes a scarce commodity.

The proposition is: what happens if we develop a poetic transformation of landscape from an economic to an eco-centric aesthetic?

An eco-centric culture is one that embodies integral critical futures, or rather, one that generates capacity and capabilities to become resilient and adaptive – a creative community of enquiry. And this paradigm shift in economic, environmental and societal values *may* challenge current landscape aesthetics and imply the need for a different language and reading of place.

As well as the land itself, that aesthetic may be considered in the making of a ‘pattern book’ of the North West Pennine Waters to generate, manage and disseminate knowledge. The process of making this artwork will be the main tool for exploring approaches to ordering, reflecting upon, and recording data. The ‘pattern language’ established through this process is expected to form an integrated inquiry, a cultural conveyor and a repository or font of knowledge (Alexander, *et al*, 1977). Here the arts lead the method of inquiry from which the sciences have precluded themselves.

A pattern book is not a coffee-table book, but a working ‘sketchbook’. They take different forms and were used by Medieval Guilds craftspeople to gather, generate and disseminate knowledge. Itinerant cathedral builders (masons and carpenters) would record the construction techniques they had learned and pass these books of knowledge on to their apprentices. Textiles practitioners still use pattern books to collect designs, samples and ideas. Leonardo da Vinci’s sketchbooks are probably the best known example. Different from the hegemony of maps, this form sets the creative conditions for an artwork, not prescribed outcomes.

(III) A WALK ON THE WILD SIDE

This is an ecological arts programme set in the current context of:

- A world of increasing urban dwelling
- A world designed and defined by spatial planners
- A world experiencing the accelerating effects of climate change

It explores the conflict between nature and culture through an expanded urban wildlife aesthetic. As climate change determines our future, *A Walk On The Wild Side* develops ways to observe and reflect on Manchester as a living organism within the Mersey Basin - an eco-sculptural form. With artists, scientists, urban professionals and diverse communities, *A Walk On The Wild Side* has generated narratives for an eco-centric culture, through walking as a performative field study.

Since 1997, I have conversed with Dr. Les Firbank³, Head of the Land Use Section at the Centre for Ecology and Hydrology, Lancaster University - a National Environmental Research Council funded organisation that generates research on behalf of government, local authorities and corporations. From time to time, he allows me to interrogate their data in return for an appraisal of their working methods, and in particular their Countryside Information System (CIS). This uses a set of landscape categories and combines satellite images with field studies to arrive at their datasets.

³ Professor Les Firbank is currently Director of North Wyke Research Station, Institute of Grassland and Environmental Research, Okehampton, Devon.

However, as stated above, it is becoming increasingly difficult to find new employees who are versed in field studies, and even more difficult to deploy such skills, since management are obliged to justify their investment in electronic hardware and virtual intelligence systems. Intuitive, improvisational or creative methods of inquiry have become stifled.

This situation is mirrored with regard to drawing, and here David Hockney's (1984) words resonate: 'the way we depict space determines what we do with it'. In the past, I have argued at length about Renaissance rectilinear perspective and Descartes' global grid as expressing philosophies of cultural and political control and domination.

Reflective observation, taking time to draw and form questions are, I argue, fundamental methods of human inquiry, sadly lost to a generation of artists and scientists alike. To address this need, *A Walk On The Wild Side* aims to raise awareness of the participants in what I have termed phenomenological drawing – a re-sensitisation of pattern recognition in our everyday experience and a means of valuing that which has drawn itself. In this instance it sets out to evolve another aesthetic - how nature and serendipity make their mark on our built environment.

To do this, each Walk becomes an interdisciplinary surveying team, formed of community representatives, students and 'experts' to conduct field studies of local neighborhoods, watercourses and transport corridors. The data they generate and share on film generates visions and proposals for spatial planning.

Through this re-invention of field study skills, the project has developed capabilities and sensibilities through the sciences, arts and communities. Taking time to experience, question and understand our environment on local as well as large scales relates this to us who inhabit it, and then to our relationship to each other – our embodied ecology.

Spatial planning is a powerful and complex concept that simply incorporates all our developmental strategies holistically. It need not be complicated. It need not be the sole territory of technocratic professionalism. If we do not engage with spatial planning then we will have discarded our birthright. If we are prevented from participating in spatial planning, then we are being denied our voice and even our capability to survive climate change. Through expanded notions of arts practice we may develop the potential to open up this process – to take responsibility for and be accountable to the future. Art may be the catalyst or the crowbar that makes this possible.

This work operates on many levels and part of my task has been to prevent the complexities from becoming complicated. In addition to the summary above, the four-year process of developing the work has encompassed wider participation in spatial planning, proposals to promote self-grown food, indigenous wildflower city roofing and the declaration of 'eco-public art' sites. At the time of writing this paper, Wild Walks have been supported by Groundwork and Urbis, the museum of urban life, commissioned by Architecture Week (2006), BBC Breathing Places Festival (2007) and the Manchester Festival of Science (2007). A compilation film of Wild Walks 1, 2 and 3 has been shown on the Exchange Square Big Screen Manchester (2007) and in galleries in Taipei, Beijing, Xiamen, Guangzhou and Santa Rosa (California). More importantly, perhaps, is that some 200 people have walked,

observed, reflected and been touched, directly, by Manchester's wildness through art *in* action.

ARTS & SCIENCES

David Bohm, the celebrated quantum physicist, wrote:

If [man] thinks of the totality as constituted of independent fragments, then that is how his mind will tend to operate, but if he can include everything coherently and harmoniously in an overall whole that is undivided, unbroken, and without a border then his mind will tend to move in a similar way, and from this will flow an orderly action within the whole. (Bohm 1980)

Art may create poetic forms to communicate complex scientific issues. But Bohm suggests a 'whole systems' approach, whereby the arts are not merely *employed* to illustrate or interpret science, but are deployed as an integral means of understanding and generating knowledge. How may this paradigm shift be achieved? Bohm proposed that:

... a form of free dialogue may well be one of the most effective ways of investigating the crisis which faces society, and indeed the whole of human nature and consciousness today. Moreover, it may turn out that such a form of free exchange of ideas and information is of fundamental relevance for transforming culture and freeing it of destructive misinformation, so that creativity can be liberated. (Bohm 1991)

Sometimes that creativity is what the Harrisons refer to when they talk of 'creating the conditions for improvisation and invention' (Mayer-Harrison and Harrison, 2006). While referencing society's inability to accept uncertainty in a quantum world, they consider the potential for art to be a strategy for surviving climate change, 'gracefully' (Mayer-Harrison and Harrison, 1985, p. 96).

Climate change then becomes 'an ennobling problem' or 'ennobling question' that brings all disciplines together in what might be termed a 'post-disciplinary' practice (Mayer-Harrison, *et al*, 2007, p. 96). The significance of this concept cannot be overstated, as this profoundly simple idea empowers everyone to act in concert to address all the issues raised by global warming, not just those selected for political convenience.

CLIMATE CHANGE: THE PROBLEM WITH PROBLEMS

It is vital, therefore, that exhibitions such as *Greenhouse Britain: Losing Ground, Gaining Wisdom* (Mayer Harrison *et al*, 2007), do not merely focus on problems, but generate new questions. Our society remains stuck in problem-based forms of learning – we educate people to identify problems and apply their skills to solve them. But all too often this approach merely reacts to the symptoms, not the cause. Question-based learning, however, addresses the situation without preconceptions – spending time observing, reflecting and 'making' questions to be addressed. Indeed, sometimes, these identify problems, but the important thing is that the questions [as in this exhibition] keep the discourse plastic – keeping it open to new ways of thinking and diverse futures.

Indeed if, like the Harrisons and their associates, one considers the principles of whole systems ecology, the potential ‘shape of disaster’ posed by global warming becomes ‘the shape of opportunity’ (Mayer Harrison, *et al*, 2007):

- Diversity – the promotion of species richness
- Interconnectedness – understanding interdependence reveals the complexity of relationships
- Finite resources – the true value of things are finally being realised

Even the inevitable rise of sea level and the little publicised mass extinction of species prompt forms of re-invention to be envisioned and acted upon:

Finally understanding

that the news

is neither good nor bad

it is simply that great differences are upon us

that great changes are upon us as a culture

and great changes are

upon all planetary life systems

and the news is about how we meet these changes

and are transformed by them

or

in turn

transform them.

(Mayer Harrison, *et al*, 2007)

ADAPTABILITY

With regard to surviving climate change, mitigation is important for the future, but our current weather is based on conditions thirty years ago and the accelerated release of carbon dioxide and other greenhouse gases from the past thirty years will bring further unprecedented and unpredictable effects of global warming. Thus our ability to adapt to these changes is at least of equal importance.

One of the things I hope to do, as an artist and an educator, is, as I mentioned above, to ‘keep the discourse plastic’. Climate change is not just about reducing carbon and methane emissions and maintaining power supplies for further development. There are many, many other issues that our society chooses to ignore or play down and each of these issues will contribute to a myriad of possible futures, not a few socially managed choices of political and economic expedience.

So how can we join the discourse? The answer is anywhere, any time – there is no right place or time. All our school and university curricula, through all the disciplines (all sciences and all arts and humanities) should be concerned with critical futures studies.

The hope is that we might be able to shift the metaphor. That is, not merely to accept the problems of others, but to change our society's 'hard-wired' thinking on the meaning and necessity for development and progress. Even to think the unthinkable – stopping development and looking to other dynamic forms of evolution and increased capabilities.

In this way, we may be able to change the narrative and change the course, not of 'the future', but of the many futures. Just as David Bohm called for a 'new order' of physics to change the way we think of the physical world, perhaps we need a new order of art to change the way we think of the future? Let us re-invent the story of our futures.

RESILIENCE

In critical futures studies the concept of resilience is gaining importance and emerging from this is the notion of two predominantly different forms of resilience. The first, 'engineering resilience', refers to designing our future for the duration, with 'sustainable development' maintaining the status quo. But this type of resilience may not necessarily be good for everyone. Slavery and desertification are less desirable manifestations of this form.

Then there is 'ecological resilience' (Kinzig *et al*, 2006). At first, ecological resilience seems to be a very depressing option, as it considers the possibility of social and ecological collapse. It is, however, also concerned with our ability to survive collapse. This form takes its lead from the concept of evolutionary perturbation – how certain species survive big shocks to their system. It is actually not about focusing on the doom and gloom of disaster, but about looking to making it through and beyond – projecting through collapse to the possibility of futures. And the notion of 're-invention' mentioned earlier, sets the evolutionary precedent here as we consider new states of becoming.

FUTURES BECOMING

The question then remains, how might we achieve this virtuously? The word, *rta*, the origin of art, has embedded within it ethics and aesthetics. So too, *Greenhouse Britain: Losing Ground, Gaining Wisdom* takes the issue of sea level rise and asks, 'as the waters rise gracefully, will we withdraw with equal grace?' In addition to aesthetic and ethical concerns, one meaning of the word graceful is 'becomingness'.

So, given the accelerating effects of climate change, how may we creatively respond to the future? Another question I asked some years ago, to find my role as a stranger working with a community, was: 'How may I and those I love survive the accelerating effects of climate change?' With this question, I opened up issues that directly connected me to people I had never even met before – we may have had different pasts, but we will now share our futures.

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David Haley's work focuses on whole systems ecology and critical futures thinking and questions the "cultural industry" that undermines stories of global warming, the global economy and the Sixth Extinction. He pursues this through arts projects, academic pursuits, education and various advisory positions. As a Research Fellow in MIRIAD at Manchester Metropolitan University he directs the A&E [art&ecology] research unit and leads the award winning MA *Art As Environment* programme. Recent projects in the UK, China, Taiwan, Germany and the USA include *The Writing On The Wall*, performed poetic interventions; *River Life 3000: Like There's No Tomorrow*, sculptural installation; *A Walk On The Wild Side*, eco-urban art-walks and films; and *Greenhouse Britain: Losing Ground Gaining Wisdom*, with Helen Mayer Harrison and Newton Harrison.