

Theme 1 – Searching for the Common Ground

Presentation: A Scientist's Approach

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I am by training, a geneticist. I graduated from college in 1958, in a period when massive amounts of money were being poured into research and universities. We were taught that science was the most powerful way of knowing. Nothing lay beyond the curious eye of the scientist and, given enough money, we could answer all the questions of the universe. We would acquire the knowledge needed to understand and ultimately control the great forces impinging on us and life would get better and better for all of humankind.

In 1962, I hosted my first television programme about science. I wanted to use this powerful medium to demystify science so that the public would better understand its importance in their lives and they, in turn, would provide better support for research. In that same year Rachel Carson published her seminal book, *Silent Spring* (Houghton Mifflin), in which she issued an important warning about the application of scientific knowledge through technology: every technology, however beneficial, has costs.

We embrace technology enthusiastically because it is deliberately designed to do things for us. When DDT was found to kill insects, the benefits were obvious - it killed pests and chemical companies made money. While geneticists at that time already knew that resistant mutants would soon be selected and render the chemical less effective and ecologists could point out that fewer than one or two out of each thousand insect species are pests to humans so broad spectrum insecticides made little sense, no-one could have warned about the hazards of biomagnification. We only learned about the phenomenon when populations of raptors began to plummet.

Carson's warnings were a potent impetus to the rapid growth of the environmental movement in North America and Europe. Within a decade, a major United Nations conference on the environment was held in Stockholm and the United Nations Environment Programme established. In the following years, names like Bhopal, Exxon Valdez and Chernobyl and new phenomena such as global warming and ozone depletion served to accelerate ecological awareness and concern. Environmentalism expanded in the 1980s from a movement in industrialised countries to a rapidly growing non-governmental community in the developing nations.

Public awareness peaked in 1988 with George Bush's promise to be 'an environmental President' if elected, and Margaret Thatcher's declaration: 'I am a Greenie'. In 1992, the largest number of heads of state in human history gathered in Rio de Janeiro at the Earth Summit to declare that henceforth, humanity would take a different path. From that point on, 'sustainable development' would be the goal while all areas of human activity would measure and incorporate the ecological costs. As if to punctuate the importance of the Earth Summit, in November, 1992, the Union of Concerned Scientists released a document entitled *World Scientists' Warning to Humanity*. Signed by 1,600 senior scientists from 71 countries and including more than half of all living Nobel prizewinners, this remarkable document began:

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about.

It went on to describe the crisis in population, atmosphere, oceans, water, soil, forests and species loss, then grew stark:

No more than one or a few decades remain before the chance to avert the threats we now confront will be lost and the prospects for humanity immeasurably diminished. We the undersigned, senior members of the scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated.

This report went virtually ignored by the world's news media. A suggestion by more than half of all Nobel laureates that we may have as little as ten years to avoid a global catastrophe was judged not newsworthy. Today, the media have pronounced the environment a dead issue and their attention is focused on the global economy. What has happened?

Tim Flannery, author of *The Future Eaters*, suggests that the current destructive spasm is not a new phenomenon. The great inventiveness and enormous capacity for memory that distinguished us from other animals gave us the ability to use our brains to project into the future. It also enabled us to overexploit our surroundings as, long ago, we migrated into new habitats. As 'future eaters', Flannery suggests we are a species that diminishes the options for future generations by a tendency to overexploit. What brings us into balance is the accumulation of knowledge about an area over countless generations. That knowledge was contained in the world-view of a group, the sum total of thinking, observing, inventing and imagining. And the insights acquired were profound.

As Claude Levi-Strauss says:

I see no reason why mankind should have waited until recent times to produce minds of the calibre of a Plato or Einstein. Already over two or three hundred thousand years ago, there were probably men of similar capacity (Man the Hunter, Aldine, 1968).

In a world-view, everything is interlinked - the stars, clouds, rivers, forests, fish, human beings. The past, present and future are all part of a continuum. Nothing exists independently or in isolation. Each world-view is inseparably tied to a specific place and time and is profoundly local. Human beings were deeply embedded in this world, charged with enormous responsibility to keep it all going. Thus, we had to say the right prayers, observe the appropriate rituals and ceremonies and behave properly, if the earth was to continue to provide.

Today traditional world-views have been shattered to such an extent that we no longer recognise the ecological ramifications of what we do: driving a car two blocks instead of walking, expecting fresh fruits and vegetables year round or purchasing any consumer item. This disconnection has been accelerated in this century by a number of factors which continue to atomise our universe while often blinding us to the consequences.

Population

The explosive increase in human numbers, from 2 billion to more than 5.6 billion in my lifetime, is made up of a majority of people who were born after 1950. For them, the unprecedented and unsustainable changes that have occurred all their lives seem normal and necessary and must be continued.

In 1900, more than 95% of all human beings lived in rural, village communities. There were only 14 cities with a million people or more, none larger than 7 million. Today there are 400 cities of a million or more and the ten largest have over 11 million people. We have become an urban species and have lost the connections that inform us that Mother Earth pays a price to absorb our sewage and garbage and deliver us water, energy and food.

Information

The vaunted information superhighway is, in fact, a superHYPEway. We are assaulted with information fragmented into snippets devoid of context, history or time.

Government

Governments now govern on an unprecedented scale, charged with making decisions that reverberate across the entire planet. Politicians pay attention to a constituency of voters and financial supporters, but children do not vote, nor do generations yet to come, and the species-chauvinism of our perspective disenfranchises fish, trees, air and oceans. Politicians do not speak on behalf of non-human resources, only on behalf of the people who want to exploit them.

Economics

Economics, a human construct devised to serve people and their societies is today reified and the relationship inverted. The economy externalises those things that keep us alive - the atmosphere, underground aquifers, topsoil, ozone layer, and because economists have such faith in our capacity to discover, replace or substitute resources, endless growth is deemed not only possible but necessary. We are using up the basic biological capital on which all life flourishes and which is the rightful legacy of all future generations.

Science and technology

Finally we come to the role played by science and technology. Scientists focus on parts of nature. We bring a fragment into the laboratory, separate it from all else, control the factors impinging on it and measure everything within it. In so doing, we acquire a profound understanding of that isolated piece of nature yet often lose a sense of the context that made it interesting or important in the first place. Ever since Newton's time, we have perceived the universe as a giant clockwork mechanism whose elementary components can be examined to derive a comprehensive understanding of the whole and eventually be pieced back together like a giant jigsaw puzzle.

Modern physics has demonstrated that this does not work. Pieces of nature interact synergistically when combined so that new properties emerge from the complex that cannot be anticipated from the properties of the separate parts. In response it has been suggested that even if we cannot predict behaviour of higher levels of organisation from the properties of underlying components, we may find principles that provide us with predictive capabilities at each level of organisation. As a geneticist, I have been astounded and exhilarated at the enormous insights and manipulative dexterity acquired in my field, but we are often so intoxicated with our discoveries that we confuse an incremental insight with being the key to opening the door to understanding and control of everything around us. We create highly simplified models of reality so that 'experts' can claim to have enough knowledge to manage forests, nuclear disposal, fish, topsoil, air and water. Yet each insight gained only serves to emphasise the enormity of our ignorance.

What, for example, is a forest? Some foresters confuse a monoculture of planted trees with a forest when in fact, a forest is the totality of air, water, soil and a vast community of organisms, most of whose components are not even identified. We understand next to nothing about how species are interlocked to make a vibrant, productive and resilient community of living things. Estimates of the number of species on Earth range from a few million to a hundred million. A widely accepted figure of ten million is acknowledged to have been arrived at very conservatively. Harvard's E.O. Wilson indicates to date that about 1.4 million species have been taxonomically identified (Naturalist, Simon and Schuster, 1997). That merely means that someone in a laboratory has given a name to a dead specimen. It does not mean that we know anything of substance about that species' numbers, geographic distribution, habitat, food, behaviour, reproduction or interaction with other species.

This is not to denigrate the astounding progress and discoveries that have been made by scientists. I simply suggest that we temper our enthusiasm with some humility. I graduated as a fully licensed geneticist in 1961 and I thought then that I knew everything there was to know about genetics and would set the world on fire. For 25 years, research in genetics was my obsession and greatest joy. Today, when I tell students the ideas we had about chromosome structure and genetic regulation in 1961, they gasp or laugh in disbelief. Today, most of the best ideas of 1961 can be seen for what they are - wrong, irrelevant or just unimportant. Indeed, that is the way science progresses, by proving that most current ideas are incorrect or wide of the mark.

The great strength of science is in description. Scientists make discoveries everywhere because we have so much to learn. But where science is weak is in prescription of solutions because our ignorance is so vast. At best, we can manage ourselves, learning to respect the boundaries of nature and pulling back in order to allow nature to replenish the things that support us.

My period of working as a full time bench scientist remains the happiest time of my life, full of moments of joy, discovery and sharing. I am proud of what I have done and grateful for having had the opportunity to work as a scientist. However, it is clear to me that we have so severed the connections that link us with everything that we forget there is a bottom line far more profound than matters economic. Now in a new area of grassroots environmental activism, I have discovered a new way of seeing the world through the eyes of the Haida, the aboriginal people of Haida Gwaii, the islands Canadians call the Queen Charlottes. For these people, and for every group of aboriginal people I have encountered, their identity is inseparably connected with the land. The land embodies their history, culture, purpose and meaning.

From the Haida I have begun to understand a fundamentally different way of looking at the ecocrisis. We are animals and as biological beings, we have an absolute need for earth, air, fire and water - they are the sacred elements of the ancients and ought to remain so today. Without them, we cannot live. And what ensures the abundance and purity of these primary elements is the collective diversity of living things on the planet.

We are also social animals and we have a deep need for love. Without it, we are psychically and physically crippled. The best way to ensure conditions that encourage the love that humanises us is to provide conditions that allow stable families and communities - full employment, justice and security. Numerous studies endorse this.

Finally, we are profoundly spiritual beings with a need to know our relatives, the other life forms that share the planet with us. Even though we will all die, we are comforted by the knowledge that nature will persist and flourish. We need to have sacred places that ecologists call wilderness sanctuaries. We have to know there are cosmic forces beyond our understanding or control.

If these constitute our real bottom line, the foundation on which communities and human activity rests, then our priorities must change.