

Commencement Address: 'Put a Planet in Your Life'

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On this graduation day each of you has completed a major phase of life's journey. Now the real challenge begins!

High-technology travel and communication physically shrink the planet and homogenize world cultures. Population explosion diminishes resources and disrupts political stability. Rampant economic growth creates waste and deteriorates environmental quality. These rapidly evolving problems, more than ever before, require that your generation understands the limits of our earth system, an intricate arrangement of air, water, minerals, energy and processes intimately interconnected to form the whole. Human destiny is inextricably linked to all other living things and to Earth's physical system.

We have inherited a priceless fortune in our planet, with all its riches. This inheritance includes vast supplies of fresh water upon which life is dependent, an incredible wealth of minerals and metals that provide us with the good life, and a bonanza of fossil fuels that power civilization. The greatest treasure of our inheritance is life itself and the diversity of organisms that play crucial roles in providing us with hospitable climates, breathable air, and fertile soils.

At this important moment, it's appropriate to look back at where we've come from so we can better understand our inheritance, the wondrous planet Earth. Astronaut James Lovell stated from his Apollo 8 spacecraft that Earth is "a grand oasis in the big vastness of space."

Earth, the third planet from the sun, is celebrating its 4.6 billionth year of existence. Initially Earth was an inhospitable, moon-like place with a toxic atmosphere and neither water nor life. The first oceans formed 3.8 billion years ago with primitive life developing within them about 300 million years later. Dinosaurs developed about 250 million years ago and became extinct 65 million years ago, which led to the rapid expansion of mammals into the void. Modern human history began about one million years ago.

John McPhee, in his book *Basin and Range* (1980) used the measure of the old English yard—the distance from the king's nose to the tip of his outstretched hand—as a metaphor to put human history into the context of the total Earth history: "One stroke of a nail file on the king's middle finger would erase all of human history."

As an earth scientist, I have spent my career studying the geologic history of major portions of this planet. One overwhelming conclusion from these studies is that the extreme success of the very recent life form we know as *Homo sapiens* has led to a force that is equal to or greater than any other natural force in the evolution of this planet. I call this new force the Human Hurricane, and it has just made landfall.

At the end of the last major glacial ice age 10,000 years ago, fewer than five million people lived in small, scattered groups of nomadic hunters and gatherers. By 1930 A.D. the population had exploded to two billion people; it doubled to four billion by 1975 and is approaching six billion today. Those of us born before 1950, which represents the last microsecond of geologic history, have witnessed a greater population growth during our lifetimes than occurred during the preceding million years of human history. This Human Hurricane can level mountains, dam rivers, change the climate, mine resources from the bowels of the earth, harvest populations of organisms to extinction, maim and annihilate whole civilizations and make Earth once again uninhabitable with weapons of mass destruction.

On December 21, we will pass through another winter solstice. More than 5,000 winter solstices ago, modern society began to take form. The Mesopotamian, Egyptian, and Chinese civilizations developed during a period when the global climate was at the most optimum conditions that have existed for over 100,000 years. Subsequent minor shifts in Earth's climate are at least partly responsible for the rise and fall of numerous civilizations, including the Greek,

Roman, and Mongol empires; the total extinction of some cultures including the Mycenaean, Mayan, and Anasazi; and the many ups and downs in the development of European history.

During this brief period of time, society has cycled through the Stone Age, Bronze Age, Industrial Age, Nuclear Age and into the present High Tech Age of computers and satellites. Our economic system has evolved from the barter system to a precious metals-based monetary system and into an electronic-based global economy—an economy grounded upon unlimited growth, development, and consumerism. The resulting economic homogenization of diverse world cultures has propelled television, violent B movies, arms and automatic weapons, and the automobile to global superpower status. This industrialization has led civilization into what Paul Hawken in *The Ecology of Commerce* (1993) calls a "once-in-a-billion-year blowout sale of hydrocarbons...now being combusted into the atmosphere at a rate that will effectively double-glaze the planet within the next fifty years, with unknown climatic results." At the same time we have relegated family planning, world hunger, and Earth management to lowest priority issues because they restrain the growth of the global economy.

In Kyoto, Japan, 160 nations struggled with the potential problem resulting from this human influence upon global climate. Some Fortune 500 companies, which do not want restraints placed on energy consumption, have actively lobbied the developing Asian countries to increase fossil-fuel use and to join them in opposing an international agreement to control greenhouse gases. They have lobbied fiercely and spent millions of dollars on a massive advertising campaign to undercut the conference goals, because they believe such an agreement would curtail their economic growth.

This example underscores a basic flaw in the way our society does business. Shouldn't our corporations accept the challenge to assume a more constructive role, improving their products while sustaining profits in ways that will minimize their impact upon the earth? Corporations must be about the business of providing products that increase quality of life without jeopardizing either the environment or the standard of living of future generations, particularly those billions of people struggling for mere survival in what are possibly never-to-be-developed Third World countries. This is the real challenge for corporations, society at large, and each of you new graduates.

Is the greenhouse effect real? Yes, it is very real and is the reason we have a habitable planet upon which to live—that's the irony! Our atmosphere traps solar energy and moderates global temperature at levels that can support life; it has done this for billions of years. Can global warming really happen? You bet it can, and global cooling as well. It has already happened many times in the last million years of Earth history.

We live in the geologic time period called the Quaternary, which is better known as the Ice Ages. Earth has experienced numerous global warming and cooling events during the Ice Ages, most of which were more severe than anything projected by participants in the global warming conference. Each event represented a significant climatic change that led to major shifts in global temperature, precipitation, and vegetation zones, as well as consequential changes in sea level, and all occurred independent of human activity.

The last major climatic warming event, which began a little over 10,000 years ago, terminated continental glaciation in North America and led to the recession of glacial ice that was thousands of feet thick over New York City and Boston. The climate shifted rapidly from "ice-house" to "hot-house" conditions, and sea level rose over 400 feet to form our present coastal barrier islands and estuaries. A rise of over 6°C in average global temperature took place in about 30 to 50 years. This climate change took place in about one human generation, not over vast spans of geologic time. We know much about the many episodes of global warming and cooling that occurred during the Quaternary, but not what triggers them. Herein lies the dilemma: can

human modification of atmospheric composition resulting from continued, unlimited industrial expansion trigger major climatic responses? We cannot answer that, but we can say that if a similar climatic change were to occur today, the response would be catastrophic to an inflexible and immobile society as it presently exists.

Initially, human existence was supported by renewable resources which naturally replenish themselves. During the Bronze and Iron Ages, society began the shift from living on renewable resources, or the "income," to living on nonrenewable resources, or the "capital endowment." Our Industrial Revolution developed on the back of nonrenewable fossil fuels and minerals, which facilitated the population explosion of the 20th century. Unprecedented expansion of the world economy since World War II has accelerated the conversion of many renewable resources to nonrenewable, through both depletion and pollution. It has also led to the exhaustion of some nonrenewable resources and the hemorrhaging loss of biodiversity. The Human Hurricane is systematically rearranging Earth's entire biotic system, concentrating and mobilizing toxic metals, mining and polluting our water resources, and producing vast arrays of chemical waste.

Paul and Ann Ehrlich in *The Population Explosion* (1990) state that "as any banker or businessman knows, one cannot continue to spend capital at a rapid and increasing rate for very long without going bankrupt—no matter how rich one is at the start." How can we continue to squander and degrade our capital and call it growth? Environmental degradation has been a by-product of industrial wealth, and it is not limited to the developed nations. It is a survival issue for the poorest nations where large portions of the world's peasant populations are trapped in a downward spiral of inseparably linked industrialization, ecological decline, and human poverty.

It is now imperative that your scholarly efforts go beyond the university classroom. Today, make a pact with which to start the new phase of your journey—let the world become your classroom and take on the great challenge of harmonizing human civilization with the Earth system. This critical time in Earth history requires enlightened and bipartisan leadership companioned with an educated citizenry, as well as open communication across the divides of disciplines, cultures, and countries. With the ever strengthening Human Hurricane, we can no longer proselytize for our individual special interests; we must now concern ourselves with the total Earth and our relationship to it and our dependence upon it.

The world out there no longer needs conquering and developing, but rather nurturing. Should we evolve back into the Stone Age? Of course not! But we can determine how many more layers of engineered and technocratic complexity our beleaguered Earth can support. Joseph Conrad said in *Heart of Darkness* that "the mind of man is capable of anything—because everything is in it, all the past as well as all the future." It is time for you, the scholars of today, to apply your academic achievements in leading us from the industrial and high-tech ages into the new millennia and an era of stewardship for our Earth.

Vice President Gore states in his book *Earth in the Balance* (1992): "For civilization as a whole, the faith that is so essential to restore the balance now missing in our relationship to the Earth is the faith that we do have a future. We can believe in that future and work to achieve it and preserve it...the Earth is in the balance." If we do not succeed with the development of this stewardship, the geologic evolution of planet Earth could unfold without its human participants.

Congratulations to each of you on your academic achievements while at East Carolina University. My best wishes for your future, and PUT A PLANET IN YOUR LIFE!