**Our Biological Past. How it Helps Us Understand our Role in Nature Today**

 Gordon H. Orians

 Professor Emeritus of Biology, University of Washington, Seattle, WA 98195

Our rich and varied emotional responses to the physical and biological environment were molded primarily by natural selection acting on our ancestors during their long tenure of living in African savannas. Environmental challenges and opportunities were a dominant part of their lives. They had to seek protection from adverse physical conditions. They had to find, evaluate, and choose among potential places to settle, to decide how long to stay there, and to decide how to improve it. They had to search for and determine which prey items they encountered they should pursue. They had to take evasive action that would reduce the chance that they became food for other organisms. They had to deal with both hostile and friendly conspecifics. Their responses to those challenges were often life-or-death matters. It is not surprising that neural circuits that evolved to deal with those challenges form a significant part of our minds today. Only about 10,000 years have elapsed since our ancestors lived exclusively in small hunter-gatherer groups.

In addition, as human societies became larger and more complicated socially, our ancestors evolved increasingly complex minds. Changes made possible by improved transfer of information among individuals, both within and between generations, emerged. Cultural evolution can and does proceed much faster than genetic evolution. Thus, to a rich substratum of genetically influenced behavioral responses, our ancestors added several key cultural innovations that both influenced subsequent genetic and cultural evolution and increased their ability to exploit and change the environment.

Weapons. Animals of many species have weapons of some kind - claws, talons, teeth, horns, antlers - that help them in conflicts with enemies and predators, but most of those weapons are small. Even the largest tusks and horns, which impose substantial burdens on their possessors, work only with direct body contact, although a predator or enemy may be deterred from attacking by observing the size of the weapon (Emlen, 2014). In marked contrast, the history of human weaponry is a story of development of weapons that allow killing or maiming at increasing distances. The dart thrower, the first projectile weapon, ancestor of the bow-and-arrow, was invented about 50,000 years ago. Its invention occurred at the same time that our ancestors became serious mammoth hunters. Armed with dart throwers a group of men could surround a mammoth or other large mammal and launch their spears from a safe distance. Dart throwers gave way to bows-and-arrows, which were replaced by guns and, eventually, rockets and other devices that can demolish enemies thousands of miles away. By this process, humans became the most powerful predator ever to inhabit the Earth, capable of causing mass extinction of other species. Historically, this power most seriously affected large species, but today we are causing species of all sizes to become extinct. The invention of throwing weapons had another, insidious consequence - it made warfare more profitable and less risky (Ridley 1996). Weapons that can be launched and directed by someone far from the weapons themselves have psychologically and physically distanced their bearers from their intended victims. This physical/psychological distance makes it difficult for us to comprehend the fact that, although war may have had positive consequences for victors in the past, future wars will not have winners. As Albert Einstein famously said “I do not know how the Third World War will be fought, but I can tell what they will use in the Fourth - rocks.”

Cooking. Some time in the remote past, our ancestors learned how to make and control fire. Perhaps by sampling animals killed by savanna fires, they discovered that cooked meat was very tasty as well as being much easier to chew, swallow, and digest. They also discovered many things that were inedible when raw were good to eat when cooked. Cooking had two major consequence for human evolution. First, it greatly expanded the range of things that could be eaten. Second, it outsourced to fire a major part of the cost of digestion. Energy previously expended in chewing food and breaking down complex molecules to more easily digested smaller ones was now available for other functions, most notably for supporting an energy-demanding larger brain. Indeed, major morphological changes among our ancestors - reduction in the length of the digestive tract, reduction in the mass of the jaws - were made possible by cooking (Wrangham 2009). Chimpanzees spend up to six hours a day chewing their food. No human can survive eating the raw food that sustains chimps. Even having highly domesticated plants that have been selected for increased palatability, raw food enthusiasts have great difficulty maintaining their weight. As Wrangham suggests, cooking may have made us human.

Domestication of plants and animals. With the exception of parts of plants - fruits, nectar - that are “designed” to be eaten, organisms devote considerable energy to the development and maintenance of structures that render them less attractive as food for other organisms. Domestication, directing the evolution of other species to make them more desirable as food, was one of the most remarkable achievements of our ancestors. Combined with modification of natural environments to favor those species - agriculture - domestication made possible an explosion of the human population. Surplus food produced by those individuals who could harvest productive crops and tasty tame animals, enabled the formation of cities, whose inhabitants depended on the enhanced productivity of agricultural workers.

Social cooperation. Anthropologists have not reached consensus on why our ancestors developed complex social systems or why we display a remarkable degree of altruism, but many investigators recognize that a main driver of increasing complexity is that our ancestors became involved with ever more complex and inclusive non-zero-sum games. This trend was favored because more inclusive non-zero-sum interactions enabled people to escape from the dire consequences of zero-sum, prisoner’s dilemma games (Wright 2000). Today we are by far the most cooperative - as well as the most destructive - animal species. Cooperation among strangers is a uniquely human trait, one that has enabled us to function in large social groups composed mostly of unrelated individuals.

In combination, these key innovations formed the foundation of what we might call human progress. Our ancestors’ increasingly inventive minds also developed science, a process based on generating hypotheses about how the world works and testing those hypotheses by a variety of methods. Using this process, our ancestors created technologies that further greatly increased their ability to exploit and change the environment. Perhaps the most important was tapping new sources of energy.

Tapping New Sources of Energy. For much of human history, people, like other animals, could harvest only the solar energy captured by plants via photosynthesis, either by eating the plants directly or eating herbivorous or carnivorous animals. With domestication the amount of energy that could be tapped significantly increased. Using the muscle power of domesticated animals for plowing and transport further increased the amount of available energy. The most dramatic increase in tappable energy, however, was the discovery and exploitation of fossil fuels, energy in the bodies of former organisms that died where they did not decompose. Tapping this source of energy fueled the industrial revolution. Today we use enough energy to change the global climate. The development of modern industrial societies also exerted a powerful influence on predominant moral values (Morris 2014).

 **what kind of mind has evolution given us?**

The rich and varied emotional responses to the physical, biological, and social environment that typify our minds today were molded by natural selection acting on our ancestors living in African savannas (Orians 2014). What are the most important features of our evolved ecological minds and why do we have them?

Until relatively recently people died close to where they were born; they seldom roamed more than a few dozen kilometers from their birth places during their lives. Even though they may have acquired items from distant people they were unaware of the existence of those people because traded items passed through the hands of many people, no one of which moved them very far. Thus, the ecological knowledge of our ancestors was rich and detailed but it was entirely local. For example, Maya children only four or five years old are familiar with more than 100 species of plants (Stross 1973), but they know little or nothing about distant environments, organisms, or people.

Suburban children in the United States, on the other hand, can identify only a few species of plants (Doughtery 1979). Fewer than half undergraduate students at Northwestern University, in Evanston Illinois, a suburb of Chicago, had any familiarity with most of the common trees in the Evanston area (Medin *et al*. 2006, p. 180). Yet, owing to the massive dissemination of information via TV and the internet, urban children today may know more about plants and wildlife on other continents than they do of their local biota.

Similarly, only relatively short time spans mattered to our ancestors. They were acutely attuned to daily, weekly, and seasonal changes in vegetation - flowering and fruiting - and breeding and movement of animals. They used this information to determine daily trajectories of hunting and gathering and to decide when to move to new seasonal camp sites. They were certainly aware that the weather varied within and among years but they could not have perceived long term changes in climate. Even if they had, such knowledge would have been useless to them. They could not have used it to make any useful decisions.

Thus, we have inherited a mind that can comprehend and deal effectively with changes in local conditions over short time spans but one that has great difficulty comprehending interactions among events at great distances and over long time spans. Moreover, one of behavioral science's most impotent discoveries is that organisms tend to respond poorly to situations that are evolutionarily unique, that is, ones they are not adapted for. Some of our most serious current problems are the consequence of a mismatch between our ecological minds and modern society (Orians 2014).

A legacy of the lengthy and intense involvement of our ancestors with the physical, biological, and social environment in which they lived, reproduced, and died, is a set of response to components of the environment that exert a powerful influence of how we respond to our environments today. Given the relative youth of the field of environmental psychology, what we know today barely scratches the surface of the rich array of preprogrammed responses we probably have. Nevertheless, what we do know provides a solid basis for assessing which of those responses appear two serve us well in a modern technological environment and which do not. We can take special advantage of the powerful motivational inclinations of the former in designing environmental policies because it is easier to encourage rather than discourage us to act in ways we already wish to act.

**Features of our ecological minds that work well today**

We automatically and unconsciously associate sickness with food we ingested hours earlier; we may develop long-lasting aversions to that food. Our negative responses to rotting flesh and pus appear to be an intuitive microbiology that evolved long before we were aware of the existence of microorganisms or that they caused diseases. Avoiding food that made us ill and environments likely to transmit diseases to us is still a good idea today.

Clues that indicate present and future locations of food get our attention. We attend to animal tracks and remember them better than most other types of objects. We are especially attracted to changing colors of leaves and to flowers, both of which signal the location of future food. Nature’s sounds may be associated with both dangerous and favorable conditions. Accordingly, we respond to sounds with a variety of emotions, such as fear, curiosity, and pleasure. These responses continue to help those of us who live in cities today, even though they are less important to us than they were to our ancestors.

Evolutionary psychologists discovered that our perceptual system makes vertical surface irregularities seem larger than they are (Jackson and Cormack 2008). Failing to detect even small vertical irregularities increases the likelihood of falling, especially when we are running. We have evolved to dramatically overestimate environmentally vertical irregularities, a still useful trait because we often run over uneven terrain. Falling may not be as serious as it formerly was when there was no 911 to call, but injuries sustained during a fall can still greatly impair physical performances.

We enjoy classifying all kinds of objects. Classifying is a vital component of the psychological process by which we seek order in the environment. By assigning objects to categories we greatly narrow the array of useful responses to them. In addition to enjoying classifying objects, we take pride in the sizes of our collections. We also take pride in the sizes of the “collections” of places we have visited or things we have observed (life lists!). Although the desire to collect may be powerful enough to disrupt some lives, diverting resources away from more valuable uses, the act of classifying is still a useful activity for most people; competition among collectors is generally psychologically rewarding, thereby contributing to the quality of people’s lives.

As expected for a primate that must drink every day, water nearly always enhances the quality of a landscape. Children prefer scenes with water and infants and toddlers mouth flat glossy objects on their hands and knees as if they were drinking. Our attraction to water also expresses itself in choices of surface finishes of art works and consumer products. For most of us today, getting enough high quality water is seldom a problem, but water is just as important today as it ever was.

Our aesthetic preference for trees with shapes similar to those that dominate high quality East African Savannas strongly influence how we design parks and gardens. That we no longer live in savannas does not diminish the pleasure we get from strolling though these aesthetically designed landscapes.

An evolutionary perspective led to predictions that the human neural system should more accurately detect changes in the positions of animals than of other objects, even vehicles, the most dangerous moving things in today’s environment (New, Cosmides and Tooby 2007). It also helps explain why children have an intuitive understanding that animals are self-propelled whereas other things are not. Understanding that animals are self-propelled is useful today but, unfortunately, we lack appropriate responses to moving vehicles, both as passengers and bystanders.

Many of the striking discoveries generated by application of evolutionary psychology theory involve our responses to the social environment. Those investigations have focused on special abilities we have for inferring the intentions of others. For example, recent research has shown that our minds have a functionally specialized neurocognitive system for reasoning about social changes. They also have an important subroutine for detecting cheaters (Cosmides and Tooby 2006), an ability that conferred obvious benefits throughout our evolutionary history. It still does today!

A surprising feature of human social behavior, our propensity to allocate benefits to others in one-shot economic games, conflicted with theories of economic and evolutionary rationality, which predicted that we should not behave altruistically toward individuals we never expect to meet again. An expanded evolutionary psychological perspective, based on the situation that would have confronted our ancestors, demonstrates that such generosity is a byproduct of decision-making under conditions of uncertainty (Delton *et al*. 2011). Our ancestors would have been uncertain if an encounter with a stranger would be one-shot or the first of many interactions. Whether to reciprocate under those conditions should evolve to balance the costs of mistaking a one-shot interaction for a repeated interaction. Assuming that there will not be other interactions when they actually will happen can be very costly because it causes us to miss the benefits from future multiple cooperative interactions. Our tendency to treat an encounter with a stranger as likely to be the first of many probably underlies our remarkable ability to interact positively with large numbers of unrelated individuals in modern society.

**Features of our ecological minds that are neutral in modern society**

Snakes are among the most common targets of fears and phobias. Evolutionary psychologists discovered that we have special neural mechanisms that facilitate detection of snakes. In visual detection tasks, both adults and children detect snakes more rapidly than they detect non-threatening stimuli (flowers, frogs, and caterpillars) (Öhman *et al*. 2001, LaBue and DeLoach 2008). Evolutionary thinking also led us to discover that we are especially sensitive to tessellated patterns, which are common among snakes but rare elsewhere in nature. That sensitivity should have increased the ability of our ancestors to detect snakes before they could launch a successful attack (Isbel 2009). Snake-phobia is still relevant in many tropical and subtropical regions but most inhabitants of modern cities live their lives without encountering a snake. Other than punctuating our dreams, snake phobia does little harm.

During most of human history, men hunted and made war. Many of the objects of their search were large, dangerous, and mobile. Women cared for children and gathered resources that were stationary but varied in quality and availability over time (roots, fruiting trees, eggs). Relocating diverse resources requires neural mechanisms that store memories of the location of many potential food resources. Recent experiments show that women remember better than men the location of high quality resources in a market (New *et al*. 2007). Women still do most of the shopping in modern societies but men are quite capable of filling a market basket when they need to.

**Features of our ecological minds that function poorly in modern societies.**

Most of the choices our ancestors had to make required an either-or decision. An object was to be approached or avoided. A perceived object was either food to be eaten or to be rejected. An individual was a suitable mate or it wasn't. In addition, decisions often had to be made quickly. An organism that pondered the desirability of fleeing from a hungry predator was more likely to be captured than one that fled instantly. A sexually active male that debated at length the desirability of mating with a receptive female found another's genes in his place.

Although taking action often requires quick and binary decisions, inputs from the environment are usually complex and contradictory. Our brains appear to be designed to resolve complex events and inputs into polar categories, thereby facilitating quick decisions. This tendency is reflected in the conceptual structure of such diverse fields as art, literature, physics, sociology, and biology, all of which are dominated by polar opposites. Polarity is not simply a feature of "Western" thought, based on Graeco-Roman logic and languages. Polar typological concepts are prevalent in many cultures with different languages and different intellectual histories. Claude Lévi-Strauss, the leading anthropologist of his generation, claimed that all tribal myths are built upon binary opposites – hot and cold, night and day, raw and cooked, good and bad (Lévi-Strauss 1962). Spatial distinctions in most languages are either-or (Pinker 2007). The cosmological schemata of many cultures feature polar opposites. Cosmological schemata of cultures as diverse as Chinese (e. g. *yin* and *yang)*, Indonesian, Keresan Pueblo Indians, and Oglala Sioux, although details differ, all divide the complexity of nature into a few categories (Tuan 1974). The universality of these patterns tells us that polar typology has deep evolutionary roots. Yet, we would deal better with many current problems if we could be more aware of their complexity and could more easily understand the nature of the trade-offs we must accept if we are to develop and implement effective environmental policies.

A major feature of our evolved ecological minds is that they focus on events at small spatial scales and over short time durations. Today we are bombarded daily with detailed information about events throughout the globe and, given the complex integration of the global economy, that knowledge is vital for current decision-making. Yet, we have difficulty grasping the nature and importance of large scale and long term problems, such as climate change and loss of biodiversity, probably the most important problems facing human society today.

We also have great difficulty evaluating and choosing among multiple simultaneous options. The probable reason is that our ancestors rarely confront that type of decision. Most of their options were between a positive (or negative) response to a particular thing or situation and then moving on to the next decision. On first encounter with an unfamiliar environment, for example, an individual decides either to settle in the place it has encountered or to continue searching. To make that decision it must have some expectation of how soon it might encounter a better option if it rejected the current environment, but the person does not need to simultaneously evaluate and choose between two or more places. Today, however, we are regularly confronted with choices among several or more options; we find making effective responses to these situations very difficult.

**Building on our innate motivational tendencies.**

We can use our knowledge about our positive and negative responses to elements of the environment to devise incentives to encourage behavior we desire and to discourage behavior we wish to minimize. For example, evolutionary psychology explains why we exaggerate and use to gain social status some things and not others - we compete for status using things that were of great value to our ancestors. The effect and function of elaboration is to make them even more pleasurable. Competition for status is successful only if it uses objects that generate strong positive emotions. Otherwise, nobody cares. There are no drugs on the market designed to induce sorrow or depression!

Cognitive functioning. For decades we have known that stress reduces performance on cognitive tasks (Glass and Singer 1972, Hockey 1983). Most research focused on performance declines in cognitive tasks, such as proofreading that require narrowly focused attention to a restricted set of information but do not require integration of diverse information (Hartig, Mang, and Evans 1991). Higher-order cognitive functioning, which involves integrating diverse material or associating previously unrelated information or concepts, is required for creative problem-solving. Natural surroundings foster performance on higher-order tasks; positive emotional states assist recall of information from memory and creative problem solving (Isen 1990). Exposure to nature can promote recovery from mental fatigue stemming from work situations that require prolonged, directed, effortful attention (Kaplan and Talbot 1983). Even a brief exposure to nature, real or via photographs, leads to positive emotional feelings, reductions in stress, and better performance on demanding tasks (Ulrich 1995). People’s affiliative responses to nature have important implications for design of work and living spaces and healthcare facilities that are just beginning to be implemented.

Environmental Education. The central role of emotions in human decision-making suggests that educators should make greater use of the arts to reach people, to inform audiences in new ways about conservation issues, and to stimulate dialogue and action. More use of music and kinesthetic activities should enhance both learning and subsequent involvement in conservation activities. Listening to music elevates endorphin levels, creating pleasurable feelings and stimulating learning. More research is needed to determine the types of active and passive art experiences that most effectively evoke changes in people’s behavior, but we already know enough to sense the great potential of such activities for enhancing the effectiveness of environmental education (Jacobson *et al*. 2006).

The serious loss of knowledge about and, hence, appreciation of, nature that accompanies growing up in a modern technological society bodes ill for efforts to preserve Earth’s biodiversity. Indirect experiences of nature do not generate the emotional involvement with living organisms that appears to be necessary to motivate people to care about biodiversity and devote their time and money to help its preservation. People cannot mourn the loss of something the existence of which they were unaware. In a world where young people increasingly experience nature only on television or on their computer screens, there is an urgent need to get them out into nature. The campaign by Richard Louv, a Berkeley, California journalist, “No Child Left Inside,” is extremely important. Louv (2005) has identified a serious current mental problem, “Nature Deficit Disorder,” that afflicts a large proportion of children today. How can we expect people who have never experienced nature to appreciate it and be willing to work to save it? What can the loss of the Passenger Pigeon, once the most abundant bird in North America, be to a child who has never seen a wren?

Although people have an inherent affiliation with nature – *biophilia* as E. O. Wilson calls it – these feelings, like many other evolved traits, do not flourish unless nurtured during childhood. Direct experience with nature affects development and subsequent appreciation of and bonding with nature (Zaradic and Pergams 2007). Of the three modes of experiencing nature – direct, indirect, and vicarious – direct experience plays the most important role in children’s cognitive development and in their feelings about nature (Kellert 2002). The complex and changing features of direct experience with nature engage a wider range of adaptive problem-solving responses than do indirect and vicarious interactions.

Environment, Design and Restorative Responses. Researchers in psychiatry (Nesse 1990), medicine (Nesse and Williams 1996, Williams and Nesse 1991), and nutrition (Harris and Ross 1987) have examined modern diseases from the perspective of hunter-gatherer lifestyles and shown how that perspective can help guide current interventions. Patients recovering from surgery in hospitals with either views of natural vegetation or simulated views that depict natural scenes with water, recover more rapidly and have less post-operative anxiety than patients with no access to natural views or who are presented with simulations of abstract designs (Ulrich 1984; Ulrich, Lundén, and Eltinge 1993).

Exposure to natural environments may help children that suffer from attention-deficit/hyperactivity disorder (ADHD), particularly those for which medication is ineffective. Natural environments may engage the mind effortlessly and provide a respite from having to deliberately direct attention to something (Kuo and Taylor 2004). Children with ADHD concentrated better after a 20-minute walk in a park than in two other well-kept urban settings (Taylor and Kuo 2008).

Exposure to high quality environments is restorative; it reduces feelings of tension and stress (Knopf 1987; Ulrich, Dimberg, and Driver 1991). Research on urban parks and other urban natural settings also has shown positive restoration from stress (Ulrich and Addoms 1981, Kaplan and Talbot 1983, Schroeder 1989). Certain natural configurations and elements appear to be more effective than others in eliciting restoration. Specifically, "relaxation" and "peacefulness" are evoked by exposure to settings having savanna-like properties or water (Francis and Cooper-Marcus 1991). Today, however, people are increasingly turning to Facebook or Twitter to regain confidence. Only time will tell if doing so works as well as immersion in real environments, but I doubt that it does!

Designing Environmental Policies. Concepts from evolutionary psychology are being used by US Federal agencies to help manage aesthetic resources on public land. In 1993 the U. S. Forest Service published Agricultural Handbook Number 701 “Landscape Aesthetics. A Handbook for Scenery Management.” Its purpose is to assist land managers implement a Scenery Management System that may improve people’s physiological well-being as “an important byproduct of viewing interesting and pleasant natural landscapes of high depth views and natural-appearing open spaces.” (bold-facing in the original!) The Handbook recommends assessing the inherent scenic attractiveness of landscapes and offers suggestions for enhancing the visibility of a landscape by manipulating vegetation or structures.

Animals and Therapy. We have neural programs that are sensitive to animals and their movements. As expected stress is reduced when people observe arrays of moving animals (Katcher *et al*. 1983) and moving inanimate objects, especially water. Animals are used extensively in treatments with adults with chronic problems such as cerebral arteriosclerosis and Alzheimer’s disease, and with autistic children. Most such socially withdrawn people focus their attention on the animals and interact with them by holding and hugging them. They often smile and laugh and talk to the animals and the people who have brought the animals to them (Katcher and Wilkins 1993).

These results make sense from an evolutionary perspective because success in hunting and gathering depended on gaining information about the locations of animals in the environment and communicating that information to other people. Adopting an intentional stance helped hunters understand and, hence, predict the behavior of animals (Dennett 1996). Asking questions like “If I were a rabbit, where would I hide from predators?” is likely to have been helpful.

Therapeutic Horticulture. The use of horticulture as emotional therapy is recorded as early as 3000 BP in Mesopotamia. Persians created gardens designed to please multiple senses by combining beauty, fragrance, water, sounds (water, birds), and shade. In 1812, Dr. Benjamin Rush, a professor of the Institute of Medicine and Clinical Practice at the University of Pennsylvania, noted that digging in a garden was one of the activities that distinguished male patients who recovered from mania from those that did not (Rush, 1812, p. 226). Thereafter, agricultural and gardening activities were often included in public and private psychiatric gardens. In 1973, a group of horticultural therapy professionals established the Council for Therapy and Rehabilitation through Horticulture (NCTRH). In 1988, the organization changed its name to the American Horticultural Therapy Association (AHTA). It has nearly 1000 members; most of them are registered professionals. A rich literature describes the cognitive, psychological, social, and physical benefits of horticultural therapy.

**Summary**

“The geneticist Theodosius Dobzhansky famously wrote that nothing in biology makes sense except in the light of evolution. We can add that nothing in culture makes sense except in the light of psychology. Evolution created psychology, and that is how it explains culture.” (Steven Pinker, *How The Mind Works*, page 210)

This brief overview of the lives of our ancestors, the challenges they faced, and how and why they responded as they did, combined with recent evolutionary psychology research, reveals that how they responded to those challenges has left a powerful legacy in our current ecological minds. Our minds, like the mind of Ebenezer Scrooge, house many “ghosts” of the past. Ghosts of volcano past, tsunamis past, earthquakes past, predators past, diseases past, and friends and enemies past influence how we respond both emotionally and with our actions. An evolutionary perspective has helped us understand some familiar responses that have been difficult to explain and it has stimulated discovery of responses that we did not know we had.

Exciting though these recent discoveries are, we have only scratched the surface of what remains to be discovered. Yet, as I have shown, we already know enough to use those insights to help us relate to our current environment in ways that may be less destructive than our evolutionarily uninformed responses. Among other things, an evolutionary perspective informs us that we should approach the environment with considerable humility. On the one hand, evolutionary biology tells us that we are only one twig on the magnificent tree of life. We are the product of the same natural processes that generated all other organisms. Darwin, in effect, knocked us off our presumed pedestal. Contrary to what we thought nots o long ago, the world was not created for our pleasure and enjoyment.

One important part of the legacies of our ancestors’ long tenure on African savannas is that our minds are adapted to deal with local problems operating over short time spans. We have great difficulty comprehending regional and global scale problems that unfold over long time spans. Unfortunately, the most impotent environmental challenges that confront us today are large scale and long term. We need to be alert to the fact that responding creatively to today’s major environmental problems will, accordingly, be especially difficult. Dealing with today's problems requires us to treat all of humanity as members of our in-group, that is, to recognize that we are all in the same boat.

Despite this serious difficulty, our common environment may be the entity that brings us together Throughout human prehistory and history, threats posed by external enemies motivated communities to unite to repel the invader. Our increasingly global economy no longer confronts an external enemy on planet Earth, and, science fiction notwithstanding, the threat of an invasion by aliens from another planet seems remote. We face a common “enemy” in the form of a physical and biological environment that does not “care” about our existence and, consequently, will not act to modify or undo damages we inflict upon it. Can we use it to overcome our differences and animosities and behave in ways that will allow the environment to support us and our descendants now and into the future? It’s worth a try, if for no other reason that it is our only hope.

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