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Environmental Decisions for Now through the Long-long Term¹

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The recent quest for primary votes in the state of Nevada led to renewed headlines about radioactive waste disposal at Yucca Mountain. The image of intense debate among the candidates over *this* issue—in the context of an ongoing war and the threat of terrorism, of a housing collapse, of a potentially declining economy, and of a looming crisis in funding medical care—prompted me to ruminate yet again on the question of how potential risks and rewards in the long and the long-long terms relate to social decisions about matters now. Where and how does timing of risks and rewards enter the picture? And, why is this issue so divisive?

In the Yucca case, these questions arose over the responsibility of this generation for the possible impacts of the wastes in the far distant future. But the same issues are of much broader salience. They are central to such diverse matters as global climate change, preservation of natural diversity, and avoiding threats to natural wonders that enrich our lives by their very existence, among many others. This essay ruminates on time of impact as it affects decisions. My goal is the modest one of sharing some of the deeper questions that have bedeviled me. And also, I will share some of my still-tentative conclusions.³

¹ This essay is a revision of a presentation entitled “Long and Long-long Term Management Goals and Decision Criteria,” presented January 8, 2008 at the Symposium “Uncertainty in Long-Term Planning: Nuclear Waste Management, A Case Study.” This two-day Symposium was held at Vanderbilt University as part of the celebration of the life and work of Dr. Frank L. Parker of that University, and was organized in his honor by his colleagues and students under the leadership of Dr. David Kossum.

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³ The ideas presented here have evolved and are distilled from the preparation of a number of papers, presentations and Congressional testimony and from deliberations on National Research Council committees on the issue of disposal of radioactive and hazardous wastes. It owes much to discussions with and comments from the numerous persons involved in these efforts, as well as to the larger literature. However, the nature of this essay makes citations and references both misleading and inappropriate. In the matter of the present essay, David Brill and Sherry Redus of ISSE and Joel Darmstadter of Resources for the Future provided insightful comments and suggestions.

I have long experienced disquiet and internal contradiction over how social decision makers should consider the future in making choices that affect, for example, the environment, the energy system, human health, and natural systems. In brief, I am *absolutely convinced intellectually* that present decisions, affecting future outcomes, should be guided by a social discount rate that takes into account the time preference of current citizens and the productivity of capital. But at the same time, I am *equally certain* that I do not wish to foster or support a social system that makes decisions on a basis that largely ignores any consideration of those who might be living 50, 100, or thousands of years from now, or of the natural systems in which they may exist. Strict application of a reasonable social discount rate as the criterion for long-term decisions would do exactly this. The quandary I want to explore here is how these contradictory propositions about how we should treat the future can be held in any mind not judged clinically insane.

Sanity may lie, I think, in rejecting as irrelevant the proposition that the future is seamless and that time is a continuum when it comes to energy and environmental decisions. That is, what may be patently true in physics or mathematics is not a useful guide to the way people think and feel or of how they or those acting for them should behave. It is my thesis that in these regards, the future is *not* a unified continuum, but instead is a series of fuzzy but definable stages, about each of which individuals and societies today have very different concepts, values and incentives. Consequently, there is not a single, consistent set of goals and criteria for environmental decisions over time. Instead, outcomes for each stage deserve separate attention and consideration by decision makers and require different criteria in making choices. In my view, the failure to recognize this is at the heart of the conundrum that challenges us at Yucca and in so many other arenas.

Let me approach this idea of fuzzy stages of the future by positing first what I will call the near term—say from tomorrow to perhaps a decade or two from now. I assert that as individuals and as social decision makers, we almost universally prefer near-term satisfaction over that which is delayed. We have a fairly good idea of whose welfare we want to improve—that of ourselves and of those we know and care about (in descending degree depending on the closeness of connection). We also have a pretty good idea of

specifically what we and they will enjoy and of under what conditions it will be enjoyed. In this context, the classic economic concepts of time preference and of the productivity of capital leading to a discounting of future benefits and costs seem to describe accurately both behavior—think saving and investing and expected rates of return—as well as our common experience. Our motives in doing without in the present in order to improve the future, that is, for saving and investing, are very palpable—benefits and costs are seen to flow directly to us and to those we care about—and they flow in largely definable ways and in forms we can foresee. Discounting this future at a reasonable rate makes sense as policy, as descriptor of common human experience, and as a guide to wise behavior.

Operationally then, where does this lead us in finding guidance for environmental decision making for the near term? In the fuzzy “couple of decades” stage, it seems to me, the classic discounted present value formulation in considering marginal benefits and costs clearly can and should dominate decisions

When the time horizon extends outward a few decades to what I term the generational or long term, however, the incentives and motivations tend to shift. While concern for the future remains, it takes on a less direct and more amorphous form because both those persons affected and the things that will affect them become more difficult to identify and define. These persons, our intended beneficiaries, become the anonymous “next generations” rather than Joe or Mary, or even our yet unborn grandchildren. And it is harder to identify what, specifically, we can do today that those in the next generations will find helpful in meeting their needs or fulfilling their desires.

When we delude ourselves about our ability to do this we should take a lesson from Christmas. Economists revel each year in pointing out the deadweight loss incurred because the gifts we choose for others are less valuable to them than the items they would have bought for themselves, if given the same amount of money. Stores gird for the post-holiday “returns,” and stacks of goods are stored in home closets for “regifting”—and oftentimes eventually end up at Goodwill or Salvation Army thrift shops. An industry has been created in “gift cards,” which now represent a socially acceptable substitute for the

more efficient transfer of cash. But even then the questions of which store's cards, and whether rent money would be more welcome, arise. It is worth considering that the transfers described here are among people familiar with one another and well attuned to what would make the other best off. How much more difficult it is to decide what use of today's resources would be most beneficial to those living a generation or two in the future!

A deeper examination of this Grinch-like view of holiday gifting provides insights into environmental decision criteria for the next and succeeding generations. First, sometimes what we "give" is determined by what we think the recipient *should* have—think restrictive easements placed on future use of open space by private property owners, or the setting aside of wilderness areas through government action. In 30 years, the "they" existing then may prefer a shopping center at that location, but they get a park instead, because that is what "we" think "they" should have. Meanwhile, the act of giving makes us feel good about ourselves; we have sacrificed current consumption in the expectation that future generations will benefit from our sacrifice. Our satisfaction exists *whether those future generations actually benefit, on net, or not*. Our motives are mixed, just as they are at Christmas. And it follows that the net benefits are partitioned between this and future generations.

Thus the "give cash, not stuff" view has an environmental decision making analog. It is that, to the extent we want to make future generations better off, we should increase the range of choices that are available to them—by increasing their wealth as defined in the broadest way. Then they can decide for themselves and for those who follow them what is best under the circumstances they face and in terms of the outcomes they seek. By being good stewards of the resources we have today—by consuming, saving and investing wisely—we can transfer some of our current wellbeing to them in a form that they can use to their greatest benefit. We purchase this legacy by using our resources efficiently now—think marginal cost/benefit tradeoffs and the saving and investment choices that follow from appropriate discounting. And, of course, wise environmental decision making is part of this investment and helps create this legacy. Through the

creation of this legacy we gain the satisfaction of helping to fulfill our felt obligation not only to the future, but also to those who came before us.

This legacy also affords us another payoff. By increasing the wealth, again broadly defined, of the next generations we not only increase their ability to provide for themselves but also in turn to provide for the generations that follow. They can do so more effectively than we can because they will have far greater knowledge about that future than we could ever imagine. In addition, we also increase their felt obligation to perform on the responsibility they have to those who follow them. And perhaps most important, we sustain and reinforce a circle of “revolving stewardship.” That is, we make the best decisions that we can with respect to protecting human health and the environment, consistent with our other goals. And at the same time, we create the conditions wherein those who follow us can, and more likely will, make wise stewardship decisions for themselves and, in turn, for those who follow them. From our actions they receive the legacy of caring and of enhanced knowledge, resources, and opportunities. Our concern for the near and generational future is matched by our contribution to its success.

What, then, is the resulting guidance for decisions whose impacts extend into the “generational” time frame? Such decisions, I believe, require a lot of humility on our part and a little forbearance on the part of those who come after us. As to the humility, we cannot, and should not seek to, lock future generations into our vision of what is best for them. To repeat, what we can and should do is to pass on a robust legacy of wealth—of opportunity to solve their own problems and meet their own needs. The passing on of this legacy is our stewardship responsibility, as their passing a future legacy to the next generation is theirs. Stewardship hence is forever. But the stewards revolve.

As to forbearance, those in the future should accept that, while our primary goal was to leave a substantial and broad-gauged legacy, in some particular matters what we will have passed on is what we think they should have and then sustain. Further, that we have the right, and indeed the obligation given our values, to force those specific choices upon

them. For example, there are certain environmental attributes that we will foster and protect for the future, even though doing so may not be efficient or even beneficial when viewed by succeeding generations. As a case in point, we will lock up wilderness areas even if it denies them handy shopping, if that is what it takes. And we will use our judgment as to what we think is best with regard to the disposition of hazardous wastes. Despite our concern for the future we will make these choices and do these things on the grounds that they represent what, from our perspective, *we think* should be done for whatever reasons *we have*, not on the deluded grounds that we are capable of knowing or submissive to, what would be best for them. In the end, our current sacrifices of direct consumption for future investment may be self-serving rather than optimally beneficial to future generations. Indeed, we clearly are motivated by the satisfaction we gain from knowing what *we will leave*. There is no assurance that future generations will necessarily be gratified by what *they have received*.

Operationally, then, this suggests that for the fuzzy “next-generations” time frame, which through revolving stewardship extends into the indefinite future, a mixture of guidance for decision making is required. Considering discounted benefits and costs has a major role, of course, in determining the size and form of the legacy left to future generations. But the long time frame, our values, and the strong sense of current responsibility for the indefinite future also lead to what amounts to *consumption decisions*—that is, actions to increase the current generation’s welfare—in the guise of increasing that legacy. These occur when this generation gets net satisfaction from using resources to preserve, foster, or to protect from specific harms things that it wants future generations to have, or to be spared, such as possible harm from hazardous wastes. We can not know, and actually do not care, whether those living in the future will see the results of such actions as an increase or a decrease in the value of the legacy they otherwise would have been left. Between the generations, such decisions can be lose-win

(that is, we sacrifice but they benefit), win-lose (that is, we get net satisfactions from what we leave in their behalf but they are made worse off), win-win (that is, we and they both get added net satisfactions from our expenditures) or lose-lose (we sacrifice and they are harmed, relative to what might have been).

Thus, again, there is a need for humility when we make our decisions about the future. There is no room for moral absolutes. We do what we do because we think it is right. And the next generation will also make stewardship decisions that they think are right that will affect those that follow it. And with the best intent, judgments will differ, and each generation will either praise or damn the decisions that came before.

Let me turn now to the long-long term time frame. I hesitate to say this as a devoted fan of country music and of the *Grand Ole Opry*, but despite the sentiments of the beloved old song, "The Circle WILL Be Broken." Someday, "revolving stewardship" will cease to revolve.

That is, long before the hazard of some of the wastes we have created has dissipated, any management structure we or our successors have put in place will almost certainly have dissolved; any isolation barriers we or they have built will likely have been breached; and the planet as we know it may have disappeared. In this context, how do we think about our responsibility to whatever now-unimaginable world, and the beings (if any) who inhabit it, that may exist a million or 100,000, or even 1,000 years from now?

My conclusion is that, however grandiose our perception of our own significance, it would be mind-boggling to think that our current environmental protection choices could make a meaningful difference to anything or anyone extant in that distant future. But those choices may make a difference to us. That is, again, we may gain satisfaction by making choices that we think will alter the future in a desirable way, whatever the consequences of those choices. For instance, we may conclude that, for whatever reason, of all the negative things that we might prevent or positive things we could foster, we are going to try to endeavor to prevent any radioactive damage from materials that might be deposited at Yucca Mountain. But the problem with this approach is that the list of potential actions goes on and on and is scarcely finite.

Moreover, the immediate consequence of spending more on barriers to dispersal at Yucca Mountain, for example, is that the resources that go into this extra effort are not available for other things. To make this decision is our right, but it is important that we recognize that among its likely outcomes are reduced current consumption *and* reduced patrimony left to immediately following generations. That is, expenditures made in a possibly futile attempt to improve conditions “after the circle is broken” come not only from this generation but also from reductions in the ability of those following us to better meet their needs. They are unwilling partners in our beneficence. We are spending down our children and grandchildren’s legacy for the benefit of whatever beings, if any, exist in the distant future.

In contrast to the situation of the Christmas gift or the restrictive easement that prevents the next generation from turning a park into a shopping center, effectively *all* of the long-term benefits from an environmental action “after the circle is broken” therefore arises from the altruistic satisfaction that we get from having made the gift, not from what the expected recipients actually receive. And this has important implications. To explore these it is helpful to approach this issue from another perspective.

As something of a humanist and utilitarian, I find it helpful to approach thinking about the fuzzy stages of future time from the perspective of space—in this case felt kinship space. From this perspective, the fuzzy stage of the present and near-term future equates in kinship space to me, family and close friends and associates and the valued ecosystems experienced directly. (Experience suggests that social decision makers at a national level respond similarly, constrained as they are by politics and law.) The collective wellbeing of all of these is of primary importance to me. In making my choices, it is the expected extra benefits and costs to these people and places and natural systems that count the most.

The generational stage in the time dimension is approximated in kinship space sequentially by acquaintances, community, and nation and by persons and natural systems whose existence I can imagine and relate to on a visceral level—including the homeless and hungry on our streets, the ill without proper medical care, and the mountains I will enjoy only from photographs and in my imagination.

With respect to the “after the circle is broken” time stage, it is most closely aligned with the abstraction of the people and places “out there” whom I neither know nor know of directly, nor with whom I feel any but the most tangential kinship. On this dimension, they are nearly as distant as are those persons or beings that will live now-unimaginable lives 10,000 or more years from now. But this analogy is faulty—and growing more so as globalization and the interconnectedness created by travel, global exchange of goods, services and people, the internet, and television bring those from distant places and different cultures closer in our emotional awareness. It certainly isn’t a global “family of man,” but we have a lot more distant “cousins” than could have been imagined a few generations ago.

This juxtaposition of time and kinship space perspectives, for me, helps in making sense of the management choices that are before us with respect to dealing with environmental and other decisions over long and long-long term time frames. In terms of how much we care about the benefits or harms borne by those affected, the level of concern quickly becomes vanishingly small as those benefits or harms are sufficiently diluted in their significance by either time or space. In the abstract, our concern for an individual unknown and unknowable person—or zebra—near starvation in Darfur is almost of the same order as for a possibly existing but unknown farmer or animal that may drink radioactive water near Yucca Mountain 10,000 or a million years from now. While flawed, this analogy can be probed for some useful insights.

Note that over the massive gap in kinship space between us and unknown persons in Africa, the predicted benefits from some gifts affect us as givers so much that we will bestow them, while that from others do not. Our altruism is discriminating. Think, for example, of the appeal of contributing for cosmetic surgery for a disfigured child pictured on TV as compared with opening our checkbook to lessen in some small way the chronic malnutrition that stunts whole populations. Or, alternatively, consider the choice by President Bush to substantially increase US expenditures for AIDS reductions on that continent. The difference in altruistic impulse is not based on minimizing the collective recipients' suffering—improvements to their wellbeing—but instead largely on the nature of the gift from which *we* get the most satisfaction.

Now think of giving to reduce specific potential threats to beings and the environment “after the circle is broken.” Of all the possible targets of our altruism, we may choose to focus on avoiding possible radiation damage from deposits at Yucca Mountain 100,000 years from now. Yet, given the unknown unknowns between us and the far distant future, our actions do not even have definable outcomes. We need to recognize that in this situation such actions—or decisions not to act—have mostly to do with us and our satisfactions; they cannot be a response to external conditions or to the priorities of those we seek to benefit. Therefore, these gifts are again choices, open to our inspection and judgment. Hence they are not a product of specific obligations or of moral imperatives.

The question is, how does this affect, if at all, how we should think about our long-long term environmental and other management decisions and goals? The connections, it seems to me, are these.

In terms of what we can control, resources are limited but fungible; they can be used for a near-infinite number of different things, but there are not enough for everything, even in a rich society such as ours. In terms of the incremental benefits each of those uses may produce, from the perspective of the responsible social decision maker, they can be distributed outward in two dimensions from the “us” that is the locus of concern: over time and over kinship space. For the now and near, or the soon and close, the decision process that incorporates and seeks the direct and indirect benefits from present and future (through investment) consumption seems both intuitively reasonable and robust. When the concept of revolving stewardship is added, the reach of this reasoning is extended. And when the “gifts” are recognized to bring benefits not only to the recipient but also to the giver—when transfers are determined partially by what the giver wants to give—the story is more complete.

But that leaves unsettled the question of how we are to express our more purely altruistic impulses for outcomes more distant in time or kinship space. The insight I draw is that the decision is far more about the “us” than about the “them.” It is about how a use should be chosen for some of today’s resources—a use that, if it does bring benefits, will bring them to others for whom, or things for which, we have *little capacity* to care in any

but an abstract way. It is about how our own values determine one outcome rather than another—how we feel about ourselves when we choose “X” rather than “Y.”

From my perspective, the humanistic, utilitarian bias comes through in considering gifts to those distant in time or kinship space. That is, the decision criterion is that I want my gifts to have the greatest probability of doing the most good *as I perceive it*—whatever the nature of those gifts and whomever or whatever they might benefit. For me, and I believe many others, I observe that kinship space has shrunk compared with what our fathers and grandfathers knew. In contrast, our sense of the fragility of, and of our power over, the continuity of the world as we know it into the distant future has grown. For me, that means that the malnourished of Darfur, and most certainly the homeless, hungry, and ill on our streets, and those of different creeds and races within our nation and world, would rank far higher on the list of priorities than they would have ranked to those who came before me. And the unlikely but possible consumer of water near Yucca Mountain a million years from now lies far down the list.

So where do these ruminations lead me in the quest for both sanity and consistency in approach to the relevance of time in environmental and other decisions? To a comfortable place, I believe. First, decision makers need to reject the idea that consistency and rationality require time to be considered as seamless. Rejecting it allows the segregation of the principles for decision into three distinct spheres. For the present and near term, discounting benefits and costs makes sense and at the same time improves welfare in future time periods. Second, revolving stewardship, with future generations obligated and

empowered to decide what is best for them and for those immediately following, brings the discounting framework into longer-term salience. Importantly, though, this occurs only with the inclusion of an element of altruism and in the presence of humility and forbearance. And finally, for the far-distant future, it is helpful to engage as well the concept of distance in kinship space. Consideration of the welfare of the far-distant future is a hallmark of a caring and advanced society. But this impulse toward altruism must consider realistically the potential effectiveness of an intervention in a circumstance of virtually complete uncertainty. It must also consider the alternative uses of those resources it wishes to surrender either to that future or to those separated by kinship space rather than time. And since any benefits are uncertain and accrue to those for whom we have little direct concern, the choices of targets for our altruism understandably rest mainly on what we want to give, not on the potential benefits that we actually convey.

Unintentionally, then, the primary debates in Nevada over the future of Yucca bring us full circle. The topic was future risk, the conflict between the candidates was over who would do more to reduce it, but the motivations that drove the debate were the potential short-term benefits that each of the candidates could gain in votes, with little consideration of longer-term or broader consequences. As, unfortunately, so often it is with other issues in the rest of the society.