Environmental Values and ethics

We found that in many natural hazard mitigation efforts, or recovery from natural disasters, significant questions about environmental ethics emerged. Environmental ethics is concerned with questions about the ethical duties and responsibilities to the environment, or relative to the environment. In the last twenty years or so especially there has been an explosion of writing and thinking in this area though little of it explicitly addresses natural hazards or natural disasters (e.g. for a review of the history of environmental ethics and this growing literature see Nash, 1989; Rolston, 1988).

A number of the most contentious mitigation cases involve a perceived or actual tradeoff between public safety (and property protection), and protection of the natural environment, or an element of the natural environment. One case which has received popular attention in the media is the (perceived) conflict between protection of the endangered Stephens' Kangaroo rat, indigenous to Southern California, and protection of homes and property from wildfires. This endangered species (and the requirements of the federal Endangered Species Act) was blamed for the property losses because of

restrictions placed on the disking of vegetation around homes, a fire control measure. Since 1989, weed abatement standards were issued by the Riverside County Fire Department which, out of concern about illegal take of the species, prohibited disking around homes, though daylight mowing, and other abatement techniques not disturbing the ground were permitted. In late 1993, a fierce wildfire erupted in Riverside County, a result of high wind and dry conditions (one of 21 wildfires in Southern California). Some 29 homes were lost in the fire, and some homeowners claimed that the prohibition on disking was the cause of the losses. A GAO study, however, concluded, that weed abatement of any kind would not likely have saved the homes given intensity of the blaze (see GAO, 1994).

Since the fires, disking within 100 feet has been authorized, and the US Fish and Wildlife Service feels that this action will not threaten the survival of the species. Interestingly, there was never a question about whether emergency firebreaks in habitat areas would be permitted as there "would be in the defense of lives and therefore would not violate the ESA [Endangered Species Act]." (p. 6). The GAO report notes that while limited disking has now been authorized, some unresolved issues remain, pointing to perceptual (or actual) conflicts between fire suppression and species protection:

> Discussions with Service and county fire department officials, however, disclosed that difficult issues regarding the county's fire management program and protection for other species that are or may be listed under the ESA remain unresolved to a large degree. County fire department officials continue to be concerned that their fire management program could be jeopardized by the Service's overall efforts to protect species and have taken the position that the department's fire prevention activities to protect people and property should not be affected by species protection actions. Service officials, on the other hand, told us they cannot fully address matters related to potential conflicts between the county's fire management program and future efforts to protect species that may be listed because there is simply no factual information available to make such decisions. However, they stated that the ESA is very flexible on such matters, as exemplified by the cooperation agreement being prepared regarding the Stephen's Kangaroo rat, and that the Service's intention in implementing the ESA has always been to allow for the protection of people and property. (GAO, 1994, pp. 11-12).

In South Florida a controversy has raged for a number of years over the expansion of a critical segment of Highway 1 (in south Dade) which has served as a bottleneck for hurricane evacuation from the Florida Keys. The road expansion has been criticized by the environmental community as ecologically-destructive and growth-inducing. Proponents of the highway see it as essential for evacuating people in time and strongly justify it on public safety grounds.

Another recent and contentious issue has been the conflict, reaching the halls of Congress, over construction of the Auburn dam, a proposed flood control project on the American River, northwest of Sacramento, California. The dam would be a 508 foot high structure, costing around $1 billion to construct. The dam has been vehemently opposed by environmentalist, especially a group called the American River Coalition. The main concern is that it would result in the destruction of 40 miles of pristine river canyons.

The Western wildfires of the summer of 1996 further illustrate these conflicts. While this issue remains unresolved, allowing such fires to run their course may actually be what is necessary to restore the ecological equilibrium of forest ecosystems, given eighty years of fire suppression. Yet, firefighters are often placed in the position of having to fight such fires because of the location of development, and having to protect private property at the cost of deploying limited resources to protect other important natural resources. One BLM fire specialist was recently quoted on the liabilities of allowing large fires to burn. "You can't let a small fire become a 100,000--acre fire because there'll always be a 7-eleven in the way." (Kenworthy, 1996, p. A-11).

Many other examples of environmental problems or issues arising in mitigation and disaster policy can be cited. Following Hurricane Andrew debris disposal was a major concern and some of it ended-up being placed on environmentally sensitive lands (Dade County has now developed a plan for dealing with debris). Natural disasters clearly can wreak significant damages on the natural environment (e.g. consider the devastation of Hurricane Hugo on the Francis Marion National Forest, and in turn on the endangered red-cockadet woodpecker; the flushing of toxic chemicals down the Mississippi River during the 1993 floods; etc.). While many of these effects and impacts are natural (e.g. pine forests destroyed by hurricane winds) there is almost always a human action or history of action that causes or exacerbates vulnerability (e.g. habitat destruction and fragmentation putting the red cockaded woodpecker in an endangered status). Mitigation ethics suggests that duties exist to curtail actions which increase vulnerability, and an affirmative duty to undertake actions which reduce environmental destruction when disaster events occur in the future.

In part these conflicts raise fundamental questions about societal and personal values and the priority and importance given environmental values relative to others. We found considerable variation in which values individuals (and communities) appear to give greater weight to. In the Auburn dam controversy, for instance, proponents of the dam unabashedly put other, non-environmental values ahead of protecting the environment, in this case the 40-miles of natural canyons. Public safety in the minds of many of its supporters are at the apex of their personal value hierarchies. Representative Doolittle, a strong supporter of the project and representing the district in which the dam would be constructed, puts it this way: "It's just a matter of priorities. We feel life,

limb and property have to come ahead of the aesthetic considerations of the canyons...These canyons are not that unique anyway." (as quoted in Egan, 1996).

Interviewing the director of emergency management for Monroe County, Florida (the Florida Keys), Billy Wagner, led to the expression of a similar sentiment concerning the Highway 1 expansion. While Wagner said he was supportive of environmental goals, he appeared to have little tolerance for the arguments of environmentalists who oppose the highway. To his mind, the pressing public safety need for the project easily outweighed any possible environmental damage that might result.

Factual or empirical dimensions to these conflicts are also important, and there is often the question raised: Can environmental values and public safety/mitigation values be achieved simultaneously? Is the value ordering or choice between these values always necessary or can programs, policies and decisions be crafted in ways which advance both? Our research suggests yes. Very often alternative measures or strategies can be found which will achieve desired protection of people and property, and at the same time protection of the environment.

Furthermore, it is increasingly recognized that protection of the environment is often the most effective strategy for mitigating natural hazards. Conservation of wetlands, for instance, can serve as a very effective (and economical) flood control strategy; coastal dune systems act as natural seawalls. Protection of natural values in watersheds is a preventative, cost-effective strategy for flood mitigation.

Many contemporary environmental ethicists, and environmentalists, argue that to preserve and maintain what exists today is simply inadequate, given the level of destruction and degradation. And there is little question that major environmental destruction and alternation characterize many of the hazardous areas we have examined -- consider the heavily leveed nature of the Mississippi-Missouri river, or the heavily armored nature of much of US coastline. Indeed, the very loss of naturally functioning ecosystems (e.g. the gradual destruction of wetlands in the Mississippi--Missouri, watershed) has exacerbated, if not outright caused, many natural disasters.

So, one increasingly important environmental value is restoration. A restorative ethic acknowledges that substantial damage has been done, and that there is a moral obligation to repair and put right damages done in the past. A number of restorative initiatives can be seen in our case studies. Following the Midwest floods, substantial federal funds were expended under the wetlands reserve program to pay farmers to return floodplain land to wetlands. In at least one agricultural levee district in Iowa, the entire area was purchased (some ___ acres), and added to the Mark Twain National Wildlife Refuge. Implementing such a restorative ethic is difficult, of course, and following the 1993 floods there was

much talk about allowing the river to return to its natural, meandering flow, and about not rebuilding many of the levees. Most damaged levees were repaired, however, as vested political and economic interests make such proposals difficult (and costly) to effectuate.

Other examples of a restorative ethic at work include federal and state efforts to restore the natural flow of the Kissimee River, and the Florida Ecosystem generally.

There is even a broader and perhaps deeper sense in which environmental ethics might come into play in natural hazards. Some in the environmental community argue for the need to move in the direction of a closer, more fundamental relationship or connection with the natural environment. Often discussed under the label of "deep ecology," such an ethic sees a fundamental unity between human and non-human, which might begin to view rivers, mountains, faultzones, and coastlines as fundamental extensions of the human species so that an act of destruction or degradation is seen as a harm to ourselves. More eastern than western in orientation, it is difficult for many to imagine a time (at least in the foreseeable future) when this form of deeper connection could be realized. Clearly, we have been moving in the direction of attaching more intrinsic value to these elements of the environment, and growing consensus about the need to live more lightly upon the planet.

Considerable attention is now beginning to be paid to the concept of sustainability, and its relationship to natural hazards. And here is another important link to environmental ethics. The notion that it is possible to promote sustainable communities and sustainable land use patterns means that it may be possible to both reduce hazard vulnerability and to protect (and restore) the natural environment.

Sustainability emerged in each of the three large disasters analyzed for this project. Following the Midwest floods, for example, a Midwest Working Group on Sustainable Communities was formed to help communities imagine more sustainable patterns of redevelopment. Following Hurricane Andrew, a series of design charrettes generated ideas (many of them not implemented, however) about how communities and neighborhoods could be redesigned and recast. Even in Los Angeles, the issue emerged, specifically with respect to the transportation system. While the Northridge event devastated bridges and highways, it did little damage to the regional rail system, and ridership on Metrolink, the commuter-rail line went up dramatically in the weeks following the earthquake. This led some to speculate that rail was (and is) a much more sustainable form of transportation, at least in the earthquake county of Southern California.

The two communities of Valmeyer (IL), and Pattonsburg (MO)--which have chosen to relocate their entirely out of the floodplain--have sought to recast themselves as sustainable communities. Whether or not either of these experiences represents a model to be emulated, or the true embodiment of a

new ethic of sustainability, is not clear. In the case of Valmeyer, while the new homes may incorporate improved energy efficiency, it is not clear that this expensive effort results in greater sustainability. Indeed, the new town is consuming previously undeveloped farm and forestland, and has raised concerns about the destruction of habitat for the endangered Indiana bat, and native American burial grounds. The town's remaining population, moreover, could easily have been absorbed within the footprint of existing towns in the county. The town is more sustainable from future floods, but as critics of the project point out, flooding had not been a major problem on the old town site (the 1993 floods were the first in 50 years). There are real doubts, then, as to whether Valmeyer represents ethical redevelopment practice, based at least on environmental values or an ethic of sustainability.

Pattonsburg is somewhat more defensible on sustainability grounds. The old town was repeatedly flooded, and its relocation is a clear improvement in sustainability to natural flood forces. Moreover, there seems to be a greater effort (though many of the ideas are not yet realized) to reduce the long term environmental impacts of the people and buildings in the town. Among the interesting features include:

Even in Pattonsburg, however, there are concerns about the cost of the project and the need to carve-out an entirely new community from the Missouri farmland. The state mitigation officer related a story of receiving a phone call from the mayor of the town up the road from Pattonsburg (Bethany, Missouri), volunteering to absorb their population within their community.

An ethic of sustainability, however, does seem to hold increasing promise in guiding development and redevelopment in high-risk areas. Projects like Jordan Commons, in South Florida, will contain homes that are both substantially stronger and better able to withstand the forces of hurricanes, but which will significantly reduce energy consumption, water use, and general environmental impacts. And, at the same time such projects have the potential to create more livable, humane places. (5)

Historic Preservation Values

Another important value, or category of values, that emerges in mitigation policy discussions is the preservation of buildings and landscapes of historic value. Sometimes these values appear to complement mitigation, and other times seem at odds.

Historic buildings are frequently much more vulnerable to natural disasters like earthquakes, and so in the aftermath of a major event like Northridge there are dilemmas about what to do. The building owner may be faced with conflicting values. On the one hand, preservationists may wish the building repaired and restored, yet to do so will frequently mean bringing the building up to current code, and the costs

involved may be exorbitant. While federal and state historic preservation laws may create procedural requirements, they generally are not able to prevent an owner from demolishing an historic building if he or she feels the cost is too great.

Another potential option for society is to exempt historic buildings from contemporary safety standards. In this way, we make the conscious choice to allow exposure of people and perhaps the community at large to greater risks, in exchange for the preservation of historically-significant buildings.

Recent disaster events have provided examples of efforts to preserve and protect important buildings. A number of historic public structures have been deemed of such importance that extensive public monies are being used to restore and retrofit them (including, for example, San Francisco City Hall, the San Francisco Opera House).

The fairness of asking private owners of historic building to spend millions to repair and upgrade historic buildings has also emerged as an important issue. The St. Joseph Cathedral in Oakland (CA) is a case in point. Renovating and strengthening this church would have cost some $9 million. The church believed it could not afford this expenditure, and wanted to tear it down. Preservationists wanted to save it. Eventually the building was torn down and to some an important community building was lost. But should private owners be required to spend large amounts of their own money to save a structure for the public good?

The very act of retrofitting or strengthening a building has sometimes been opposed by preservation advocates because of the perceived interference of some structural features with the historic integrity of the building ...

One of the clearest examples of the importance of historic preservation values in mitigation that we encountered was the flood levee project planned to protect the small town of St. Genevieve, Missouri. (6) The levee, expected to cost approximately $50 million was found not to be cost-effective (with an estimated benefit-cost ratio of .2) but has progressed anyway as a result of the perceived historic significance of the town by a number of individuals and groups. The low benefit-cost ratio is primarily the result of the fact that St. Genevieve is a small town, and that very little property is actually at risk, as well as the fact that the necessary levee system is a relatively complicated one.

St. Genevieve is an important town in the westward expansion of the nation, and contains some impressive 18th Century French Colonial architecture. The National Trust for Historic Preservation (which is putting up some of the funds to cover the non-federal match for the levee), has paced it on its endangered list and has called it the "Williamsburg of the Midwest." The cultural and historic value of this unique place, then, appears to justify the high cost needed to preserve it.

Preserving and restoring historic structures that have been damaged by a natural disaster is an area where considerable disagreement has occurred, however. Tough choices must be made about what can be saved and what can't, and about the amount of repair and restoration that can be afforded. There is a considerable range of opinion about what the correct balance is here. Richard Andrews, head of the California Office of Emergency Services, for instance, feels that preservationists may sometimes go too far, and he wonders about the real historic value of some buildings that may only be only forty or fifty years old. He described the debate and current controversy over repairing and restoring the Los Angeles Coliseum following Northridge. Some preservationists have argued for the need to preserve even the urinals in the building as historic. The concession stands and even palm trees that are viewed by some as historic. Andrews tends to believe that these concerns go too far, and believes that preservationists, rather than always choosing to do battle over these issues, should realize that the retrofitting of these buildings is ultimately the most effective long-term preservation strategy, at least in earthquake country.

Distributive Equity

A number of ethical issues emerged concerning the fairness with which mitigation benefits and burdens were allocated. Several different kinds of distributive equity problems or concerns were identified. One is that lower-income and minority individuals and communities are disproportionately affected by natural disasters when they strike. Not surprisingly, riverine floodplains are frequently the location of lower-cost housing and in the Midwest and consequently many low income residents live in the areas that are the most vulnerable to disasters. Lower income residents are more likely to live in substandard housing, and housing more structurally-vulnerable to earthquakes. (mention loss of SRO housing following Loma Prieta?).

Another dimension involves the negative side-effects that often befall low-income and minority citizen and communities as a result of otherwise desirable mitigation programs. One example is the potential effect that mandatory retrofit ordinances can have on displacing lower-income residents. In California, communities are required by law to develop seismic retrofit programs, aimed primarily at retrofitting especially vulnerable unreinforced masonry buildings (or "URM" buildings, of which there are some ... in California). Some cities, notably Los Angeles ..., have instituted mandatory retrofit ordinances, requiring building owners to undertake seismic upgrades by a certain date, under the threat of condemnation. While these programs have been fairly successful at strengthening and upgrading buildings, they have resulted in direct displacement due to the loss of some structures (i.e. razing) and economic displacement due to the raising of rents ...

In the Florida Keys a similar dilemma exists over how strictly to enforce the Monroe County floodplain management

ordinance. Under the requirements of the National Flood Insurance Program, new structures must be built to at or above the 100-year flood elevation level, with no habitation allowed below this level. Yet, over time a large number of small apartments have been created illegally below the BFE, and according to Bob Henry, director of planning for Monroe County, there are some ___ non-conforming units. These apartments provide a significant number of affordable housing units, in a county where housing is very expensive. What does Monroe County do in this situation--stringently enforce the law, cracking-down on these illegal units, or doesn't turn a blind-eye, recognizing the affordable housing benefits these units provide?

Similar concerns were expressed about the impacts of the buyout program following the 1993 Midwest floods. Because the floodplain is a major location of affordable housing concerns have been voiced that buying out these structures, with the admirable intent of reducing exposure to floods, would have the unintended consequences of severely reducing the supply of affordable housing. Concern about this potential effect, led some communities, like Cherokee (Iowa) to take proactive steps (including developing a new subdivision) to add new housing opportunities at the same time that other units were being destroyed or taken out of commission. (Indeed, some communities encouraged the moving of homes to new sites, and the auctioning of purchased homes where these homes were structurally salvageable.) In this way some communities have provided examples of how safety and mitigation objectives can be advanced while not negatively affecting the conditions of the least-advantaged, and perhaps even improving these conditions.

Nevertheless, these potential side-effects have placed public officials in the difficult position of having to choose between achieving a certain level of seismic safety for all residents and ensuring the availability of basic housing.

Another important dimension of the equity question has to do with the fairness with which mitigation benefits are allocated or distributed. Do all citizens have the same access to and ability to benefit from mitigation programs, or do low-income and minority residents (and communities) receive disproportionately low amounts of these benefits? There is some evidence to suggest that such inequities do occur ...

Distributive equity also raises questions about the criteria employed in allocating mitigation or post-disaster benefits. Many benefits are distributed based on a principle of equal benefit, regardless of income or wealth. At least for certain mitigation programs, distributive equity may argue for some form of income - or wealth-based limit, so that scarce public funds can be targeted to those individuals and communities, in greatest need, and with the least financial capability.

Questions of Acceptable Risk

We uncovered a number of questions concerning the risks from natural disasters, and what amount and types of risk were deemed "acceptable". This is one of the most important categories of ethical choice, at both individual and collective levels. While there is a paucity of literature, specifically on the ethical dimensions of natural hazards, there is a voluminous literature on risk (e.g.).

Clearly, choices about acceptable risk are implicit in the adoption of any specific mitigation program or policy. One empirical observation is that there are a variety of different risk standards in use. In floodplain management, for example, the National Flood Insurance Program (NFIP) is heavily focused upon the 100-year flood, while the Corps of Engineers has historically used the "standard project flood" (i.e. the 500 flood event). In coastal areas, there is great variation in shoreline setback requirements (from no setback in many coastal states and localities, to 30-year and 60-year setbacks in states like Florida and North Carolina respectively).

While these risk-standards may be unclear (especially to the public) and complex, they nevertheless represent choices about how much and what kinds of disaster risks are acceptable or appropriate.

Our case studies provided rich examples of communities and states where the public debate about mitigation essentially centered on the question of which risk standard to use--and how cautious, or risk-averse the community should be ...

Evidence of difficult choices and priorities about risk pervade. In California, for instance, certain categories of public buildings, specifically hospitals and schools are required to be built to a much higher seismic standard. Retrofit ordinances (of the mandatory and voluntary sort) typically stipulate compliance timelines that reflect similar risk assumptions--greater priority is given buildings and facilities that house many people, for example.

Different methods are used in reaching these choices about acceptable risk, and different moral criteria and factors are considered. One frequently employed criterion is cost ...Another criterion is the notion that each individual has the right to a minimum level of safety...

The Moral Community

Philosophers and ethicists frequently talk about the "moral community," and this concept is extremely important as well in understanding the ethical dimensions of mitigation. By moral community we mean the people or things to which moral consideration should be given. Whose interests and welfare should be taken into account when making a particular mitigation decision or choice, or when allocating benefits or forms of assistance?

Different approaches to defining the moral community

turned out to be extremely important in two of the large disasters studied here--Hurricane Andrew and the Northridge earthquake. In both events, particular controversies arose over the eligibility of illegal residents to receive disaster assistance.

In both cases FEMA provided aid to illegal residents, and was criticized by some for it. Following Northridge, Congress placed new additional restrictions on such aid, contained in the supplemental funding bill. Under these new requirements, aid could not be extended beyond 90 days without "self-certification" of citizenship. The law has since changed again, leaving it up to states to decide this question. In California, currently only medical, life-saving assistance can be provided to illegal residents.

There is considerable disagreement about this within the hazards community. In California the issue is perhaps the most sensitive. One state OES official, in an interview, indicated that he felt it was bad morally to deny people in need, regardless of their citizenship. And, he pointed out, we send millions of dollars to other countries each year for foreign assistance. To deny assistance in the U.S. to certain individuals because of citizenship to him seemed arbitrary. The current director of the California OES had a different view, indicating it was inappropriate in the face of federal and state budget deficits to be providing disaster assistance to individuals who were here illegally.

Another way to potentially define the moral community is geographically or spatially. Many mitigation issues involve cross-boundary or interjurisdictional impacts or effects. The filling of wetlands, watershed degradation, and constructing flood control projects upstream will have definite effects downstream. Understandably local officials (and citizens) tend to think first about their own jurisdictions and do not commonly undertake mitigation actions that primarily or in large degree benefit other jurisdictions. These "other" jurisdictions are often not viewed to be part of the relevant moral community.

The moral community can also be defined in temporal terms. Historically, public policy (and indeed most individual actions) tends to be driven by a very short timeframe. Things that might happen in the future, and people who might be affected, are simply not as important, if considered at all. But many individual and collective decisions about natural disasters clearly impact the future, and future residents. These ethical duties are frequently described in terms of intergenerational equity or intertemporal justice, or obligations to future generations.

One rationale for building codes is that while any particular owner of a home or building may be willing to accept a low level of safety, that home or building will likely be occupied by a number of occupants and owners in the future who may not agree with this risk assessment.

Laurence Kornfield, chief building inspector for the City of San Francisco, has articulated a strong professional ethic to ensure the safety of buildings for "future users" and for the various general public who have made no direct personal choice to place themselves at risk. Kornfield eloquently states this "building philosophy" in a recent paper on the Kobe earthquake (Kornfield, undated, p. 2):

> As a building official, I am committed to a code of professional behavior which to me is usually clear but which is often puzzling, even absurd, to others. One of the basic precepts I employ when viewing building concerns is that I represent, in absentia, the unknown future user. In single family homes, for example, an owner may say 'It's ok like this ... I don't need to fix or upgrade my building. After all, just me and my family live here. I'm not endangering anyone else.'
>
> What the homeowner does not consider is that he is endangering his own family, who certainly have not agreed to take risks. Further, after that homeowner has moved out, which is inevitable, the home will be occupied by an entirely unsuspecting resident who will assume that certain construction standards have been met, and will have no idea that his safety is endangered by, say, inadequate fire exits or inadequate structural seismic bracing ...

Similarly, the daily users of larger buildings, such as office buildings, supermarkets, train stations, have no idea at all of the potential hazards of such buildings. Are the fire suppression systems up to date? Does the smoke evacuation system work? Are the fire exits unobstructed? Is the building structure adequate to withstand the anticipated ground shaking of an earthquake?"

There is a strong moral duty, then, in Kornfield's philosophy, to take into account the safety of future building owners and users. And indeed, while the average mortgage may only be for thirty years, clearly buildings survive and are used for much longer periods, perhaps hundreds of years. Equally true, a thirty-year or even sixty-year coastal setback for a building may serve to protect it in the short term, but serve to expose future residents to significant erosion and storm risks. Taking into account safety for the full and complete life of a coastal structure would suggest much more stringent setback standards, perhaps on the order of 100-year, 200-year, or greater setbacks. As well, many discrete, individual decisions about buildings or sites can cumulatively affect in major ways, the long term patterns of hazards and the safety levels future residents will experience. While the building of one or two structures in the floodplain may seem insignificant, or the building of a road or other public facility in a high risk area inconsequential, such decisions can set in motion patterns of future development that may, in this way, significantly influence risk levels for future generations. The recent report of the Natio-

nal Science and Technology Council (1996), makes a strong statement that the current generation must take into account the impacts of its actions on the vulnerability of future generations. In the words of the report: "...[f]orward-looking decisionmaking today regarding land uses, the direction and nature of economic development, and needed investment in societal infrastructure and capital facilities, improves the prospects and opportunities afforded to future generations" (National Science and Technology Council, 1996, p. 4).

There is also a sense among some that we talked with that there is a moral duty to work to increase safely over time--a duty to do what can be done to make the future a safer, less--dangerous one. This might be characterized as one of many potential obligations to future generations.

Other obligations to the future have also emerged. Many of the environmental and historic preservation actions discussed earlier can be defended in terms of the interests and well-being of future generations. Preservation and restoration of a pristine natural river canyon, it can be argued, is required as part of the natural legacy we are duty-bound to pass along to our descendents. Similarly, seismically-retrofitting buildings like San Francisco's city hall and opera house (among many other examples) seems fundamentally about preserving the cultural capital of society and ensuring that this capital is passed along, and not lost in an earthquake event. These mitigation programs are clearly also about protecting people and about preserving this of value to be enjoyed by the present generation--yet, there is an important piece of the moral equation that considers duties and obligations to the future.

The way that mitigation programs and investments are funded also raises questions of temporal ethics. Governor Wilson's proposal to fund the state costs associated with the Northridge earthquake by floating bonds, was objected to by some because it essentially transferred these costs onto future taxpayers (and reversed its practice of pay-as-you-go). Where future residents can be said to enjoy the benefits of a mitigation project (say a levee project with a useful life of fifty years), such a financing scheme may be less troubling, but where the primary objective is to find the least painful way of paying for something, the principle of intertemporal equity may be violated.

The way that mitigation programs and investments are funded also raises questions of temporal ethics. Governor Wilson's proposal to fund the state costs associated with the Northridge earthquake by floating boards, was objected to by some because it essentially transferred these costs onto future taxpayers (and reversed its practice of pay-as-you go). Where future residents can be said to enjoy the benefits of a mitigation project (say a levee project with a useful life of fifty years), such a financing scheme may be less troubling, but where the primary objective is to find the least painful way of paying for something, the principle of intertemporal equity may be violated.

Another dimension of the moral community involves other forms of life. Are other life species due some degree of moral consideration--Do other forms of life have inherent worth? These questions have been considered extensively in the environmental ethics literature, and is largely beyond the scope of this paper (e.g. see Nash, 1989). Consideration of the interests of other forms of life during and after natural disasters is not uncommon, however. The massive flood in the Midwest left many species stranded, and efforts were made to rescue and re-release these animals. Clearly, as well, there is considerable worry about the status of pets during and after disaster events. There is little question that humans believe other species (at least some) are deserving of protection and rescue, and that, in this sense, they are clearly part of our moral community.

And, the duty to protect and restore the natural environment is partly motivated by the fact that such areas often represent habitat for a rich set of non-human life. Moreover, the federal Endangered Species Act, which has an impact on some mitigation programs, is (arguably) a strong statement of the inherent worth and right of existence of other species.