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Ecology and the Common Good: Sustainability and Catholic Social Teaching

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INTRODUCTION

There is no question that over the last thirty years environmental degradation and the ecological crisis have become in our day and age a predominant sign of the times. In response to this worrisome development official documents of the Roman Catholic Church, at various levels, have sought to address the growing ecological concern from the perspective of Catholic social teaching. Consequently references to ecology and environmental issues have surfaced in papal encyclicals during the last fifteen years generating national and regional responses. In the United States, for example, the U.S. Conference of Catholic Bishops has issued two pastoral statements on environmental issues in 1991 and 2001. Significantly, the Catholic Bishops of the Pacific Northwest, representing Canada and the U.S. have also issued a unique international letter focused on a particular ecological region—the Columbia River Watershed. What all of these efforts hold in common is the attempt to apply Catholic social teaching to a new and disturbing phenomenon in human experience. The result has been an expansion of Catholic social thought. What was once the "social question" has now become the social and "ecological question." This development, the effort to address ecology and environmental issues as ethical problems, is the focus of this paper. In particular this paper will link environmental and human ecology with the concept of sustainability, with the intention of proposing an interpretation of the common good and a definition of sustainability within Catholic social teaching.

The paper begins with an analysis of the science of ecology and the ecological processes that sustain the natural world. In contemporary

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discourse we are mindful of the fact that the term "ecology" is often used as a philosophical abstraction. It is our intention to emphasize that ecology is the scientific investigation of the interaction of organisms with their bio-physical environment, and that an adequate understanding of ecological processes is essential in the human endeavor to successfully develop specific ethical norms that guide our interaction with the natural world. In keeping with our attention to ecology, the paper also utilizes insights from the sub-discipline of human ecology. The focus of human ecology is the interchange between human and natural systems. It provides provocative insights into the nature of human relatedness with and impact on the natural world and a window through which the concept of sustainability may be configured. We will therefore discuss models of sustainability as an ethical praxis that has great potential for providing a foundation for re-structuring human systems to promote the common good and the common welfare of future generations.

Moreover it is also our perspective that human ecology offers unique hermeneutical lenses through which the Catholic principle of the common good may be interpreted in our present age. Consequently the paper provides a brief summary of the historical development and expansion of the common good within modern Catholic social thought from the point of view that it is a "dynamic" principle that must be applied to the social and ecological concerns at this moment in human history. Finally the paper concludes with an ecological interpretation of the common good and a preliminary attempt to define sustainability in light of the Catholic understanding of justice. Our hope is that this analysis will engender subsequent reflection and ethical action in the interest of justice, the universal common good and the integrity of God's creation.

ECOLOGY AND THE SCIENTIFIC PRINCIPLES OF SUSTAINABILITY

There is nothing mysterious or hidden about the fact that the natural world has been in significant decline in many ways for over a century, due to modifications and manipulations caused by human beings. In *Centesimus Annus* (1991), Pope John Paul II referred to "the ecological question" in terms of the impacts of consumerism, the resources of the earth, and the destruction of the natural environment.[1] This paper

[1] Pope John Paul II. 1991, no. 37.

recognizes and affirms the seriousness of the ecological question as a significant sign of our times and in our view it is best understood as a sequence of three interrelated questions. The first question is "What are the processes by which ecosystems are maintained, and what principles of ecological thought allow us to grasp the interconnected natural processes which human activities have impacted?" Secondly, "What is the current status of each of these fundamental ecological processes worldwide, and at what rate are things changing and projected to change in the future due to the activities of humans and their economies?" Thirdly, "What would human social and economic activities have to look like in order for us to achieve a sustainable relationship with the natural world, a relationship in which fundamental ecological processes are not deteriorating in either quality or extent, and where future generations will have sufficient resources to meet their needs and appropriate aspirations?" The first question reflects scientific knowledge that has grown dramatically over recent decades, the second question in isolation could lead to despair and negativism, and the third question is the informed possibility for an economic and environmental vision that we hope to highlight in this paper.

The ecological principles summarized below are essential for answering the first and second questions noted above. They include the following processes of the natural world:

BIOGEOCHEMICAL CYCLES

The cycles of basic molecules crucial to life such as Carbon (C), Nitrogen (N), and Phosphorus (P) involve chemistry, biology, and physics interacting on a complex global scale. Human activities have begun to imbalance these cycles, and early local consequences of these imbalances, such as the eutrophication of lakes due to excess N and P from fertilizer use or sewage effluent, have progressed to much larger manifestations of biogeochemical imbalance on a global scale. Examples include rapidly developing oceanic dead zones, increases in the frequency and severity of toxic algal blooms worldwide, and the many expressions of global climate change. Imbalanced biogeochemical cycles are now considered to be a serious threat to our capacity to continue as a civilization.

Inherent to these cycles are clear indications of limitations. For example, the ocean can only absorb so much N and P before near-shore oceanic areas where large rivers drain start to become seasonally, episodically, or permanently anoxic. Likewise the atmosphere can only

absorb so much CO_2 before global mean temperature increases, disrupting earth's climate. The operation of the hydrological cycle by evaporation, condensation, and precipitation is a very closely related issue. This is an instance of limits that is quite similar to that of biogeochemical cycles. There is only so much freshwater, rivers can only flow if they have snowmelt or rain to do so, aquifers only recharge at a finite rate regardless of how quickly water is drawn from them for irrigation or drinking. These geophysical limitations have ethical consequences relating to human population, consumption and waste.

BIOACCUMULATION OF PERSISTENT TOXINS

The fact that arctic predators like polar bears suffer from the accumulation of toxins used elsewhere on the planet, such as DDT, is an expression of what environmental scientists call biological magnification or bioaccumulation. Bioaccumulation is the process whereby toxic chemicals or heavy metals accumulate in animal tissue and organs. The related problem of bio-magnification refers to the progressive increase in the concentration of persistent toxins in animals as one ascends the food chain. This problem is exacerbated by the fact that many of the synthetic organic compounds invented by humans over the last century are fat-soluble. Because animals are very efficient at absorbing fatty materials from the food they consume, the ingested chemical compounds pass rapidly into body fat. As a result of bio-magnification, animals higher on the food pyramid, such as humans, are exposed to potentially dangerous levels of persistent toxins.

If pathways of exposure are broadened beyond what we think of as food webs to include exposure by breathing and water consumption, the polar bears are really no different scientifically from a discussion of increased cancer rates among farm workers exposed to pesticides, people in North America's "cancer alleys" such as Louisiana and the Great Lakes region exposed to industrial pollutants like polyvinyl chloride, and the developmental consequences of poor inner city children exposed to lead.

Rachel Carson's classic work published in 1962, *Silent Spring,* was a defining national moment when growing numbers of U.S. citizens became aware of the extent and implications of toxic exposure. It was the moment we realized that substances like pesticides travel dramatically from one organism to another in a way that is especially dangerous for

organisms at higher trophic levels. *Silent Spring* might be the moment that the environmental movement was born out of the field of ecology. In it Carson observes that

> These sprays, dusts, and aerosols are now applied almost universally to farms, gardens, forests, and homes-nonselective chemicals that have the power to kill every insect, the 'good' and the 'bad,' to still the song of birds and the leaping of fish in the streams, to coat the leaves with a deadly film, and to linger on in soil-all this though the intended target may be only a few weeds or insects. Can anyone believe it is possible to lay down such a barrage of poisons on the surface of the earth without making it unfit for all life? They should not be called 'insecticides,' but 'biocides'.[2]

HABITAT DIVERSITY, STABILITY, AND FOOD WEB RELATIONSHIPS

The stability inherent in complex ecological relationships, the stability provided by complete food webs, exists because of the capacity of plants, herbivores, predators, and prey to compensate for fluctuations of growth or reduction in numbers of any particular species' populations. This dynamic directly relates to the value of maintaining biodiversity. This is increasingly important in a world where habitat destruction, susceptibilities to pollution, and effects of invasive species may greatly diminish the numbers of any one species in a food web in an unexpected, sudden, and unpredictable pattern. Diversity in types of intact patches of habitat, combined with diversity in the biological community's resident in those habitat patches, is a requisite for preserving the stability and variety of life on our planet. G. Evelyn Hutchinson, the great British-American ecologist, considered by many to be the father of modern limnology, recognized the inter-species relationship of food webs a half a century ago when he observed that

> Biological communities do not consist of independent food chains, but of food webs, of such a kind that an individual at any level (corresponding to a link in a single chain) can use some but not all of the food provided by species in the levels below it. It has long been realized that the presence of two species at any level, either of which can be eaten by a predator at a level above, but which may differ in palatability, ease of capture or seasonal and local abundance, may provide alternative foods for the predator. The predator will therefore neither become extinct itself nor exterminate its usual prey, when for any reason, not dependant on predator-prey relationships, the usual prey happen to be abnormally scarce.[3]

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[2]Carson, Rachel. *Silent Spring.* Boston: Houghton Mifflin, 1962, 6-7.

[3] Hutchison, Evelyn G. "Homage to Santa Rosalia or Why are There so Many Kinds of Animals." *The American Naturalist* XCIII (1959): 145-159.

TROPHIC PYRAMIDS

A primary scientific fact is that biological life is all ultimately based on solar energy. Moreover, from a thermodynamic perspective a fundamental organizing principle of ecology is the observation that as one ascends trophic levels available energy is rapidly diminished. There can be more biomass present in plants than in herbivores, more biomass of herbivores than of carnivores, and so forth through higher levels in both natural ecosystems and human-managed situations. The higher up a trophic pyramid, the lower the efficiency of organisms in converting the initial solar energy into biomass, so that unbridled human production of higher trophic level food sources such as grain fed cattle or farmed salmon fed on pellets is especially demanding in terms of energy wastage. Even at one trophic level, variability in energetic efficiency exists. For example, it takes more feed grain to produce a pound of beef than a pound of pork, and more to produce a pound of pork than a pound of chicken. According to Lester Brown, "Cattle in feedlots require roughly 7 kilograms of feed concentrate per additional kilogram of live weight. For pigs, the ratio is nearly 4 to 1. Chickens are much more efficient, with a 2-to-1 ratio".[4] There are more calories available in grain than in any of the meats that can be produced indirectly from that grain. While protein rich foods like meat can have an important place in a healthy diet, consuming meat to excess can place a great burden on the planet in terms of the grain required to produce that meat. The environmental cost of the meat also includes the animal wastes and the water, pesticides, fertilizers, and fossil fuels required to grow, harvest, process, and ship the grain and subsequently the meat.

THE ECOSYSTEM CONCEPT AND ITS ECOLOGICAL SERVICES

The recognition that the important level of organization in nature is an ecosystem containing plants, animals, microbes, and all the physical factors of soil chemistry, and other abiotic habitat factors is a central principle of ecology. The origin of the ecosystem concept goes back to A. G. Tansley when in 1935 he observed that

> . . . the more fundamental conception is, as it seems to me, the whole *system* (in the sense of physics), including not only the organism-complex, but also the whole

[4] Brown, Lester R. *Eco-Economy, Building an Economy for the Earth*. Washington, D.C.: Earth Policy Institute, 2001, 158.

> complex of physical factors forming what we call the ecology of the biome—the habitat factors in the widest sense. It is the systems so formed which, from the point of view of the ecologist, are the basic units of nature on the face of the earth. These *ecosystems*, as we may call them, are of the most various kinds and sizes.[5]

Related to the ecosystem concept is the recognition of the ecological services that ecosystems provide. This notion has gained increasing appeal among some contemporary environmental scientists who, living in a commodity culture such as the U.S., want to highlight the essential "goods and services" of ecosystems upon which human existence is dependent. A good example of this is the fact that all oxygen in the earth's atmosphere comes from photosynthesis, consequently the forests of the planet are its "lungs" removing CO_2 and providing the O_2 required to support life. While this is an essential ecosystem service, it is nearly impossible to put a price-tag on O_2, but life could not exist without it.

Building on Tansley's ecosystem concept, the notion of ecological services accentuates the value of long-term stability of ecosystems to humans and the consequences of the hyper-instrumentalization of nature for short term harvest rates of resources. This concern was articulated by Eugene P. Odum, a leading figure in the development of modern ecology. In 1969 discussing the strategy of ecosystem development he summarized the idea of ecological services when he stated that

> Man has generally been preoccupied with obtaining as much "production" from the landscape as possible, by developing and maintaining early successional types of ecosystems, usually monocultures. But, of course, man does not live by food and fiber alone; he also needs a balanced CO_2—O_2 atmosphere, the climatic buffer provided by masses of vegetation and clean (that is, unproductive) water for cultural and industrial uses. Many essential life-cycle resources, not to mention recreational and esthetic needs, are best provided man by the less "productive" landscapes. In other words the landscape is not just a supply depot but it is also an *oikos*—the home—in which we must live. Until recently mankind has more or less taken for granted the gas-exchange, water-purification, nutrient-cycling, and other protective functions of self-maintaining ecosystems, chiefly because neither his numbers nor his environmental manipulations have been great enough to effect global and regional balances. Now, of course, it is painfully evident that such balances are being affected, often detrimentally. The "one problem, one solution approach" is no longer adequate and must be replaced by some sort of ecosystem analysis that considers man as a part of, not apart from, the environment. . . . Society needs, and must find as quickly as possible, a way to deal with the land-

[5] Tansley, A. G. "The Use and Abuse of Vegetational Concepts and Terms." *Ecology* 16 (1935): 284-307.

scape as a whole, so that manipulative skills (that is, technology) will not run too far ahead of our understanding of the impact of change.[6]

HABITAT FRAGMENTATION, DEGRADATION, AND HUMAN DEVELOPMENT

Human activities (urban sprawl, conversion of natural ecosystems to agricultural use, road construction, etc.) both decrease the surface area of native plant and animal communities that exist, and also fragment the existing natural areas into what are frequently unconnected "puzzle pieces" that no longer fit together or have any connectivity for animal migration. These isolated pieces of natural habitat take on the characteristics of oceanic islands in terms of the plants and animals that live in them, with areas of inhospitable or impassible terrain generally separating them. As habitat fragments grow smaller, species diversity declines, when organisms whose natural history requires a large home range or extensive migratory movements lose the ability to complete their life cycles.

There is much debate about optimal habitat fragment size when ecosystem reserves are being set aside for species conservation. While it is generally true that as habitat patches become larger the number of species they contain increases, local species distributions and the potential uses of migration corridors make attention to the details of the plants and animals in any area crucial where reserves are being considered. David Quammen offers a vivid example of habitat fragmentation likened to cutting up a fine Persian rug. In *The Song of the Dodo, Island Biogeography in an Age of Extinctions*, Quammen writes

> Let's start indoors. Let's start by imaging a fine Persian carpet and a hunting knife. The carpet is twelve feet by eighteen, say. That gives us 216 square feet of continuous woven material. . . . We set about cutting the carpet into thirty-six equal pieces, each one a rectangle, two feet by three feet. . . . When we're finished cutting, we measure the individual pieces, total them up—and find that, lo, there's still nearly 216 square feet of recognizably carpetlike stuff. But what does it amount to? Have we got thirty-six nice Persian throw rugs? No. All we're left with is three dozen ragged fragments, each one worthless and commencing to come apart.
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> Now take the same logic outdoors and it begins to explain why the tiger, *Panthera tigris*, has disappeared from the island of Bali. It casts light on the fact that the red fox, *Vulpes vulpes*, is missing from Bryce Canyon National Park. It suggests why the jaguar, the puma, and forty-five species of birds have been extirpated from a

[6] Odum, Eugene P. "The Strategy of Ecosystem Development." *Science* 164 (1969): 266-267.

place called Barro Colorado Island—and why myriad other creatures are mysteriously absent from myriad other sites. An ecosystem is a tapestry of species and relationships. Chop away a section, isolate that section, and there arises the problem of unraveling.[7]

CARRYING CAPACITY

The carrying capacity of an environment is the number of individuals of a given species that a defined environment can support indefinitely. Ultimately in nature the movement of energy into the biotic world by photosynthesis, the flow of energy through food webs, and abiotic factors like precipitation and temperature combine to produce carrying capacities that are both characteristic and either stable or cyclic within a normal range of variation. Carrying capacity depends on a wide array of factors (food supply, water supply, availability of shelter, etc.). As organisms become too numerous, an array of density dependant mortality factors emerge that reduce population growth levels and reduce overall numbers of individuals of a species present. The density dependant mortality factors include things like starvation, lack of water, enhanced spread of pathogens and parasites as population density increases, accumulation of waste products, lack of shelter, increased predator populations, and intraspecific competition. Human beings are not immune to these carrying capacity dynamics. With a present global population of roughly 6.4 billion humans, what is our ultimate carrying capacity, and how rapidly are we approaching it? For humans the answer to this question is complex and includes such factors as birth rates, death rates and rates of resource consumption. It is important to note that consumption of natural resources by humans in the northern hemisphere, who typically have low birth rates, far exceeds the rate of consumption of those living in the developing southern hemisphere. This is a serious ecological and ethical issue.

WATERSHEDS

Within any geographic region there are areas whose topography determines that they share the same stream and river drainage for precipitation running downhill towards the ocean. Such drainage basins are often referred to as watersheds. Within a watershed a number of distinctive biological communities may exist, as in the common pattern where grassy uplands give way to forested riparian zones along rivers,

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[7] Quammem, David. *The Song of the Dodo, Island Biogeography in an Age of Extinctions*. New York: Touchstone, 1996, 11.

but these are bound together by a common flow of life's most fundamental molecule**.** Historically, humans have settled and developed their large population centers along the coasts, on large lakes, or on rivers, depending on the availability of water for drinking, transportation, industry, irrigation, and waste disposal. Urban growth challenges watersheds around the world, as mega-cities place huge demands on watersheds that are no longer sufficient to meet increasing needs of growing populations**.**

Watershed level thinking is crucial, as the consequences of alterations to one part of a watershed will inevitably reverberate throughout the rest of the watershed. As the National Research Council of the National Academy of Sciences says

> Managing water resources at the watershed scale, while difficult, offers the potential of balancing the many, sometimes competing, demands we place on water resources. The watershed approach acknowledges linkages between uplands and down-stream areas, and between surface and groundwater, and reduces the chance that attempts to solve problems in one realm will cause problems in others. Watershed management is an integrative way of thinking about all the various human activities that occur on a given area of land (the watershed) that have effects on or [are] affected by, water.[8]

AN ECOLOGICAL DEFINITION OF SUSTAINABILITY

The ecological principles outlined above are essential characteristics when considering an environmental and scientific understanding of sustainability. Consequently, defined ecologically a sustainable situation exists when an ecosystem's energy flows and nutrient cycles are stable or fluctuating within a normal range of variability, when the species diversity and population levels of organisms are undiminished, when habitat diversity and the areas and connections of natural habitats are sufficient to allow organisms to carry out all stages of their life cycles, and when toxic materials are not accumulating in the soil, air, or water. Non-deterioration of the biotic and abiotic elements of an ecosystem is the hallmark of ecological sustainability; even a slow rate of progressive, directional deterioration will eventually overwhelm the capacity of any natural ecosystem to regulate its crucial characteristics within acceptable limits. Nevertheless, as crucial as the ecological understanding of sustainability is, the whole picture is incomplete without due consideration of human societies and economies and the largely

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[8]National Research Council. *New Strategies for America's Watersheds*. Washington, D.C.: National Academy Press, 1999,1.

detrimental impact on natural systems of human activities. This moves the analysis into the arena of human ecology, which can be defined as the study of the interrelationship between human beings and their bio-physical environment.

HUMAN ECOLOGY: THE IMPACT OF HUMANITY ON ECOLOGICAL PROCESSES

The ever-accelerating pace of fossil fuel consumption by human beings has produced the most obvious imbalance in a biogeochemical cycle, as increasing CO_2 levels destabilize our global climate. However, other, less obvious imbalances are beginning to become apparent. As a species we now use enough artificial fertilizer in agriculture and allow enough solid waste from our domestic animals and ourselves to escape into rivers and the ocean that the global N and P cycles are becoming out of balance. This is more severe to date for N because of our capacity to carry out industrial nitrogen fixation and fertilizer production (converting N_2 from the atmosphere into biologically available forms of ammonia, nitrite, and nitrate) but excessive mining of P has also begun to imbalance that cycle as well. Accumulating levels of N and P have choked lakes and ponds with a process of eutrophication for years, but now we see oceanic dead zones increasing in both spatial and temporal dimensions, and toxic algal blooms becoming more common. The oxygen starved dead zone, for example, in the Gulf of Mexico, produced by eutrophication caused by massive N and P runoff from America's agricultural heartland down the Mississippi River, grows steadily in its extent and annual duration.[9]

Other biogeochemical cycles, such as Calcium, Sulfur, Magnesium, and Potassium may be shifting out of balance as well.[10] These are huge cycles, whose recovery may take periods of time to ameliorate well beyond the span of the present and next several generations. All of the biogeochemical cycle imbalances share a common root misconception in their origins; we have been acting like the materials draining off land-

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[9] Rabalais, Nancy N., E. Eugene Turner, Dubravko Justic, Quay Dortch, and William J, Wiseman, Jr. *Characterization of Hypoxia: Topic 1 Report for the Integrated Assessment on Hypoxia in the Gulf of Mexico*. NOAA Coastal Ocean Program Decision Analysis Series No. 15. Silver Springs, MD.: NOAA Coastal Ocean Program, 1999, 6-33.

[10] Hungate, Bruce A., Robert J. Naiman, Mike Apps, Jonathan J. Cole, Bedrich Moldan, Kenichi Satake, John W. B. Stewart, Reynaldo Victoria, and Peter M. Vitousek. "Disturbance and Element Interactions." *Interactions of the Major Biogeochemical Cycles, Global Change and Human Politics.* Eds. Jerry M. Melillo, Christopher B. Field, and Bedrich Moldan. Washington, D.C.: Island Press, 2003, 47-51.

scapes, coming from smoke stacks, and effluent pipes "goes away." It is now clear that there is no "away" and that we have exceeded the capacity of the planet to dilute our waste materials without producing unintended ecological consequences.

On the issue of bioaccumulation of persistent toxins, the tens of thousands of synthetic organic compounds used and disposed of in our industrial society continually present us with surprises in terms of their persistence, toxicity, voyages through the ecosystem, and health consequences for us and for other life forms. This should come as a shock to no one, the consequences of chlorinated hydrocarbons like DDT in the 1960s and the events that took place at Love Canal, NY, were a wake-up call that we only very partially heeded. Consider for a moment a particularly troubling example of exposure recently made available by the Environmental Working Group (EWG). In a first-of-its-kind study of newborn infants, researchers with the EWG found pre-natal accumulation of 287 toxins in umbilical cord blood of children in the U.S., 180 of which are known to be carcinogens.[11]

While regulations about pesticide and herbicide use, industrial waste processing, and the utilization of other toxic compounds have improved since the days of Love Canal, we still license the release of toxins (by setting acceptable emissions levels for industrial facilities) and we know very little about the health effects of most synthetic organic compounds before we begin to use them. The cost of investigating these health consequences by animal testing prior to employing our inventions would be staggering, so we have come to tacitly accept the Frankenstein-like nature of our chemical industry. Some of what we invent serves us well, some of what we invent harms us brutally, and the costs are often borne disproportionately by workers in the chemical industry, and by the poor who live in inexpensive locations near industrial facilities or in third world countries with weak environmental legislation. A significant issue is the apparent inability of modern society to discriminate between "needs" and "wants". If we focused our chemical industry on developing and testing materials we need to produce food, fibers, medications, vital metals and plastics, etc., we would be dealing with monitoring a much more reasonable number of novel compounds. When we add to those necessary industrial products the materials needed to

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[11] Houlihan, Jane, Timothy Kropp, Richard Wiles, Sean Gray, and Chris Campbell. *Body Burden, The Pollution in Newborns*. Washington, D.C.: Environmental Working Group, July 14,2005,7. Available on-line at http://www.ewg.org/reports_content/bodyburden2/pdf/bodyburden2_final-r2.pdf.

make portable electric ice makers for picnics, luminescent cosmetics, brilliant yellow Hummers, flashing shoe lights, electric winders for self-winding watches, 20,000 BTU patio barbecues, and his-and-hers cappuccino machines, the multiplication of materials being invented to meet the ultimately insatiable appetites of an excessive consumerism mean we never have time or resources for caution in considering the consequences of what we synthesize and manufacture. Our own accelerating immodesty of consumption poisons us or someone else.

The issue of the insatiable appetites of an excessive consumerism requires further reflection. As noted above this is a serious ethical concern. Our accelerating rates of consumption in the Western World, the use of Western society as an economic model for the rest of the planet, and the detailed choices of what is appropriate to consume, must be examined. These choices are ones that increasingly have unintended consequences as human populations increase in numbers in most regions while human affluence increases in some areas. Disproportionate resource consumption and pollution production by industrialized societies, which generally have low population growth rates, mean that this component of the world reaps economic benefits while causing environmental consequences, often in distant locations from which natural resources are being harvested at unsupportable rates. For the West, consumption is the facet of society that needs moderation in order to ameliorate the environmental crisis. High population growth rates in regions like sub-Saharan Africa and parts of Asia pose their own challenge to the planet. In those areas where population may be doubling every 20 or 30 years, people are generally living at subsistence levels already, and drinkable water, farmland, firewood, and other resources are increasingly scarce on a per capita basis. These regions cannot decrease their per capita consumption rates significantly, nor can they continue to grow exponentially in their human populations without devastating their local ecologies.

The ecological impact of a regional population of humans on the planet is the product of their numbers multiplied by their individual consumption rates. People living at a subsistence level may have far less impact on the planet's air, water, soil, and other natural resources than a few people living an excessive lifestyle. Some areas of the globe, such as the northern hemisphere, are peopled by societies making enormous individual demands on a finite global ecosystem as their homes get larger, their cars become bigger, their fashions become outmoded and disposable more quickly, and the baseline for what is appropriate in terms of consumption levels creeps insidiously upwards. The culture of "supersizing", based on the generally unspoken premise that increas-

ing rates of consumption are of themselves a good thing, must be called into question. Our most successful economic models are predicated on continual growth in consumption providing an engine to drive human progress upwards in terms of employment, productivity, and affluence, but these models are unsustainable and strikingly non-ecological in their nature.

Ecosystems are stable because the flow of energy and nutrients is maintained by various homeostatic mechanisms within a normal range of fluctuation. The idea of unlimited economic growth is based ultimately on the premise that an infinitely increasing rate of productivity is compatible with a finite global supply of natural resources. This model provided by over-consuming societies is a dual threat to ecosystems and to global political stability. Add to this the legitimate aspiration of impoverished societies to emulate over-consuming societies in what they eat and how they live, and it compounds the threat. The combined phenomena of rapid population growth and over-consumption are a serious ecological concern that must be addressed by the world community. Clearly steps towards recycling, reuse, reduction and elimination of waste, are needed as human societies strive to become sustainable, that is, to learn how to live more like nature without impoverishing themselves or the future. The wealthy nations of the world are ethically bound to take the lead in this endeavor.

Watersheds deserve separate mention in terms of human ecology, because the present pattern of agriculture and development is so peculiarly out of touch with the reality of water supplies that it needs to be highlighted. In many locations around the world, crops are being grown that are inappropriate for the local availability of water. For example, rice production in the Central Valley of California is based on subsidized water pumped out of the Colorado River as part of a system that almost entirely consumes the water in the river before it reaches the sea. A particularly devastating example has been cotton production in the Aral Sea region of Uzbekistan and Kazakhstan, where extensive water diversion into unlined irrigation canals has led to the death not only of the Aral Sea itself but to extensive salinization of the surrounding soils as well as immense human suffering caused by airborne pesticide-laden dust from the former sea bottom.

In other areas we see rapid urban growth in arid regions where the negative impacts of increasing human population densities are being spread over hundreds or thousands of miles of land surrounding diverted rivers. In the U.S., Phoenix and Las Vegas are perhaps the

prime examples of watershed-blind development that is occurring elsewhere around the globe. Watersheds are real entities, and the fact that we ignore them is a major contributor to the newly minted expression "water will be the next oil."

If we accept Eugene Odum's observations, noted above, we as a species have never recognized the complexity of ecosystems, the essential services they provide, the vital need for conserving both biotic and abiotic ecosystem components for long-term stability, and the results of partitioning the world haphazardly by our development activities. We have taken for granted that the air will remain breathable, that water will run fresh and clear, that birds will return in the spring and salmon will return to spawn. If this has not been true in our communities, or in our region, we have believed that it was true somewhere. But the views of our planet from space show that our complacency is misplaced. Much of the northern hemisphere glows at night as our cities sprawl, the tropical forests diminish and burn as slash-and-burn agriculture spreads into what were strongholds of rainforest. On the opposite scale, microscopic samples of ocean water show algal diversity declining, and our fish communities are diminished as jellyfish and other "inedible" forms replace over-fished commercially valuable species. An intentional engagement with planning and economic activities at every level from the local to the global is vital if the irreplaceable ecosystem services upon which our lives rely are to continue unabated. Crucial to success in this venture is the realization that human ecology has implications at a progression of levels from small geographic units to continents. Integration of things like the planning of local parks, power plants, and reservoirs, is needed. The vertical and horizontal nature of the planning process we need to employ for achieving sustainability is both comprehensible and challenging. One way of grounding the nature and complexity of human ecology is offered by Mark Steiner. He states

> To understand human ecologies, the most relevant levels of organization include habitat, community, landscape, region, nation and state, and earth or ecosphere. These levels present different, yet interconnected, scales of analysis. Each level possesses a history and a literature of analysis and debate. The habitat includes the building and the lot. The community is comprised of buildings, lots, streets, and blocks. Landscapes can be urban, suburban, rural, and wild. Regions are hodgepodges of landscapes, while the distinctions between regions, and often those between states and nations, are even more blurred. But there is less ambiguity about the ends of the Earth.[12]

[12] Steiner, Mark. *Human Ecology*. Washington, D.C.: Island Press, 2002, 13-14.

Steiner's units or levels of human ecology—habitat, community, landscape, region (bioregion or ecoregion), nation-state, and planet—begin with the most basic and local form of human habitation and proceed outward in ever expanding but interrelated circles of human existence ultimately incorporating the entire earth. From a visual perspective, Steiner's levels of human ecology can be represented in the following manner (Figure 1).

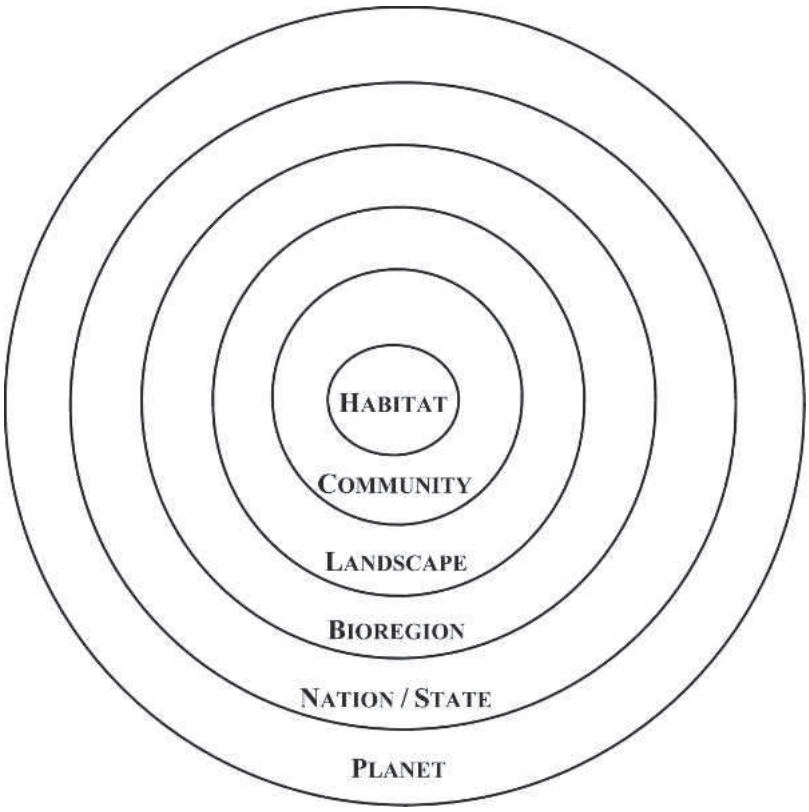

Figure 1. Concentric Circles of Human Ecology

Bear in mind that inherent to this model of human ecology, is the fact that ecological processes function at every level of human habitation. In Steiner's view, habitat, community, landscape, ecoregion, and planet can be regarded as independent yet interconnected ecosystems.[13]

The human impact in the U.S. on earth's Carbon cycle exemplifies the connectivity within Steiner's levels. At the local level of habitat, many

[13] Steiner, 24.

of us burn fossil fuels to heat/cool homes and businesses and we drive to and from work with fossil fuel burning vehicles. Combine that with population density and local weather patterns and that adds up to poor air quality and concomitant health impacts at the community level. Consider for example Los Angeles and Houston, cities according to recent EPA data that have the worst persistent air quality of any urban areas in the U.S. Now consider the impact on landscape and region of burning fossil fuels. One immediate consequence is acid precipitation, which has affected large areas of the east coast from New England south into the mid-Atlantic region. In addition to reduced visibility of the landscape, acid deposition in these areas reduces pH (increases acidity) of freshwater bodies and negatively impacts forest health and survivability. Compound this at the nation/state level where the U.S. has consistently refused to ratify the Kyoto Protocol and reduce fossil fuel emissions—no small matter when one considers the fact that 85% of the energy we consume is fossil fuel and, at about 5% of the world's population, the U.S. consumes 25% of the world's primary energy. Combine our fossil fuel consumption with everyone else on the planet and the result is a major impact on earth's carbon cycle with potentially devastating consequences. According to the Intergovernmental Panel on Climate Change's Third Assessment Report volume II, *Climate Change 2001: Impacts, Adaptation and Vulnerability*, the negative impact and vulnerability scenarios on human populations due to global warming and climate change, will be most acute among the world's poor in the developing countries of Africa, Asia and Latin America.[14]

A reasoned assessment of the human impact on earth's carbon cycle is that the current rate of fossil fuel consumption worldwide and especially in the U.S. is not ecologically sustainable. Nonetheless, ecological processes are only one component in the overall picture of sustainability. The underlying human drivers, that is, the social-economic institutions humans create, must be addressed if we are to realize an adequate understanding of sustainability. In this regard attention to human ecology is indispensable. As Steiner states, "We must understand the organization—the function, structure and process—of the communities that we inhabit in order to lay the foundation for the future."[15]

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[14] Intergovernmental Panel on Climate Change. *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. Eds. James J. McCarthy, Osvaldo F. Canziani, Neil A. Leary, David J. Dokken, and Kasey S. White. Cambridge: University of Cambridge Press, 2001, 915-959.

[15] Steiner, 11-12.

HUMAN ECOLOGY AND MODELS OF SUSTAINABILITY

All ecologies, whether biological or human, are about understanding relationships. In the case of human ecology the focus is on two sets of relationships. As noted earlier human ecology is concerned with the relationship or interaction between human beings and their bio-physical environment. Unlike environmental ecology, however, human ecology is also concerned with the interrelationship between human beings in the social systems they create and how those institutions interact with the environment. As Steiner states, "*Human* ecology extends how relationships occur in nature to human systems. . .".[16] In this perspective society, understood as a complex web of human behaviors and interactions that have become institutionalized over time, is a critical component for both the study of human ecology and an adequate understanding of sustainability. Within this complex web of human interactions, the economic institution proves to be particularly significant insofar as it is the primary producer of goods and services for society's consumption as well as the primary producer of society's impact on the bio-physical environment. Consequently it is our view that ecology, economy and society, and the interrelationships therein, are key characteristics from a human ecological perspective for adequately understanding and defining sustainability. This model of sustainability can be visualized by a Venn diagram (Figure 2).

Defining sustainability and sustainable, often used as an adjective to describe such things as development, society, economy, etc., has proven to be a difficult and mercurial task. By some counts nearly seventy definitions of the terms exist providing a wide range of perspectives depending on one's loyalties and ideological commitments. This suggests, in Mark Diesendorf's view from "down under" that "sustainability and sustainable development are contestable concepts . . . and . . . They cannot be defined in the same way that physical scientists might define the standard metre."[17] While there is a great deal of merit in Diesendorf's observation, we would argue that any suitable and acceptable definition of sustainability must address and attend to ecology, economy and society as a basic framework and model for understanding and achieving sustainability. With this in mind we offer the tentative working definition of sustainability as the ethical engagement and pro-

[16] Steiner, 24.

[17] Diesendorf, Mark. "Models of Sustainability and Sustainable Development." *International Journal of Agricultural Resources, Governance and Ecology* 1 (2001): 110.

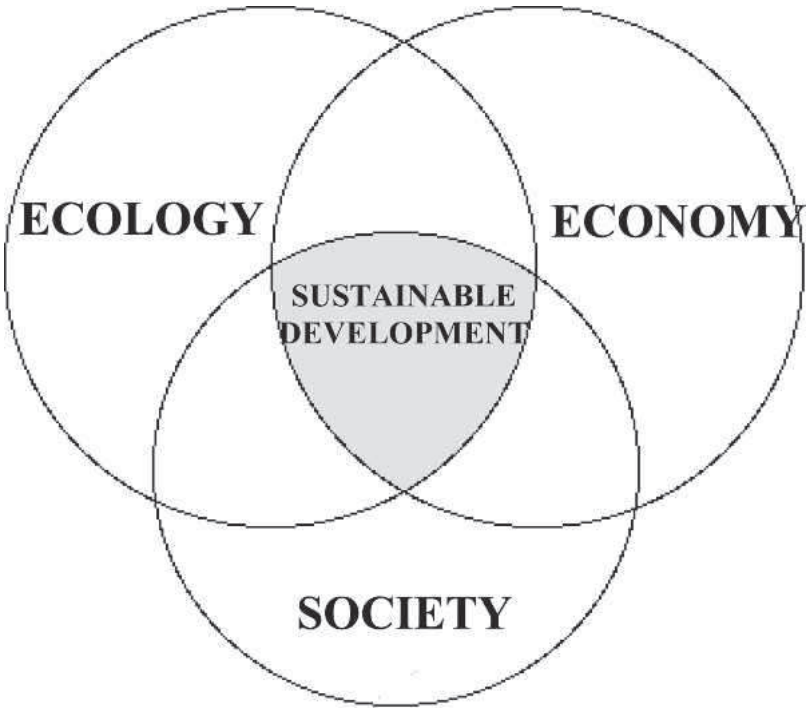

Figure 2. Ecology, Economy and Society Model of Sustainability

cess of achieving stability and non-deterioration of ecological processes, through the just and equitable restructuring of economic and social institutions designed to meet present needs without jeopardizing future human and non-human generations from meeting their needs. The image we wish to produce is balance, stability and equity within the complex web of relationships identified by ecology, economy and society with a definite future orientation. Moreover our definition of sustainability is applicable to each level of human ecology from the local habitat to the plant's ecosphere.

Writing from an Australian context and with the assumption that sustainability must incorporate the ecological, economic and social, Diesendorf makes a compelling case that if sustainability is to be implemented then criteria need to be developed. Calling these "measurable objectives" or "sustainability indicators" Diesendorf offers these examples (Table 1).[18]

[18] Diesendorf, 114.

Table 1. Examples of Some Measurable Objectives or Sustainability Indicators

'Ecological'	'Economic'	'Social'
Rate of materials' flow	'Genuine Progress Indicators'	Basic services within walking and cycling distances of dwellings
Rate of energy use	Distribution of household and personal income	Availability of day care
Total and per capita rate of greenhouse gas emissions	Percentage of income needed to pay for basic 'needs' of a person	Levels of education, including literacy & numeracy
Vehicle kilometers traveled per capita	Percentage of children living in households with no adult earner	Life expectancies at birth and at age 20
Human population and growth rate	Mortgage repayments and rents relative to median income region	Morbidity rates
Area of land degraded and polluted	Employment by top five companies in region	Crime rates
Water pollution		Homelessness
Air pollution		Teaching of indigenous languages in schools

While we acknowledge the significance of Diesendorf's insight and contribution to the discourse on implementing sustainability, we would adapt his criteria of sustainability indicators to include the following characteristics (Table 2).

Table 2. Characteristics of Sustainability Indicators

Ecological Processes	Economic Indicators	Social Factors
Biogeochemical cycles and impacts	Distribution of household and personal income	Minimum health care benefits availability
Bioaccumulation of toxins	Minimum wage issues	Urban livability and greenspaces
Habitat diversity, stability	Percentages of income needed to pay for basic needs	Availability of daycare
Food web relationships	Unemployment issues	Homelessness
Trophic pyramids and energy flow	Agricultural operations and organic farms	Levels of education and ecological literacy
Ecological services of ecosystems	Food delivery systems	Infant mortality and life expectancy
Habitat fragmentation	Number of sustainable businesses in region,	Hunger and food resources
Carrying capacity	Employment projections	Crime rates
Water quality/ watersheds	Potable water	Environmental health factors
Air quality		
	Type of Ethical Action Required	
Ecological Justice	Distributive Justice	Social Justice

These criteria are not intended to be comprehensive or inflexible but to provide the reader with concrete examples of what is meant by the ecological, economic and social dimensions of sustainability. Specific

nation-states and ecoregions would most likely have to adapt these criteria to suit their own national and local social, economic and ecological situation.

Another model of sustainability that merits serious scrutiny is one proposed by William McDonough and Michael Braungart in their book *Cradle to Cradle*. McDonough, an architectural designer from the U.S. and Braungart, a German environmental chemist formed a joint business venture in the mid 1990's with the vision of making children the standard for safety in industry. Consequently their principle "to love the children of all species for all time" is a working standard in their business enterprise.[19] What is unique and compelling about the McDonough-Braungart model of sustainability is that it is not an abstract theory or concept but an actual concrete model utilized in their business design process—what they refer to as their "triple top line" of Ecology, Equity and Economy. They created a visual model, represented below, that allows them "to conceptualize and creatively examine a proposed design's relationship to a multiplicity of factors. . ."[20] (Figure 3).

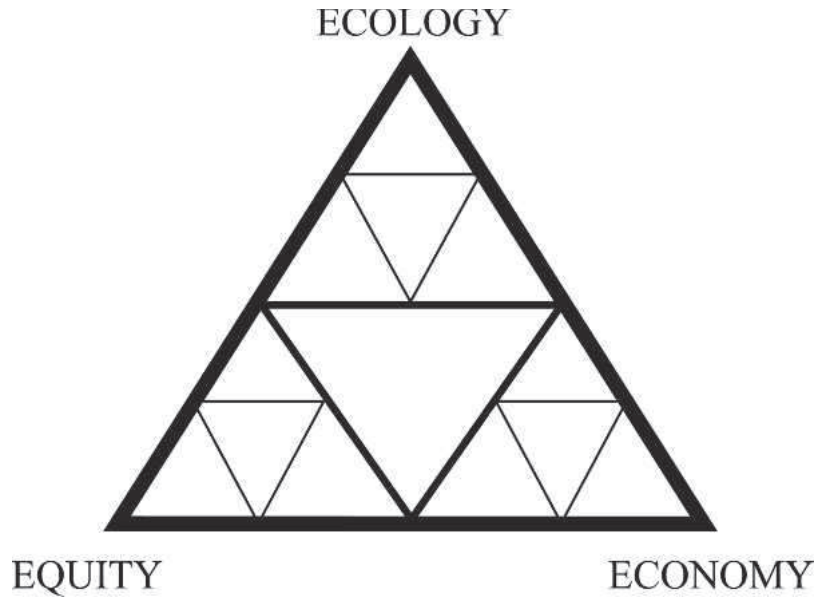

Figure 3. McDonough-Braungart Triangle Model of Sustainability[21]

[19] McDonough, William and Michael Braungart. *Cradle to Cradle*. New York: North Point Press, 2002, 14.
[20] McDonough and Braungart, 150-151.
[21] McDonough and Braungart, 150.

According to McDonough and Braungart, this "visualization tool"

> is based on a fractal tile, a form with no apparent scale that is composed of self-similar parts. . . The fractal is a tool, not a symbol, and we have actively applied it to our own projects, ranging from the design of individual products, buildings, and factories to effects on whole towns, cities, even countries. As we plan a product or system, we move around the fractal, asking questions and looking of answers.[22]

As business people McDonough and Braungart typically begin their process of analysis with the Economic sector and here they are, as they state, "in the realm of pure capitalism. . ." Consequently questions regarding profit, wealth and the "bottom line" are expected. As the process continues they move toward the Economy/Equity sector where questions of a social and ethical nature are relevant, such as "Are people treating one another with respect?" Here issues such as racism or sexism are relevant. As the process transitions into the Equity/Ecology sector McDonough and Braungart "consider questions of ecosystem effects, not just in the workplace or at home, but with respect to the entire ecosystem: Is it fair to pollute a river or poison the air?"[23] In the pure Ecology sector, McDonough and Braungart are moving in an entirely new and creative dimension of industrial design that may be described as "bio-mimicry," a process of design that intentionally attempts to mimic natural processes. In this category the ecological processes outlined previously are the baseline for analysis and discernment. From that point the McDonough-Braungart fractal process continues over again in an iterative manner. Their model is, in other words a heuristic and iterative process for visualizing and achieving sustainability within a business context.

It is important to note that Diesendorf and the McDonough-Braungart approach to sustainability are grounded in a clear ethical respect for humans and the natural world now and in the future. Also their models are applicable to the multi-layered understanding of human ecology as described by Steiner. The description of McDonough and Braungart's fractal process for achieving sustainability, quoted above, that it is applicable to individual products, buildings, cities and countries clearly suggest this. It is our view that these similar models and approaches to sustainability are applicable to many if not all human endeavors whether they are profit or not-for-profit enterprises. They could for example be applied to an Archdiocesan chancery build-

[22] McDonough and Braungart, 151.
[23] McDonough and Braungart, 152.

ing or to a parish complex or to an entire Episcopal region. That leads to the crux of our analysis: What exactly is the relationship between sustainability and Catholic social teaching? Our review of the documents pinpoints one—the U.S. Bishops' pastoral statement, *Renewing the Earth* (1991)—where the language of sustainability is used with considerable frequency. In fact in Section A, "Aims of This Statement," the Bishops state that one of its six goals is "To promote a vision of a just and sustainable world community".[24] As in most literature on sustainability, the term sustainable appears—approximately sixteen times—in *Renewing the Earth* as an adjective providing a descriptive modification to such things as economy, economic policies, global economy, agriculture, world and development. We, of course, applaud its utilization as it signifies an important development in the tradition of Catholic social ethics and theology. It is our view, through the lenses of human ecology that the most appropriate link with Catholic social teaching is with the central concept of the common good, an evolving principle and norm within this enlightened body of social teaching. In fact we will suggest that sustainability, as an ethical principle is one way of interpreting the work of repairing and maintaining the common good whether it is understood as a local, regional, national or planetary dimension.

THE COMMON GOOD AND HUMAN ECOLOGY

Derived and developed within the Thomistic and scholastic tradition the principle of the *bonum commune* or the common good is the hallmark of Catholic social teaching. Simply put this key ethical norm refers to the value or the sum-total of values that shapes the aim of all personal and social activity in a particular society. Typically linked on one hand with the doctrine of the *imago Dei* validating the intrinsic value and dignity of the human person, and on the other hand with the work of justice and the defense of human rights, the common good is the linchpin of Catholic social teaching and the most appropriate characteristic for developing an interpretation of sustainability within Catholic social and environmental ethics. This section is not intended to provide a detailed analysis of the common good but to identify key historical junctures that highlight the development and expansion of the concept in modern Catholic social teaching beginning with *Rerum*

[24] National Conference of Catholic Bishops. "Renewing the Earth: An Invitation to Reflection and Action on Environment in Light of Catholic Social Teaching." *Pastoral Letters and Statements of the United States Catholic Bishops*, Vol. 1989-1997, Ed. Patrick W. Carey. Washington, D.C.: United States Catholic Conference, 1998, 398.

Novarum (1891). From our review of the tradition it is obvious that the norm of the common good is an evolving and flexible principle that can and has been applied to multiple spheres or levels of human activity and that in the last fifteen years it has been interpreted and its meaning expanded in direct response to ecology and the environmental crisis. What follows is a historical summary of significant moments of development of the common good drawn primarily, but not exclusively from papal documents.

Rerum Novarum (1891)

Pope Leo XIII's encyclical letter on *The Condition of Labor* is usually seen as the foundational document in modern Catholic social teaching. Written in response to the distressing conditions of labor caused by rapid socio-economic change, this document defined the common good in terms of the nation-state and in reference to the rights of individuals. In David Hollenbach's interpretation of *Rerum Novarum*, the common good "consists in the mutual respect of rights and the fulfillment of duties by all citizens."[25] At this stage of development the common good meant the social constellation of individual rights and the state plays the "chief role" of ensuring the common good.

Quadragesimo Anno (1931)

Following Pope Leo XIII, Pius XI's letter *On Reconstructing the Social Order* continued to define the parameters of the common good in terms of the nation-state but with a particular emphasis on social and economic conditions. The significance of this papal encyclical is that Pius XI recognized that promoting the common good would require the restructuring of socio-economic institutions. In this regard the introduction of social justice—in relation to the common good—is a major development in the tradition of Catholic social teaching. Moved by the disparity between rich and poor caused by the Depression of 1929, Pope Pius XI wrote

> To each, therefore, must be given his own share of goods, and the distribution of created goods, which, as every discerning person knows, is laboring under the gravest evils due to the huge disparity between the few exceedingly rich and the unnumbered propertyless, must be effectively called back to and brought into conformity with the norms of the common good, that is, social justice.[26]

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[25] Hollenbach, David S.J. *Claims in Conflict, Retrieving and Renewing the Catholic Human Rights Tradition*. New York: Paulist Press, 1979, 49.

[26] Pope Pius XI. 1931, no. 58.

The significance of this papal letter lies in the recognition that human dignity is constituted by social systems—which in the case of *Quadregesimo Anno* the economic system is primary—and that in order to ensure the common good, these social systems need to be restructured and transformed.

Pacem in Terris (1963)

Pope John XXIII's encyclical, *Peace on Earth*, signifies another important developmental leap in the interpretation of the common good. In addition to articulating the first comprehensive list of human rights in Catholic social teaching, *Peace on Earth*, expanded the meaning of the common good beyond the nation state to include the entire human race. Finding expression in the language, "universal common good," Pope John, according to David O'Brien and Thomas Shannon, used the common good as a "principle of integration".[27] On one hand the common good is ensured when nation-states guarantee the totality of rights of individuals, and on the other hand it is also promoted in reference to the common good of the entire human community. By implication Pope John introduced the notion that the common good, as an ethical norm, may be applied to various levels of human activity whether it is the national or international field of social interaction. Re-iterating his definition of the common good from *Mater et Magistra* (1960), Pope John stated that "the common good of all embraces the sum total of those conditions of social living whereby men are enabled to achieve their own integral perfection more fully and more easily."[28] Linking the common good with all humanity prepared the way for subsequent developments in interpreting the common good during the Second Vatican Council and beyond.

Gaudium et Spes (1965) and Pope Paul VI

Those familiar with Catholic social teaching usually identify the Second Vatican Council as a highly significant development. Characterized by a fresh awareness of modern human interdependence, pluralism, and a historical consciousness, this development is perhaps best exemplified by the *Pastoral Constitution on the Church in the Modern World*, *Gaudium et Spes*. This document continued the identification of the common good with the entire human race but with a broader view of the

[27] O'Brien, David J. and Thomas A. Shannon, eds. *Renewing the Earth, Catholic Documents on Peace, Justice and Liberation.* Garden City, NY: Image Books, 1977, 122.
[28] Pope John XIII. 1963, no. 58.

complexity and historicity of its application. Consequently, the Council Fathers defined the common good as the

> sum total of those conditions of social life which allow social groups and their individual members relatively thorough and ready access to their own fulfillment, today takes on an increasingly universal complexion and consequently involves rights and duties with respect to the whole human race. Every social group must take account of the needs and legitimate aspirations of other groups, and even of the general welfare of the entire human family.[29]

Two encyclicals by Pope Paul VI, *Populorum Progressio* (1967) and *Octogesima Adveniens* (1971) continued in the same vain of thought as the *Pastoral Constitution* but added new dimensions to the requirements of the common good. While neither of these documents provided a full-blown definition of the common good, they did identify specific needs, the fulfillment of which are necessary to promote the common good on national and international levels. Hollenbach provides an excellent summary of the focus of these documents when he states that

> Pope Paul's social statements are shaped throughout by consciousness of the historicity of social institutions. They are also dominated by concern with transnational and international patterns of human interdependence. The problems of economic development, international economic relationships, and, above all, the poverty of developing nations are the central concern of these documents.[30]

In *On the Development of Peoples*, Pope Paul offered "a global vision of man and of the human race" by introducing the concept of integral development. The document argued that "There can be no progress towards complete development of man without the simultaneous development of all humanity in the spirit of solidarity."[31] *A Call to Action* re-asserted the need for full human development but also added several new insights to Catholic social teaching with significant ramifications for the evolving norm of the common good. First, *A Call to Action* explicitly addressed the "dynamism" of Catholic social teaching indicating that "It develops through reflection applied to the changing situations of this world" and, given its "rich experience" can undertake "daring and creative innovations."[32] Secondly, the encyclical acknowledged different but interrelated spheres of human community, and gave new emphasis to human interdependence on the international level, to which Catholic social teaching must be applied. Third, Pope Paul's let-

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[29] Second Vatican Council. 1965, no. 26.
[30] Hollenbach, 78.
[31] Pope Paul VI. 1967, no. 43.
[32] Pope Paul VI. 1971, no. 42.

ter was the first papal encyclical to identify environmental degradation as a new "wide-ranging social problem which concerns the entire human family."[33] These innovations prepare the way for the recognition that the bio-physical environment is incorporated into the common good in the social encyclicals of Pope John Paul II and eventually to the idea that the common good is planetary in its scope.

Pope John Paul II

With *Sollicitudo Rei Socialis* (1987) and *Centesimus Annus* (1991), we see an increased emphasis on universal interdependence and the inclusion of the "ecological question" into Catholic social teaching. In honor of *Populorum Progressio* and in keeping with its focus, Pope John Paul links economic development with ecological concern in *Sollicitudo Rei Socialis* by declaring "the need to respect the integrity and the cycles of nature. . . when planning for development. . ."[34] In making the case that "the moral character of development" requires "respect for the beings which constitute the natural world," Pope John Paul highlights three issues: 1) That humanity must consider the "mutual connection" of living and non-living aspects of the natural world as part of an "ordered system," 2) That some natural resources are non-renewable and must be made available to future generations, and 3) That society must be mindful of the consequences of "haphazard development" particularly in relation to industrialization and "the pollution of the environment, with serious consequences for the health of the population."[35]

In *Centesimus Annus*, Pope John Paul picks up the "ecological question" again and makes distinctions between environmental ecology, human ecology and social ecology. What is significant, however, for our analysis is the statement that it is the state's task "to provide for the defense and preservation of common goods such as the natural and human environments. ."[36] In its commentary on this issue, the *Compendium of the Social Doctrine of the Church* states that "Care for the environment represents a challenge for all of humanity. It is a matter of a common and universal duty, that of respecting a common good . . ."[37] Our interpretation concludes that the natural environment

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[33] Pope Paul VI. 1971, no. 26.
[34] Pope John Paul II. 1987, no. 26.
[35] Pope John Paul II 1987, no. 34.
[36] Pope John Paul II. 1991, no. 40.
[37] Pontifical Council for Justice and Peace. *Compendium of the Social Doctrine of the Church,* 2004, no. 466.

and its ecological processes is included in the common good and that the care of the bio-physical world is a moral obligation without which the common good can not be promoted or maintained.

U.S. Conference of Catholic Bishops

The analysis of the common good in Catholic social teaching would not be complete without a brief reflection on two important pastoral statements by the U.S. Catholic Bishops. In their first letter, *Renewing the Earth,* the Bishops provided new language and a new dimension to the common good when they referred to it as "The Planetary Common Good." In this section of the letter the Bishops acknowledge the evolving characteristics of the common good and make the point that the ecological crisis "has heightened our awareness of just how interdependent our world is."[38] Moreover this pastoral statement makes the claim that "The universal common good can serve as a foundation for a global environmental ethic."[39] The Bishops re-visit the same idea in their letter on *Global Climate Change* (2001). In their reflection on climate change and Catholic social teaching, the Bishops link the universal common good with climate, which is "by its very nature part of the planetary commons."[40] Re-affirming the linkage between the common good and the planetary commons, the *Compendium* provides an excellent summary of the progressive extension of the principle of the common good—from nation-state to planet—when it states, "The common good of society is not an end in itself; it has value only in reference to attaining the ultimate ends of the person and the universal common good of the whole creation."[41]

Our summary analysis of the historical evolution and expansion of the common good suggests the following conclusions. First, the norm of the common good in our present historical context must be understood and applied as an inclusive principle that embraces the bio-physical environment and the ecological processes that sustain the natural world and provides the support structure for all life, human and non-human. In theological language the common good embodies the entire commonwealth of creation. It does, of course, continue to apply to the

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[38] Carey, 407.

[39] Carey, 407.

[40] U.S. Conference of Catholic Bishops. *Global Climate Change, A Plea for Dialogue, Prudence, and the Common Good.* Washington, D.C.: United States Catholic Conference, 2001, 7.

[41] Pontifical Council for Justice and Peace, no. 170.

common welfare of humanity, but it recognizes that the well being of humans has relatively little meaning without due recognition of the ecological interdependence between human welfare and a healthy functioning planetary ecosphere.

Second, while the common good must be interpreted as an inclusive principle, our analysis strongly suggests that it is flexible and multidimensional and consequently, may be applied to various levels of human endeavor. This is certainly clear in our review of papal contributions to Catholic social teaching where it has been applied to human communities and social groups at national and international levels. The flexible adaptation of the common good is also quite evident in the regional pastoral letter of the Bishops of the Pacific Northwest, *The Columbia River Watershed, Caring for Creation and the Common Good* (2001). In this unique and creative application of Catholic social teaching, the Columbia River Watershed is defined as a common good wherein the principle of the common good is applied to an ecological region as well as local community and landscape. Addressing themselves to the communities within the Columbia Basin, the Bishops propose ten "Considerations for Community Caretaking" the first two of which are "Consider the Common Good" and "Conserve the Watershed as a Common Good."[42] Drawing on Catholic social teaching on private property the Bishops state that "We urge private property owners and all managers of public lands to be good stewards of God's land, to restore and conserve that land, and to promote human communities integrated with regional ecosystems."[43] As a common good, the Bishops note that "The Columbia River Watershed is home to people and to a variety of other creatures. This shared habitat needs to be nurtured and carefully conserved if all inhabitants are to live in an integrated and interrelated matter."[44]

With a great deal of sensitivity to the Catholic principle of the common good and ecology, the Bishops of the Pacific Northwest have skillfully crafted a pastoral statement that creatively links the common good with habitat, community and ecological region emphasizing the integration and interrelatedness of these domains of human and nonhuman habitation. Moreover, their pastoral statement provides an ex-

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[42] *The Columbia River Watershed: Caring for Creation and the Common Good*. An International Pastoral Letter by the Catholic Bishops of the Region. Seattle, WA: Columbia River Pastoral Letter Project, 2001, 13.

[43] *The Columbia River Watershed: Caring for Creation and the Common Good,* 13.

[44] *The Columbia River Watershed: Caring for Creation and the Common Good,* 13.

ceptional example of the flexibility and adaptability of the common good as an ethical principle that functions as an inclusive universal norm as well as a principle that may be applied to very specific levels of social engagement. In light of our analysis we are encouraged to suggest that, if interpreted through the lenses of human ecology, the common good may be visualized using Steiner's levels of human interaction with the natural world as an interrelated web of human relationships from the local habitat to the entire planet (Figure 4).

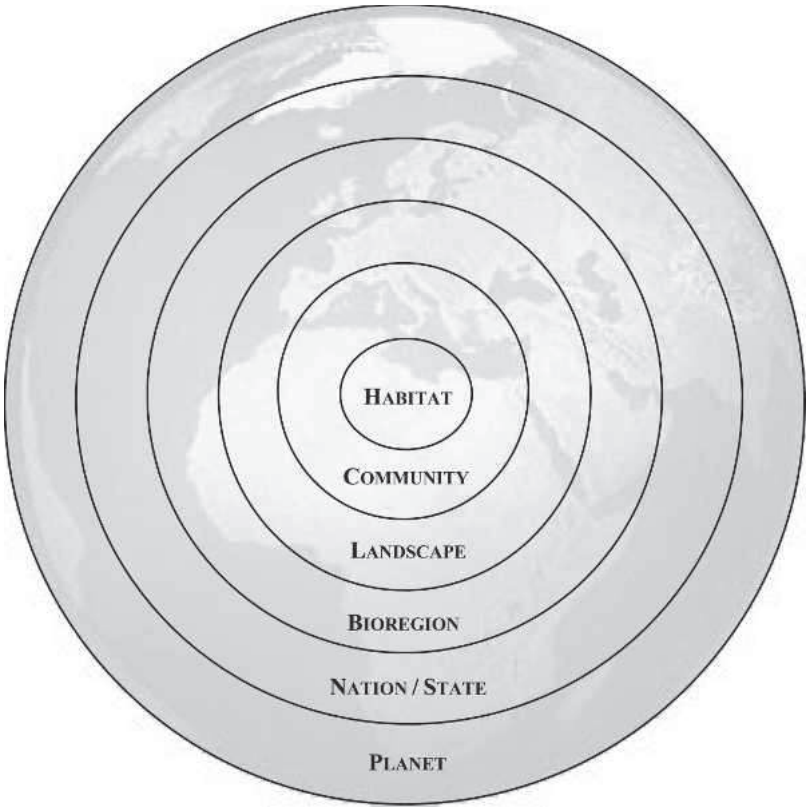

Figure 4. The Universal-Planetary Common Good

Our point is really quite simple. The common good as "the sum of those conditions of social life" that allow individuals and groups "ready access to their own fulfillment" has a profound ecological dimension reflecting the interrelatedness and interdependence of human persons in community as well as the interrelatedness and interdependence of human beings in their bio-physical environment. As a moral norm, however, the common good highlights the moral obligations human beings have to one another, society and the natural world in order to

respect and ensure human rights and the integrity of creation. In Catholic social teaching this is typically referred to as the work of justice. It is through the work of justice—in all its permutations—that the common good is promoted. This leads to our third and final conclusion, that sustainability as an ethical praxis is a new way of interpreting the work of justice within Catholic social teaching.

CONCLUSION: THE PRAXIS OF SUSTAINABILITY, JUSTICE AND THE COMMON GOOD

In Catholic social teaching justice is the means whereby individual rights are guaranteed and the common good promoted. Traditionally defined in three modalities, commutative, distributive and social, the work of justice is an integrating praxis where on one hand the rights and dignity of individuals are ensured and, on the other hand, social goods are equitably allocated and the social institutions necessary for their allocation exist and are properly ordered. In Hollenbach's analysis social justice in particular is an "aggregative principle" the measure of which "orders personal activities in such a way which is suitable for the *production and protection* of the common good."[45] Given the models of sustainability, previously noted in this analysis, the three-fold understanding of justice in Catholic social teaching is entirely consistent with the social and economic components of sustainability. In fact it is through the pursuit of justice that social and economic institutions are re-structured, if necessary, enhanced and maintained in order to ensure and sustain the rights of all. Nonetheless, given the ecological component of sustainability and our ecological interpretation of the common good, an additional modality of justice is required—the work of ecological justice. We believe the concept of ecological justice already exists, although in nascent form, in recent documents on Catholic social teaching that address the "ecological question." For example, the *Compendium*, quoted above, recognizes that "Care for the environment . . . is a matter of a common and universal duty. . ." Given our perspective in this analysis we propose that the work of ecological justice is the ethical duty and moral obligation of ensuring the integrity of creation through the restoration and maintenance of the ecological processes that sustain all life on this planet. Consequently, the praxis of sustainability must be considered an ethical duty and ought to be defined within Catholic social teaching as the work of commutative, social and ecologi-

[45] Hollenbach, 152.

cal justice, the meta-purpose of which is repairing, producing and sustaining the universal and particular common good for all life. Framed within the ecological-social-economic model of sustainability it may be represented by the following diagram (Figure 5).

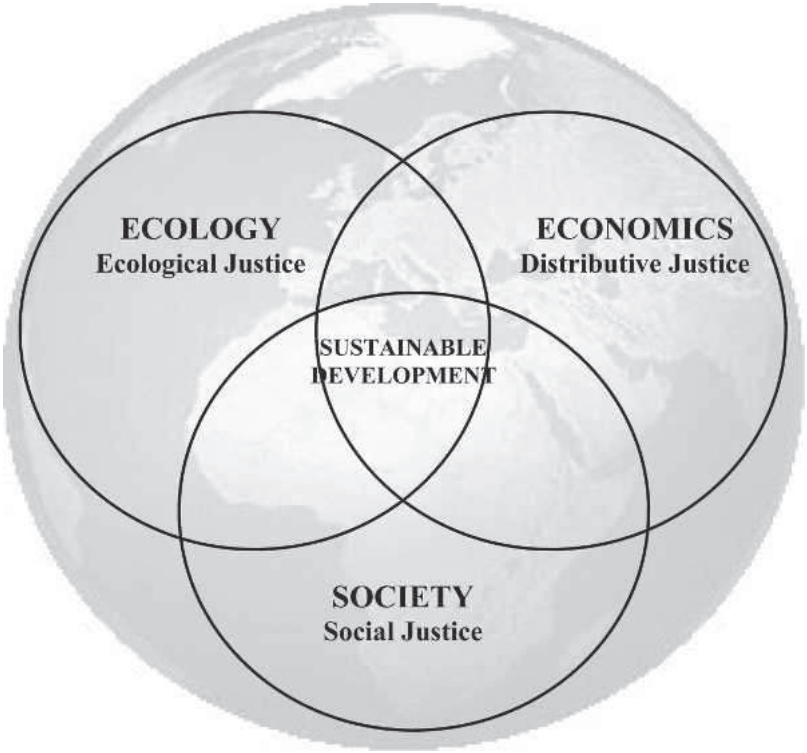

Figure 5. Sustainability, Justice and the Planetary Common Good

In concluding this reflection on ecology and the common good one final thought is in order. As a result of this preliminary analysis we find the ethical principle of sustainability to be entirely compatible with the broad framework of Catholic social teaching and in particular with the Church's evolving notion of the common good and its growing awareness of and attention to the ecological crisis. In our view this rich body of social teaching contains great potential for creating a platform and horizon for the formation of public policy on sustainability that the United States and the entire world require. The disruption humanity has caused to the earth's ecosphere is no small matter and if we are to avoid the potential for devastating consequences we must act with haste and a sense of urgency. We are reminded, therefore, of Pope Paul VI's *A Call to Action* in which Christians are urged to "take the initiative freely and to infuse a Christian spirit into the mentality, customs,

laws and structures of the community in which they live."[46] We are also reminded of the words of William McDonough that "all sustainability is local," therefore, wherever we find ourselves whether it be community, region or nation, let us embrace the work of sustainability in order to ensure the common good and create the possibility that the children of all species will have a promising and hopeful future.[47]

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[46]Pope Paul VI. 1971, no. 48.
[47] McDonough and Braungart, 123.

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