



Sustainable World Initiative

Policy White Paper

**Designing Environmental Governance to Achieve
True Sustainability and Long Term Global Prosperity**

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1. Abstract:

This paper offers general as well as specific recommendations to incorporate sustainability principles and macro-resource balancing into national and global governance systems.

To create a prosperous and truly sustainable future for all life on the planet, we must adopt the practice of living within our natural resource means. In other words, the total biological and geo-physical *demands* that result from the scale of anthropogenic activity must not exceed finite resource *supplies*. This macro demand vs. supply balance, referred to as *macro-balancing*, is central to the concept of sustainability, and is a requirement which must be evaluated and addressed if we are serious about protecting life for future generations.

Functional recommendations are offered for both national and international governance, including national sustainability evaluation and planning, and international macro-balancing support, monitoring, and goal setting. These recommendations are also organized into a specific ‘gap/opportunity’ analysis in context with the “Background Paper by the Executive Director” of UNEP, dated 17 May 2010. Although some recommendations directly or implicitly suggest *forms* of governance, the primary purpose of this paper is to highlight the *functional need* to incorporate macro-sustainability concepts into our systems of governance.

2. Introduction and Background:

Throughout human history, with the exception of only the last few centuries, there has been very little interest in global ecosystems and how human activity impacts natural environments. This is because the total scale of anthropogenic activity was always relatively small compared to the ‘boundless’ size of Earth’s oceans and terrestrial ecosystems. Within the last few hundred years, however, stimulated by the industrial revolution, exponential population growth, and game-changing technological advancements, the global human enterprise has grown to become the dominant player in the ‘power struggle’ with nature.

Within just the last few decades, the growth of the human endeavor has passed a major milestone, and caused a fundamental shift in the human relationship with nature.

(side margin emphasis box)

...within just the last few decades..... there has been a fundamental shift in the human relationship with nature.

The human species is clearly now demanding more ecosystem goods and services and taking more resources than nature can supply, and this ‘overshoot’ condition is getting worse with every passing year.

(side margin emphasis box)

...we now demand more from nature than nature can provide.

This fundamental change in our global condition is often described as moving from an “empty world” economic model, to natural resource “overshoot,” and it is a very important but not readily understood transformation. Climate change, peak oil, fresh water shortages, waste overload, and rapid bio-diversity loss are clear signs that we are over using nature’s finite resources, and have moved into global overshoot.

Sustainability can only be achieved if our resource demands are brought and kept in *balance* with, natural resource supplies. Unfortunately the current global overshoot condition represents a significant resource imbalance. It creates an unstable drawdown of planetary resources which can lead to economic and societal breakdown. If we want to protect life on Earth and allow future generations to enjoy healthy and fulfilling lives, the issue of overshoot must be addressed.

The solution to this global overshoot challenge is to broadly adopt the principles of macro-resource balancing and to apply them in our policy decision making processes. The solution will also require the incorporation of macro-sustainability evaluation, planning, and accountability functions into our national and international governance processes; the subject of this policy paper. Ultimately we must return human use of natural resources to within sustainable limits, and this must become a global priority.

Human welfare depends on both social and economic development, and both of these depend on a healthy system of natural resource goods and services. Therefore, future development of the human enterprise can only be done within the context of macro-resource balancing that is appropriately designed to adequately protect the planet’s natural resources.

3. Problem Statement:

As outlined in the introduction, the global human enterprise has grown to the point where we are now demanding more resources than planet Earth can sustainably provide. This fundamental global transformation to resource overshoot is a relatively new biological and geo-physical reality that poses a challenge to the long-term welfare of all life on the planet, including humans.

Since both economic and social developments are dependent on a solid foundation of environmental resources, it is critical that we address and correct this macro-sustainability problem. Unfortunately our existing national and international governance institutions are not currently designed to address macro-sustainability issues. Evaluation of environmental sustainability is not presently a function of either national or international governance, and our existing institutions and governing processes do not

answer such questions as: “Is our country (or the world as a whole) on an environmentally sustainable course?”

Today’s global reality is increasingly analogous to the problem posed by Garret Hardin in his “Tragedy of the Commons” essay written more than four decades ago (see appendix B for a more in-depth discussion of Hardin’s essay). The essence of the “Tragedy” is that individuals, acting rationally and in their own self interest, are driven to over-use open environments (the commons).

Humans have arbitrarily segmented the planet into autonomous sovereign states, and these nations act very much like individuals do in relation to a local commons. The commons, for this global analogy is the entire Earth, both its biosphere and its mineral wealth. The essence of this global tragedy is that nations acting today in their own selfish interests over-use, and consequently degrade, commonly shared resources (the global commons). In fact, in today’s overshoot world, the economically advanced nations all use significantly more resources than they have. Low income countries, on the other hand, typically don’t. However, as their populations grow and their consumption levels rise (as a result of desired economic development) they also tend to go into resource overshoot.

So to a large degree, the “Tragedy” applies today on a global scale, and this conceptual construct helps to explain an important aspect of today’s global environmental challenge. Individual nations, acting rationally and in their own self interest, are compelled to continually increase their use of resources, but in a finite world.

4. Proposed Solution (overview):

There is an old adage, which says that if you don’t know where you are going, any road will take you there. To correct overshoot, and to avoid continued ecological damage to the planet and harm to our posterity, we must know where we are starting from, where a desirable destination is, and we must have a plan that directs us along an appropriate route to this desired destination. As we proceed on our trip, we must also periodically check to ensure that we are correctly following the prescribed route. These four generic elements are required for any successful journey and can guide our thinking about how the world must proceed in response to the global resource overshoot challenge.

The prerequisite for our journey to global sustainability is that every nation must individually understand and adopt the fundamental principle of sustainability: living within our means. In other words, each nation must consume resources only at a level that can be supported by the resource capacity within its sovereign territories. Adopting this principle will not be easy. Politically motivated resistance to adoption will certainly arise, but the principle must ultimately be embraced and fully complied with in order to achieve success on a fully aggregated global scale. Once the basic sustainability principle is adopted, each country must plot its own course for achieving sustainability. Specifically, each nation must do the following:

1. Evaluate its existing macro resource balances and sustainability position;

2. Develop alternative future sustainable living scenarios;
3. Select and establish one scenario as a national goal;
4. Design, adopt, and implement national policies in support of this scenario goal; and
5. Periodically assess progress toward achieving the national sustainability goal.

National adoption of the basic sustainability principle of living within the resource means of sovereign territories does not mean that nations can no longer engage in international commerce. It only requires that the *total* resource demands by a nation's citizenry (regardless of where in the world they might physically occur) are less than or equal to the nation's *total* resource capacity. The nation's total demand/capacity balance must be adjusted by the net amount of resources that are embodied in international commerce.

Evaluation of sustainability, utilizing macro-resource balancing, is an activity that must be done at the national level and in context with the respective resource capacities of each national entity. Such evaluations will be technically challenging for many national governments. International governance should be designed to efficiently meet this challenge by providing technical support and global standardization of sustainability evaluations, as well as performing other needed functions such as international resource allocations, monitoring, planning, and global resource goal setting. International governance will also need to help nations allocate and peacefully resolve resource issues that arise from spatial incongruities between national boundaries and more naturally occurring ecological system boundaries (e.g. allocated fresh water rights to sovereign territories that exist within larger topographical watershed boundaries).

5. Proposed Solution (in detail):

As outlined above, the global economy is not sustainable at current levels of population and consumption, and this global resource imbalance is becoming more severe with time. It is now acknowledged that our global 'business as usual' is leading us on a collision course with nature and that we are undermining the resource assets of the planet which are foundationally necessary for social and economic development. To deal with this reality and global crisis, and to ensure a truly sustainable future for the world, we must address the total biological and geo-physical balance between what humans and other species demand of nature, and what nature can provide. Creating and preserving an appropriate macro demand vs. supply balance is a critical requirement of sustainability and the long-term viability of the planet.

It follows that a most critical need within the context of international environmental governance (IEG) reform, and a most desirable outcome for the Rio+20 Earth Summit, is that we make macro-sustainability central to our current and future thinking, and that all nations agree to a global plan that takes the world in the direction of a more balanced and sustainable future. Such a plan will require both national and international action and a new approach to environmental governance.

A. National Sustainability Governance:

Each nation must individually embrace the broad concept of sustainability (living within our means) and commit to a program of action which results in continuous macro-balance improvement. This commitment will require a robust scientifically-based sustainability planning effort, and for most countries this will mean creating a new national sustainability institution, or at least a new sustainability focus within an existing institution. It will require new evaluation processes, periodic reporting, and a commitment to adopting national policies that promote self sufficiency within the natural resource limits of each respective sovereign territory.

Each nation, under our global governance system of national sovereignty, has the right and responsibility to manage their respective populations, consumption practices, technology investments, and economic institutions in a manner that is consistent with the limits of their natural resources (or more accurately their total natural resource assets as supplemented by legitimate international agreements). Each sovereign nation, through national policy promulgation, implementation, and administration, controls its resource demands and its effective resource capacity. Each nation knows its own societal and cultural needs, and has the right to determine its own unique path toward sustainability. Consequently it is at the aggregated level of **national governance** that most of the sustainability work must be done.

B. International Sustainability Governance (ISG):

There are six important functions of international sustainability governance:

1. Support of national sustainability efforts - Nations will require scientific, policy, and administrative support to evaluate, report progress, and move in the direction of macro-biophysical sustainability within their respective sovereign entities. An international sustainability institution is needed to provide scientific as well as policy guidance in support of these national sustainability efforts, and to provide universally acceptable sustainability standards.
2. Allocation of international resources - Certain resources are spatially outside of national boundaries and are considered part of the global commons, most notably ocean resources including international fisheries and the ocean's carbon sequestration capacity *1. All such international resources must be allocated to individual sovereign states so that they are realistically included in national sustainability plans and goal setting. If international resources are allocated in this manner, then national sustainability plans can be aggregated to produce a viable global sustainability scenario.

Note 1: The majority of CO₂ sequestration capacity is not in this category because the predominant sequestration mechanisms are land-based, and therefore controlled by the actions of sovereign governments.

3. Global management of waste loadings – Toxic waste loadings cannot be managed within a national ‘balance with nature’ framework for a number of reasons. First, the long term capacity of the biosphere (along with the lithosphere) to assimilate toxic and other difficult anthropogenic waste streams is not clearly understood. Second, many (if not most) toxic wastes migrate beyond national boundaries, and we are not able to accurately account for this migration. Third, in order to manage by balancing it is essential that we are able to reasonably calculate an anthropogenic **demand** (human waste output), and compare it to the assimilation **capacity** of natural ecosystems. The former we can probably do by reporting and aggregating point source emissions, but the latter is virtually impossible. We simply do not know, and cannot calculate with required degree of precision, nature's capacity to assimilate our toxic waste loadings. These realities make it clear that we must regulate toxic wastes at the international level and address the threats posed by them in much the same way that we dealt with threats to the world's ozone layer, and in a manner consistent with the precautionary principal for the long-term benefit of all nations. [Note: This ISG function applies for persistent toxic wastes and does not apply to humanity's largest waste stream; CO₂. CO₂ emissions can be managed by individual nations within a renewable resources ‘balancing framework,’ because we are able to calculate CO₂ **demand** (by aggregating point source emissions) and also calculate the carbon sequestration **capacity** for individual sovereign territories.]
4. International sustainability goal setting - Although each sovereign country will independently chart its own course toward the goal of national macro-sustainability, and achieve progress along its respective path (see section A. above), progress for the world as a whole may be insufficient to reasonably ensure the future viability of global ecosystems (e.g. excessive planetary warming or ocean degradation). Therefore sustainability goal setting must also be done at the global level. The international sustainability institution must solicit appropriate scientific advice, and periodically develop sustainability goals and targets. This international body will also be responsible for overseeing international efforts or negotiations aimed at encouraging or facilitating international action on sustainability.
5. Global sustainability monitoring - Global sustainability can best be evaluated and achieved via aggregation of national sustainability efforts. The international sustainability institution, as an international watchdog, must monitor and ensure progress of individual national efforts, and report progress (or non-compliance) to appropriate international forums.
6. Forum for international resource agreements – Many nations will not be able to achieve balanced resource plans within the natural resource constraints of their sovereign territories. Therefore they will need, at least for some period of time, to acquire legitimate rights to resources from other nations. The international sustainability governance function should provide a forum for the negotiation of

such resource treaties and agreements, and promote transparent international dialog about global resource demands, capacities, and sustainability trends.

6. Detailed Recommendations in a Gap/Opportunity Format:

(Offered in context with the “Background Paper by the Executive Director” of UNEP, dated 17 May 2010.)

GAP 1. Evaluation and Reporting of Macro-physical Balances

The primary shortcoming of the existing international environmental governance (IEG) system, and the proposed IEG reforms, is a lack of macro bio-physical balance evaluation and progress reporting. We are essentially ignoring the most important foundational requirement of sustainability; living within the finite resource limits of the planet. Without evaluating where we are (or in what direction we are going) on the ‘roadmap to sustainability’, we will never reach our desired destination. Social and economic development cannot be achieved without complying with this finite and foundational resource reality.

A minimum requirement for sustainability is that total human and non-human biological and geo-physical demands are equal to or less than what nature can provide. This macro-balance must be addressed by all sovereign states (and the world) in order to ensure that we are not ‘drawing down’ natural resource assets, and indeed have a sustainable future.

Opportunity 1A. National Sustainability Evaluation and Reporting

We propose that each and every sovereign nation of the world conduct sustainability evaluations, report national trends, and develop national sustainability plans for their respective countries based upon macro-resource balancing. Each nation should address the critical questions:

1. *Are we on a sustainable course?*
2. *If not, what does a sustainable future scenario look like for our nation?*
3. *What is required to transition to this more viable future scenario?*

Opportunity 1B. Create a World Sustainability Organization

We propose that a specialized international agency be established to support the national sustainability efforts outlined in paragraph 1A. This world sustainability organization would also oversee or directly administer the six international governance functions listed above (pages 7-9).

GAP 2. No International Sustainability Treaty

Another major shortcoming of existing IEG structure and the proposed IEG reforms is the lack of a global sustainability agenda. In numerous ways the world is addressing ‘sustainable development’ issues and realities (e.g. a “greener” economy or

sustainable production and consumption) but we are neglecting the critically important macro bio-physical balancing element that is central to sustainability.

Since global resource balancing is derived by aggregating national balances, and since sovereign rights and responsibilities are generally acknowledged and respected in our current international governance system, it follows that an international sustainability agreement is required.

Opportunity 2A. International Sustainability Treaty

We propose that an agreement be drafted and ratified through an appropriate UN process, which would establish a global sustainability mandate, and encourage all nations to do sustainability evaluation, reporting, and planning (see 1A above). Such a treaty would unite the world under the general principle of individual responsibility (of sovereign states) for the collective (global) good.

In order to achieve global sustainability, each and every nation of the world must adopt the guiding principal of living within the resource limitations of its own sovereign territories. Universal adoption of this guiding principal is a necessary first step on the path toward a peaceful, healthier, and more prosperous global future.

GAP 3. Segmented Approach to Environmental Science and Governance

National entities as well as international institutions tend to review or address environmental issues and challenges in a segmented or issue specific fashion. A classic example of this is the global warming and climate change (GWCC) challenge that the world faces. The IPCC has extensively evaluated this subject. Numerous examples can be cited of both national and international GWCC policy proposals, most of which address the GWCC issue in relative isolation. GWCC, however, is only one of many interrelated environmental challenges that the world faces. Fresh water scarcity, over-population, fishery collapse, and biodiversity loss, are just a few examples of some other significant environmental challenges. The ultimate solution to all of these challenges is that we make sustainability (and living within planetary limits) central to our thinking and to IEG.

Opportunity 3A. Integrated Sustainability Balancing

We propose that more emphasis be placed upon integrated macro bio-physical sustainability balancing and evaluation as a necessary focus for national and global action. The current international focuses on MDGs, agenda 21, and the MEA evaluation processes are very important. However, they don't address the total supply/demand balance issue, and thus they cannot answer the question; "Are we on a sustainable course?" We can only answer this question if we focus on macro bio-physical balancing.

Beyond answering the above question, we wish also to ultimately create a healthier and more prosperous sustainable future for all life on the planet. We can only do this if we fully understand planetary resource limits, and operate within these limits.

In an over-subscribed resource world, it is especially important that we address global challenges in an integrated fashion. Otherwise we will find that solutions to one challenge can easily exacerbate another (e.g. more food production can destroy forest habitat which jeopardizes bio-diversity preservation and carbon sequestration capacity).

Opportunity 3B. Improving the science of sustainability

Fortunately, the sciences of ecological accounting, non-renewable resource evaluation, and waste assimilation and health dynamics, are advancing rapidly. We can now determine with increasing accuracy, such things as greenhouse gas emission limits, energy supply “peaking,” and the extent of total anthropogenic demands on nature. And better yet, we can use these metrics to put real mathematical substance to the critical global issue of living within planetary means. We propose that all IEG reforms include a strong emphasis on integrated sustainability evaluation, and that the advancement of sustainability science be made a high development priority.

Opportunity 3C. Worldwide Use of Existing Science and Methodology

The science and methodology of ecological accounting is already well established and being practiced in many countries of the world. This is just one example of an existing and sufficiently robust methodology that answers sustainability questions and highlights sustainability issues. This science could readily be transferred to other nations of the world, easily improved upon (through individual country specific reviews to improve all of the national ecological accounts) and readily applied globally. IEG should support the early use, improvement, and global application of this and other promising sustainability methodologies.

GAP 4. Science to Policy Linkages and Educational Shortcomings

There is an educational and policy gap in today’s world that is caused by a fundamental shift that has occurred in the global balance between human societal demands and environmental capacities. In the early part of the last century anthropogenic demands on nature were comfortably below nature’s capacity to provide. We could expand our economies and societal institutions as we pleased, and not worry about the availability of sufficient natural resources to support these expansions. Economists could reasonably think in terms of an ‘empty world’ economic model. But in the last half of the 20th century, with expanding human numbers and strong global economic growth, the anthropogenic scale of activity became so large that total human demands on nature began to exceed nature’s capacity. This global imbalance, often referred to as ‘overshoot,’ has grown significantly worse in recent years, and shows no signs of abating.

Our educational institutions and policy making processes, by in large, have not ‘caught up’ with the implications of this fundamental shift from an ‘empty world’ to an ‘overshoot’ capacity constrained world. Natural resource constraints in any overcapacity scenario means that when any person or human institution makes a decision, this decision will result in a resource demand change that impacts upon another individual or institution. This global zero-sum situation has many policy ramifications. For instance, the ‘economic growth as a solution’ paradigm must be reconsidered because never ending total growth cannot be sustained on a planet with finite resources.

Opportunity 4A. Strengthen science/policy interfaces to account for macro-sustainability

By developing the science of sustainability (opportunities 3A, B, and C) and requiring international sustainability reporting (opportunities 1A and B) we will create a stronger factual base for informed decision making and policy direction. To maximize the value of this new information base it will be important to enhance the science/policy interface by relating sustainability data and trends to individual policy decisions. We already understand the major factors that are causal to environmental impact (population numbers, production and consumption practices, technology, and economic processes). The challenge will be to connect the body of enhanced sustainability knowledge and perspective, to the many and usually segmented individual policy arenas (e.g. energy, labor, finance, etc.).

Opportunity 4B. Incorporating macro-sustainability into educational curriculum

There is a substantial need and sizable opportunity to make educational institutions (and their curriculums) more relevant to today’s global realities. The fundamental global shift outlined above is often not recognized by many established and respected educational institutions. Even many relatively progressive institutions that have recognized the importance of ‘sustainable development’ in their curriculums, do not address the broader issue of sustainability. So, to a large extent, educational institutions are not responding to the many implications of global resource ‘overshoot.’

We believe that a very legitimate function of improved IEG would be to promote sustainability education.

7. Appendixes:

Appendix A – Definition of Sustainability

The people of the world use the word sustainability in many ways, so it is important to establish clarity about its usage in the context of international governance. **The basic concept of sustainability is that we must live within our natural means.** In other words, our total biological and geo-physical demands must not exceed the finite resource supplies of the planet. This macro demand vs. supply balance is central to the concept of sustainability, and a requirement that must be evaluated and complied with if we are serious about protecting life for future generations.

Sustainability is different from ‘sustainable development’. The multitude of ecologically efficient projects, programs, and development initiatives throughout the world that exist under the rubric of sustainable development may contribute to a more sustainable world, but they ignore the question of biophysical limitations: the equivalent of advocating for efficiency in the corporate world without any reference to the bottom line. In the business world, it does no good to be more efficient, but still bankrupt. In the natural world, it does no good to be more sustainable at the micro level, but still unsustainable at the macro level. While supporting more ‘sustainable’ practices, we must also evaluate the macro bio-physical situation and operate within the finite resource limits of one planet.

The above definition of sustainability focuses specifically on biological and geo-physical resources, and the necessity to preserve these ‘foundational’ resources. Sustainability can certainly also be defined in context with social and economic development parameters, but this is not the focus of our initiative. Many other organizations throughout the world are addressing social and economic development issues in a very competent manner. However, very few organizations or initiatives are addressing the basic fundamental sustainability issue of balancing total resources. Nature will not compromise on this requirement.

Appendix B - True prosperity rather than a global ‘tragedy of the commons’

The only true prosperity is sustainable prosperity. The late Professor Garret Hardin of the University of California at Santa Barbara wrote an article entitled; “The Tragedy of the Commons,” which was published in Science Magazine in 1968. This work was widely acclaimed at the time by environmental activists, as well as professionals in ethics, philosophy, sociology and many other fields.

Despite its reception as somewhat revolutionary, the ideas expressed in Hardin’s “Tragedy” were not original, and can actually be traced back to ideas expressed by Aristotle who wrote that; “what is common to the greatest number has the least care bestowed upon it.”

Hardin, however, offered a very comprehensible and compelling description of the “tragedy of the commons,” and his article made a timely contribution to the burgeoning environmental movement. It continues to serve as a useful conceptual construct in explaining why humanity continues to take our anthropogenic enterprise to the brink of environmental catastrophe.

Hardin’s parable postulates a pasture equally accessible to all herdsmen who wish to put cattle on it. Each individual will try to maximize his personal economic revenue by putting as many animals on this “commons” as he can. This open utilization scheme will work without a problem until the commons reaches its natural carrying capacity. At this critical point in time, however, when social stability is most needed, “the inherent logic of the commons remorselessly generates tragedy.” Hardin goes on to explain this as follows:

“As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, “What is the utility *to me* of adding one more animal to my herd?” This utility has one negative component and one positive component.

1. The positive component is the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.
2. The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all herdsman, the negative utility for any particular decision making herdsman is only a fraction of -1.

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another.... But this is the conclusion reached by each and every herdsman sharing in the commons. Therein is the tragedy. Each man is locked into a

system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons.”

Hardin’s tragedy can be demonstrated with simple mathematical models, and the concept holds true for a variety of alternative scenarios. For example, one could assume that the total capacity of the commons will remain at a fixed maximum yield, regardless of how many animals are grazing. Alternatively one could reasonably assume that the total capacity will actually decline over the years, as over-grazing degrades the land. For the first scenario, the total fixed annual capacity is allocated evenly over the total number of cows, and the individual herdsman will observe an ultimate weight loss in his animals which is proportional to how dramatically the commons becomes over-subscribed. In the latter scenario, the individual herdsman will observe an even greater animal weight loss because the commons also becomes progressively less productive over time. In both of these scenarios, however, the individual herdsman, acting in his own self interest, will still be compelled to add more animals to the commons.

Hardin, in addition to describing the tragedy, offers some relevant observations and conclusions:

1. There is a class of human problems which can be called, “no technical solution problems.”
2. The “(human) population problem” is a member of this class.
3. The social arrangements that produce responsibility are arrangements that create coercion, of some sort.
4. Mutual coercion, mutually agreed upon by the majority of people affected, can be an acceptable (although not liked) scenario for solving societal problems.

Hardin clearly recognized the limits to growth for the total human enterprise. Although the subject of his parable is limited to one common grazing area, he extends this micro “Tragedy of the Commons” to humanity’s macro “population problem,” and offers a solution that falls within the purviews of ethics and societal structure. His solution is to manage the common resource rather than leaving it as open access land (a structural change). Proper management, as it plays out, will require allocations and a restriction of freedoms for all herders.

Today’s global reality is analogous to Hardin’s “Tragedy”. Instead of herdsmen, we have individual nations acting in their own self interest. Instead of a common grazing field, we must consider the total (and limited) global supply of natural resources available on planet Earth as the ‘commons’. Sovereignty, and the human practice of dividing the Earth’s common resources into nationally controlled sovereign territories, does lend a bit of confusion to this scaled up analogy. However, in practice, the global analogy is still sound. This is because all nations tend to exploit resources from beyond their national lands. Greenhouse gas emissions are a good example of this. An emission load from one country is automatically transported by the Earth’s atmosphere to all forests and other Earthly carbon sinks including the oceans. International trade is another way that natural

resource utilization crosses national boundaries. Goods that are produced and shipped internationally contain embodied natural resources derived from the producing country. The nation that acquires and consumes these goods, is in effect consuming the natural resource assets of the producing nation.

In today's overshoot world, economically advanced nations tend to use more resources than they have. From a renewable resource perspective these countries are called ecological debtors. Ecological creditor nations, on the other hand, don't currently over-consume their total natural resources. However, this is typically because these highly populated nations have very low average living standards, and the resulting low per capita consumption levels offset the effects of over-population. As the populations in these nations grow, and as they naturally seek to improve their general economic well-being, these nations also will become ecological debtors.

So Hardin's "Tragedy" applies today, but on a global scale. Individual nations, acting in their own self interest are compelled to continually increase their use of resources, in a finite world.

The solution to this dilemma is the same as Hardin's was at the sub-national scale. We need to manage the global commons and protect them by restricting access in some mutually agreed upon manner. In other words, we need to regulate the exploitation of the global commons and adopt policies at the national level that will serve to achieve sustainability.

Because most of the Earth's natural resources are physically located within (and controlled by) sovereign nations, international management of the global commons only makes sense if it is done principally at the national level. International governance cannot practically take on the huge administrative task of managing all the Earth's natural resources. This, however, does not suggest that the global 'tragedy' cannot be solved. If each nation of the world adopts the ethical principle of individual sustainability, then the aggregated total will equal a sustainable world.

The new ethical principle simply stated is: each and every nation of the world must strive to live within its natural resource means. In other words, each and every nation of the world should strive to keep the total resource demands of their societies (regardless of where in the world these demands might physically occur) in balance with the natural resource capacity of their respective sovereign territories. Universal adoption of this principle is the first step toward solving the "Global Tragedy of the Commons," and putting the world on a sustainable course. Because of today's serious overshoot condition, we need to take this step as soon as possible. It is the only viable approach to global sustainability and true prosperity.

Appendix C - Thoughts about how we might re-frame the subject of global environmental governance

The phrase global environmental governance (GEG) suggests an international objective of protecting and preserving the ecosystems of the world. Although such preservation is clearly needed, framing the issue in this relatively narrow environmental context is problematical. The use of the word 'environmental' in the GEG phrase implicitly subjects it to value debates and controversy (e.g. 'tree huggers' vs. jobs, or preserving fish species vs. producing needed food). Such controversy could be reduced significantly if we reframe the issue within the broader context of sustainability. Instead of global (or international) environmental governance (GEG or IEG) we might consider a term like; "Governance for a Sustainable World". Such a title, or any similar reframing under the rubric of 'sustaining life,' will tend to reduce both value controversy and the potential for international polarization. The idea of preserving and maximizing the potential for life on our planet is less controversial than 'saving the environment,' especially when people make the connection between preserving natural resource assets and how such preservation foundationally supports both social and economic development.