

PROLOGUE

Yesterday, Today and the day after Tomorrow: Industrial Engineers, Society and Our Globally, Shared Ecosystems

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It is well known that societal progress toward more sustainable patterns is often slow and unpredictable. Frequently, crises trigger major changes from the ‘business-as-usual’ approaches to new ‘normal behaviors.’

In that regard, no, the world did not end on December 22, 2012, as some had predicted! There have been many, similar predictions of abrupt termination of life on the earth that have not come true. In this case it did not happen either although we know that millions of years ago, meteors crashed into the earth and dramatically altered the climate and the biosphere of planet earth for extended periods of time.

Less abruptly, many human cultures such as those on Easter Island, the Pitcairn and Henderson Islands and the Mayans disappeared. What were the causes and what can we learn from their disappearance that may help us to avoid similar collapses?

Dr. Jared Diamond explored causes of the long-term weakening of the eco-sphere and other problems that led to collapse of those cultures in his excellent book.¹ He documented that cultures collapsed due to one or more of the following:

1. Failure to anticipate the consequences of their actions;
2. Failure to perceive the risks of what was happening;
3. Failure due to rational, bad behavior;
4. Failure due to disastrous values;
5. Failure due to other types of failures.

¹ “Collapse: How Societies Choose to Fail or Succeed,” by Jared Diamond, Published by Penguin Group, 375 Hudson St., New York, New York, 10014, U.S.A. in 2005, ISBN 0-670-03337-5.

He also emphasized that not only can we learn from those societies' mistakes but we can also learn from the approaches used by the cultures, which chose to survive. What did those societies do to succeed? (*I invite you to read Diamond's book to learn about his multiple answers*).

Similar, to some of Diamond's insights, the readers of this journal were challenged by Dr. Ing. Sánchez' prologue published in the previous edition. He highlighted many crucial challenges that we must address if we are to avoid similar societal collapses. He also made a number of constructive recommendations. I invite you to re-read his excellent prologue to refresh your memory on his points and recommendations. I fully agree with Dr. Sánchez.²

In the following paragraphs, I underscore the urgency for all of us to accelerate our progress in disciplinary and multi-disciplinary research to develop a more complete understanding of how human impacts are threatening societal survival.

We must understand the interconnected, systemic, impacts of the more than seven billion humans currently on the earth and of the 75,000,000 that are being added annually. Additionally we must understand the climatological, ecological, economic, social and ethical consequences of our daily discharge of 100,000,000 to 1,000,000,000 tons of greenhouse gases to the atmosphere. The climate changes that these gases and other human activities are increasingly causing more frequent and more severe storm events as well as more extensive and severe flooding and droughts.

Additionally, we are dumping millions of tons of toxic substances into our air, water and soil every year. Those toxic substances have negative, system-wide bio-diversity impacts. They adversely impact eco-system health and human health. Consequently, the earth's eco-systems are losing their capacity and functionality to provide the eco-system services upon which all species are totally dependent.

Numerous publications and reports from scientific journals, such as this one, the UN, the World Bank, Non-Governmental Organizations and others provide documentation of the serious challenges and the urgency with which we must seek to prevent, reduce or solve these and numerous other problems.

Fortunately, there are also some encouraging examples at local and regional levels of progress being made to decrease or to reverse some of the negative human impacts.

In this regard, the authors of the papers included in this issue have documented valuable lessons from theoretical and practical work in academia, industries, and communities, in food production companies such as aquaculture and in many other contexts.

Based upon their results, analyses, and recommendations, individual companies and the region can benefit from the organizational and regional learning for innovative problem

² "Competitividad en la Ingeniería Industrial de hoy: Sostenibilidad e innovación" by Dr. Eng. Juan Martínez Sánchez, Journal? Year? Volume? Pages?

definition and problem solving approaches that the authors co-facilitated and documented. Involvement of the broader society through regional learning and empowerment to build upon these researcher's findings is crucial, in order to develop and implement ways to 'mainstream' the findings more broadly throughout companies, regional organizations and educational institutions in all of society. This process will be a long journey! But starting on that journey is the first step, staying on that journey are essential to help to ensure the essential societal transformations that are required to help to make sure our children's, children's, children's children also have a wonderful planet upon which to raise their children in happy, safe, productive societies.

As part of that journey, the Brazilian Government, hosted the Earth Summit in 1992 at which the UNEP Rio Declaration on Environment and Development was made public and discussed. The Agenda 21, with its 40 chapters, was one of the most significant documents from the Earth Summit. Agenda 21 has helped to catalyze numerous initiatives in 'sustainable development in communities, cities and regions. Some of those initiatives continue to help citizens to lead their communities forward toward the goal of sustainable communities, cities, regions and societies as they make the necessary transitions to more sustainable patterns.

Twenty years after the 1992 Earth Summit, the Brazilian Government, hosted the Rio+20 to catalyze in-depth evaluations and reflections on what had been accomplished since 1992 and to chart our course for planning and implementing sustainable societies.

The summary observations of several groups in answer to the question, "What had been accomplished since 1992?" was that although some progress was made in some cities, regions and countries, the progress was far too limited and far too slow to slow down or to prevent major catastrophic environmental and societal tragedies.

The Rio+20 conference on Sustainable Development, which took place in Rio de Janeiro, Brazil in June 2012 was the biggest UN conference ever and was a major step forward in achieving a sustainable future – [the future we want](#). (Click on this phrase and you will be linked with the full report).

More than \$500 billion was mobilized with over 700 commitments made.

The document, [the future we want](#) was agreed upon by the representatives of the 193 UN member states who participated in the conference.

This document calls for a wide range of actions including:

1. Launching a process to establish sustainable development goals;
2. Detailing how the green economy can be used as a tool to achieve sustainable development;
3. Strengthening the UN Environmental Programme and establishing a new forum for sustainable development;
4. Promoting corporate sustainability reporting measures;
5. Taking steps to go beyond GDP to assess the well-being of a country;

6. Developing a strategy for sustainable development financing;
7. Adopting a framework for tackling sustainable consumption and production;
8. Focusing on improving gender equality;
9. Stressing the need to engage civil society and incorporate science into policy;
10. Recognizing the importance of voluntary commitments on sustainable development.

At the concluding ceremonies of the Rio+20 Conference, leaders, including many from the very skeptical groups, stated that they hoped more would be accomplished with this agreement than has been achieved as a result of many other UN agreements.

Of course many other conferences have been held which have resulted in other declarations, agreements, and accords. It is my personal hope, as an Environmental Scientist who has taught since 1961 that educators, scientists, corporate leaders, political leaders and other societal members will increasingly see the need to become personally involved in helping to make the transition personally, professionally and societally to behavioral patterns that will help societies to make the necessary transitions.

During the twenty years since I had the opportunity to start the Journal of Cleaner Production (JCLP) and to be its Editor-in-Chief, I have had the good fortune to have received and read thousands of documents from brilliant people throughout the world. As of 2013, we are expanding the JCLP from 18 to 24 volumes per year. I invite you and your colleagues and students to access, use and build upon the wisdom of the thousands of articles we have published and will publish. That wisdom will help you and your colleagues in your research and teaching and will help you to develop strong papers for publication in this journal as well as in the JCLP. Please access this website for more information:

(Journal of Cleaner Production <http://ees.elsevier.com/jclepro/default.asp>)

Based upon a rigorous peer review/revision process, we have published the best of the papers submitted to us during the JCLP's twenty-year history. Based upon insights from many of those articles and other sources, I am increasingly hopeful that we will make the changes that are needed.

In the following paragraphs, I list some changes that many scientists recommend and many groups are implementing:

1. Increasing societal energy efficiency in both generation and usage at all levels of society including in transportation, production of products and services, building construction and operation, and in all other facets of society;
2. Shifting from fossil fuel-based centralized electricity production systems to decentralized systems based upon renewable energy such as the wind, sun, hydro, geo-thermal, wave and tidal sources;

3. Developing and implementing ‘smart’ electrical grids capable of managing the flow of energy among millions of decentralized, renewable energy sources and storage units, which can be used to replace or to supplement the centralized systems that dominate at this time;
4. Developing and implementing educational programs, within Kindergarten, elementary, high school, university level and within life-the long learning phase to ensure educational opportunities to empower societal members, of all ages, in making the necessary attitudinal, values and life-style changes to make the transitions to high quality, sustainable patterns;
5. Working to make the transition to sustainable consumption and sustainable production of eco-products and the provision of human and eco-system friendly services;
6. Working to go beyond the very narrow, socio-economic indicators of health of the nation used by most countries that are known as Gross National Product (GNP) or Gross Domestic Product (GDP) to concepts and terms such as:
 - a. The Quality of Life Index (QoLI);
 - b. The Happiness Index (HI);
 - c. The Wellness Index (WI);
 - d. The Inclusive Wealth Index (IWI);
 - e. World Happiness Index (WHI);
 - f. The Gallup World Poll (QWP);
 - g. The World Values Survey (WVS);
 - h. The European Social Survey (ESS)³

³ For more information on these and other indices and concepts, I refer you to:

“The 2012 World Happiness Report”, by John Helliwell, Richard Layard and Jeffrey Sachs of the Earth Institute at Columbia, University.

“The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and The World,” by Jeremy Rifkin, Published by Palgrave-Macmillan, 2012, ISBN 978-0-230-11521-7.

“Inclusive Wealth Report 2012: Measuring Progress Toward Sustainability,” Cambridge Journals, Environment and Development Economics, Volume 17-Issue 03.

These and related *'qualitative concepts'* are being tested in many countries. All are designed to help society to make progress beyond the currently dominant, GNP or GDP indicator of human and eco-system health. These initiatives were referred to by the developers of statement number five of the ten action statements in document: [the future we want](#).

That statement is: ***“Taking steps to go beyond GDP to assess the well-being of a country.”*** It is my hope and anticipation that the more we continue to experiment with ways to integrate such qualitative approaches to measure happiness, wellness, quality of human life, and health of the eco-systems. We must learn to live in harmony with each other as humans and to live in harmony with other species on this beautiful BLUE PLANET!

The term ‘Gross National Happiness’ (GNH) was coined in 1972 by [Bhutan's fourth Dragon King, Jigme Singye Wangchuck](#).

(Note, by clicking on the words above, Bhutan, or Dragon King or Jigme Singye Wangchuck or (http://en.wikipedia.org/wiki/Gross_national_happiness) you will be hyper-linked to different relevant information about this innovative and promising qualitative approach toward sustainability.

Brazil and other countries are beginning to explore application of GNH.

I invite you to explore this initiative in your community. For an excellent video on application of GNH in Bhutan, please access the following: *“Bhutan: Taking the Middle Path to Happiness,”* developed and distributed by Vendetti Productions LLC, 2007 (www.BhutanFilm.com).

As with all new developments, “the GNH is evolving as experience is gained in its application. The second-generation GNH concept, treating happiness as a socioeconomic development metric, was proposed in 2006 by [Med Jones](#), the President of International Institute of Management. The metric measures socioeconomic development by tracking seven development areas including the nation's mental and emotional health.^[6] GNH value is proposed to be an index function of the total average per capita of the following measures:

1. Economic Wellness: Indicated via direct survey and statistical measurement of economic metrics such as consumer debt, average income to consumer price index ratio and income distribution;
2. Environmental Wellness: Indicated via direct survey and statistical measurement of environmental metrics such as pollution, noise and traffic;
3. Physical Wellness: Indicated via statistical measurement of physical health metrics such as severe illnesses;

4. Mental Wellness: Indicated via direct survey and statistical measurement of mental health metrics such as usage of antidepressants and rise or decline of psychotherapy patients;
5. Workplace Wellness: Indicated via direct survey and statistical measurement of labor metrics such as [jobless claims](#), job change, workplace complaints and lawsuits;
6. Social Wellness: Indicated via direct survey and statistical measurement of social metrics such as discrimination, safety, divorce rates, complaints of domestic conflicts and family lawsuits, public lawsuits, crime rates;
7. Political Wellness: Indicated via direct survey and statistical measurement of political metrics such as the quality of local democracy, individual freedom, and foreign conflicts”.

The above seven metrics were incorporated into the first Global GNH Survey.¹¹ [^](#)
["Gross National Happiness \(GNH\) Survey | Global GNH Survey"](#)

I am convinced that the GNH and other initiatives will help us to work to make our societies more equitable, more healthful, more happy and more sustainable as we work increasingly within our dynamic eco-systems.

In order to succeed in making these transformations, we must work to develop and implement ‘good governance,’ that supports holistic research and educational approaches based upon ‘Education for Sustainable Societies’ for people of all ages.

We must also develop and monitor our progress or lack of progress in making the transition to sustainable societal patterns, based upon effective, understandable and readily measurable indicators.

When we detect that we are on the right path, great, we can reinforce that.

When we detect that we are not on the right path, we must have the will and the integrity to determine what is not functioning properly, why it is not functioning properly and how to make changes in our pathway. Such cybernetic societal systems will be essential in making the transition to sustainable societies.

Let’s remember and use the motto of Gandhi: *‘Be the Change You Want to See in Society!’* Change begins and continues within each of us as our knowledge, perceptions, values help us to become motivated to make positive personal, community and societal changes on our ‘sustainability’ journey of today and tomorrow.

Let’s all join in on this journey!

Please contact me with your ideas, experiences, and plans for your journey!!

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