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Critical Analysis of Green Economy Proposals

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ABSTRACT

At the world summit held in Rio de Janeiro in June of 2012, the United Nations Organization presented a proposal supposedly aimed at leading the global economy towards a more sustainable and equitable economic pattern. This proposal is UNO´s third attempt to modify our dangerous economic model based on predatory use of renewable resources and intensive use of nonrenewable resources that reduces the planet´s resilience. This summit was promoted by multinational enterprises interested in selling "green" technologies. This initiative should be discussed given its potential to promote an even more unfair and unstable system. It may be an illusion similar to the idea of Sustainable Development proposed in Rio 92. In this paper, the world´s critical problems are described together with their ideal solutions.

INTRODUCTION

I have chosen the Emergy Synthesis framework to examine the Green Economy framework, using as reference a seminal paper by Brown et al. (2000). While doing this, I discovered some limitations of this methodology and give suggestions for its improvement. After that, I critique previous planning efforts made by the United Nations and the objectives of Rio+20. I then list the main, real world problems with some ideas to solve them. Since the driving force of the global economy is information power that includes political, ideological, financial and military force, the structure of that system will be described briefly. Several authors (as indicated by Odum & Odum, 2001) have predicted a global decline after a long period of economic growth based on consumption of natural resources, which also create great social and environmental problems. The decline may be precipitous or it can be a prosperous way down, if the world population is able to self-organize and develop policies for wiser use of resources. We need an ecologically-based social system to empower the people for the coming period (see Figure 1, in Boulanger, 2012).

Emergy Synthesis

Brown and coworkers, in 2000, introduced Emergy Synthesis as a framework to study the Ecology-Economy interface. It is a biophysical approach that uses emergy to evaluate systems. Solar emergy sums all contributions of nature and human processes using equivalents of solar energy considering differences in energy quality. It is an evaluation from a supply side perspective, different from the usual economic demand-based approach that relies on subjective values. It uses Open Systems Thermodynamics, General Systems Theory, and Biogeochemistry, but it should also consider Political Science, Philosophy (Ethics), and Climate Science (mainly Paleoclimatology) to provide a complete perspective.

Symbols, basic diagrams, concepts and emergy formulas

As system efficiency values are very small and induce errors when used, it is preferable to use the inverse value that is an energy transformation factor.

$$Efficiency = \frac{Energy}{Emergy} \rightarrow Transformity = \frac{Emergy}{Energy}$$

In systems there are recycling loops, internal reinforcing flows, and external inflows. The internal feedback makes it possible to reinforce emergy intake (Figure 2).

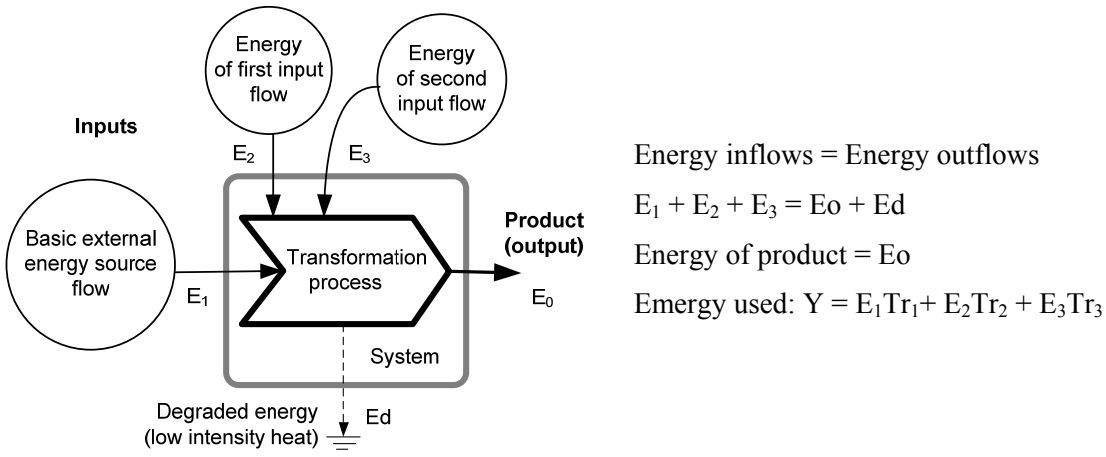


Figure 1. *Interaction of energy flows to produce a resource. Energies (E_1, E_2, and E_3) interact to produce a work product (Eo) and degraded energy (Ed). Eo has a different energy quality (Tr), which is the ratio of the emergy used to the energy in Eo.*

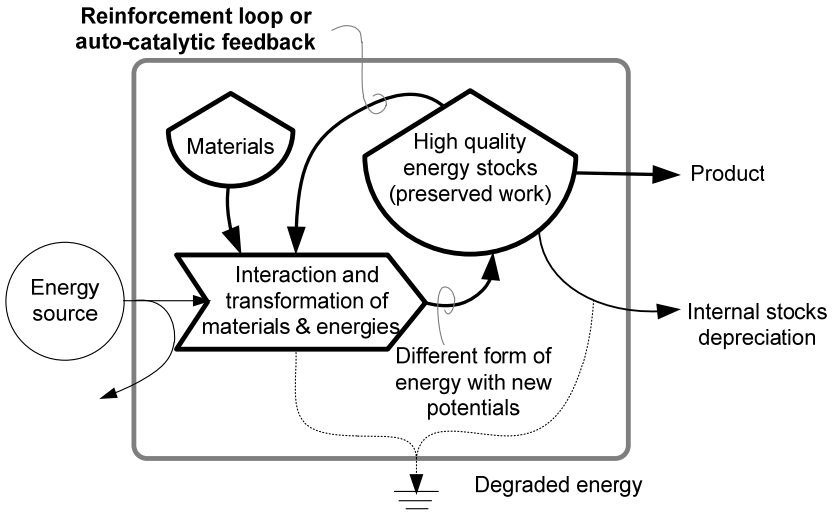


Figure 2. *Emergy intake maximization by autocatalytic loops.*

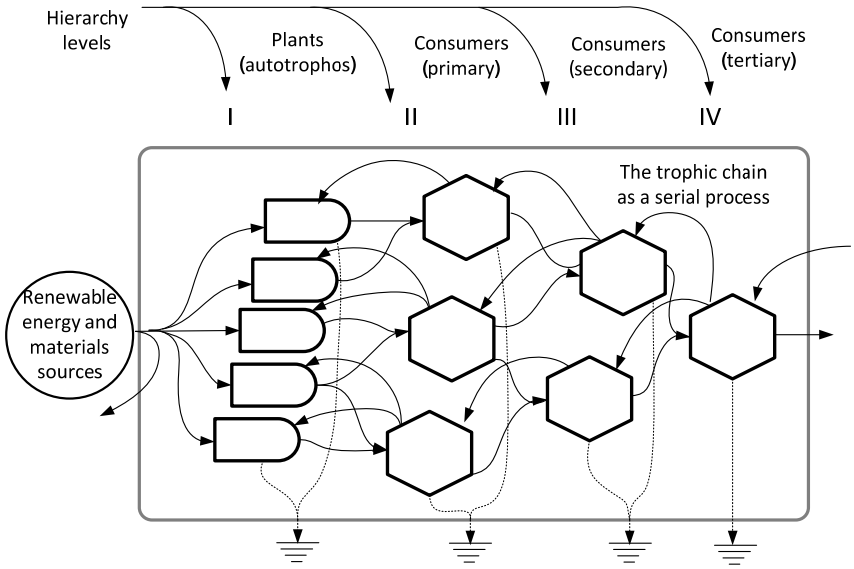


Figure 3. *Diagram of a network of autocatalytic systems using renewable resources.*

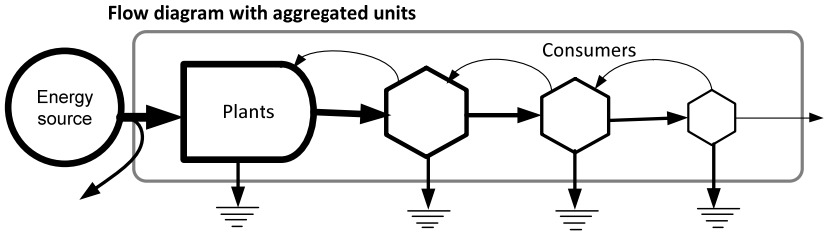


Figure 4. *Diagram of a network of aggregated units using renewable sources.*

Present Situation

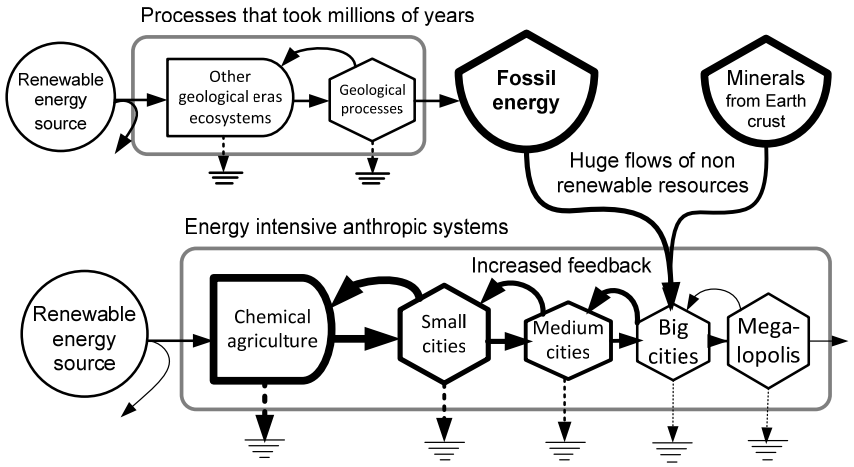


Figure 5. *Diagram of a network of autocatalytic units using non renewable sources.*

Figure 7 shows how through information, investments and infrastructure ecological systems are destroyed and transformed in systems dependent on external systems.

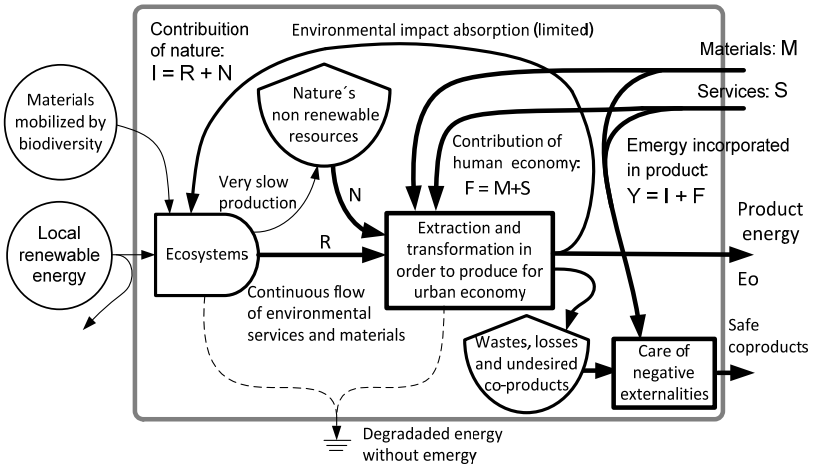


Figure 6. *Diagram of an economic production system, including negative externalities.*

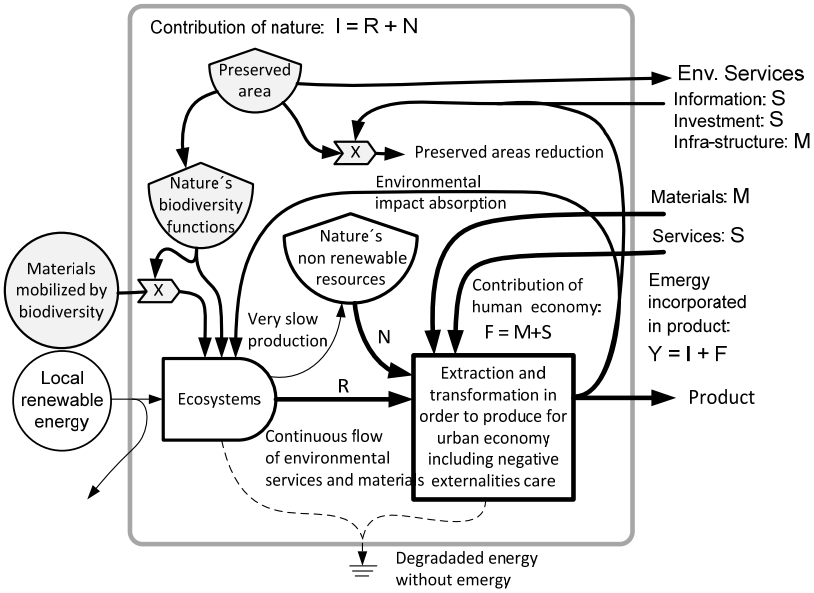


Figure 7. *Diagram of a production system including environmental services losses.*

Table 1. Criteria for public policy alternatives assessment

Criterion	Emergy parameter	Equation
Competitiveness	Emergy power density	ED=Y/area
Social pressure	Emergy power/application time of force	Eo/DT
Benefit/Impact	Emergy Sustainability Indicator	ESI=EYR/ELR
Fitness	Emergy Investment Ratio	EIR =F/(R+N)
Sustainability	Renewability	%Ren = 100* R/Y
Resilience	(Species)(emergy/species)/(emergy/preserved area)	Vital area needed

The ecosystem and present state behavior

The global system´s assessment using Emergy Synthesis (Figure 8) should include the environmental impacts on biodiversity and volatilization of fossil carbon sequestered stocks (oil, gas, coal, permafrost, lime, glaciers, polar ice caps).

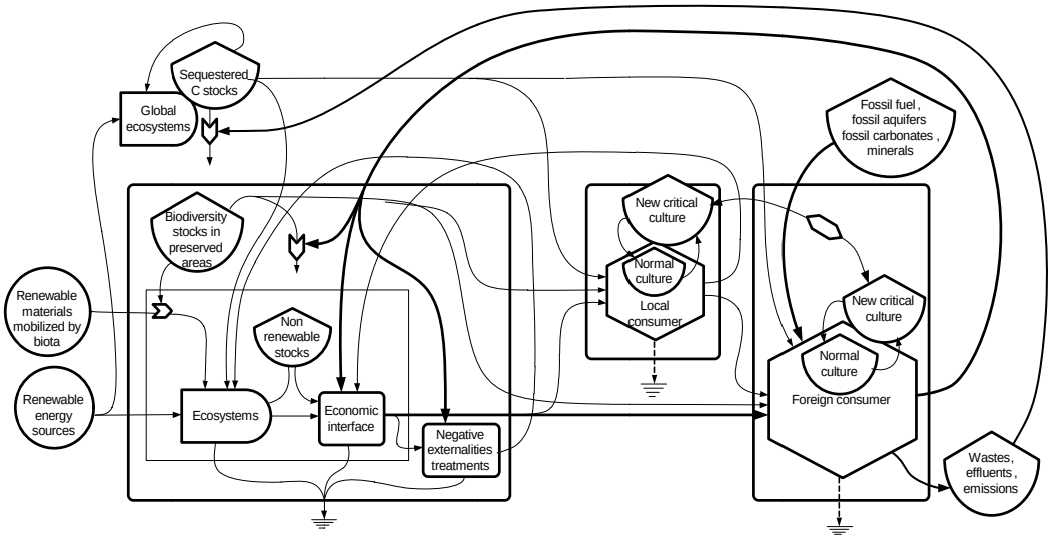


Figure 8. *Diagram of the present global production and consumption system.*

A Prosperous Way Down Future

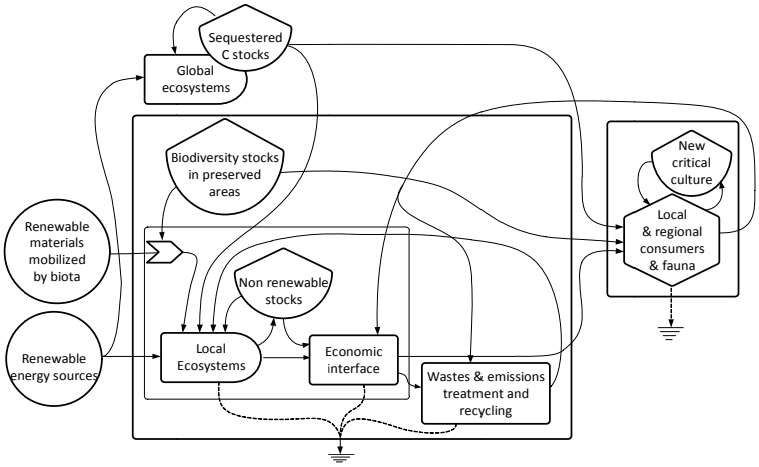


Figure 9. *Diagram and image of a system based on renewable resources.*

The analysis of consumption structure

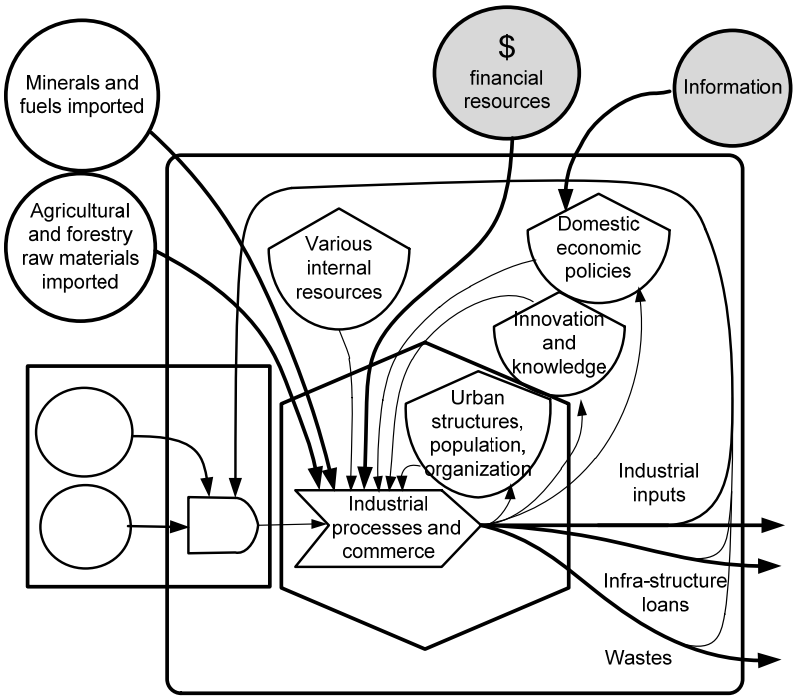


Figure 10. *Diagram of an industrial country with much bigger consumption than local production capacity that depends on imported resources and external information.*

The information structure

According to Odum (1999), the exchange of "good quality" information can promote organizational changes and new social structures, including political power. But, we must recognize there are different kinds of information.

In the present time, information and foreign investments are the forces that define the system´s organization for the benefit of powerful groups in central industrially-developed countries. Current consumption is several times larger than the biosphere's renewable capacity, due to the use of fossil fuels and minerals (Brown and Ulgiati, 1999).

The consumers´ values and the industrial inputs are transferred to the production subsystem by means of international policy and private management. The production-consumption system is linked to an institutional superstructure that creates a complex framework that drives the operation of the global system for the benefit of a relatively small human group (wealthy corporate managers, investors and government leaders). This important framework is called super-structure and it deserves a systems analysis to understand the way it behaves.

The super structure

Figures 11 and 12 show the political control imposed by the corporate super-structure by means of ideology, loans, and offers of technology. Debt payment is then coerced via military means creating trade imbalances and driving resource extraction from less developed countries. Information is political power that has a special ethical behavior. It is usually assumed that information is neutral, but that is not the case. The media promotes consumption and growth. Therefore, critical groups should organize to provide alternative messages to promote another kind of social organization.

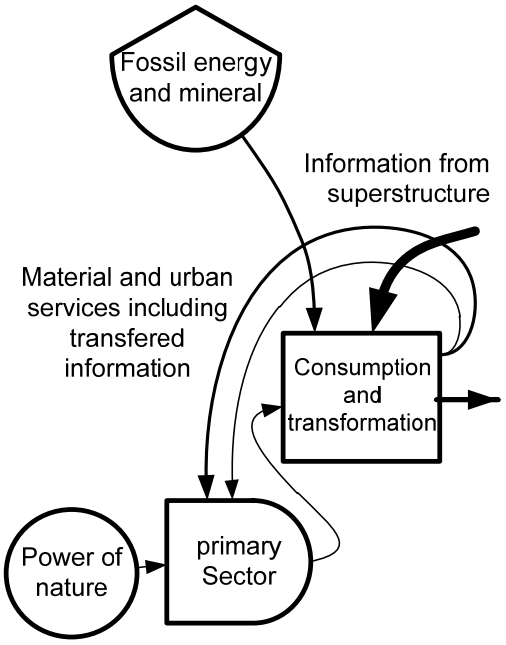


Figure 11. *Diagram of subsidiary economy showing links to the super structure.*

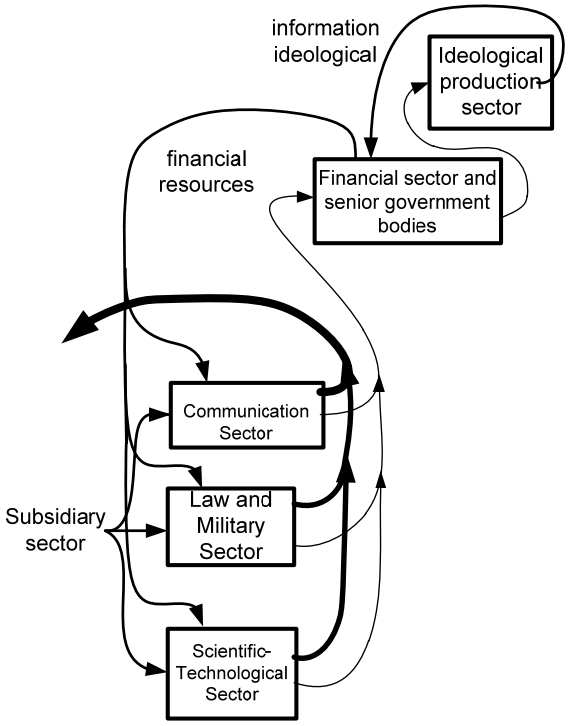


Figure 12. *Diagram of the super structure links to subsidiary systems in detailed form*

UNO´s efforts for a Sustainable Economy

The previous efforts of Ecological Planning for the Global Economy made by the United Nations (Stockholm, Rio92) were made in response to public movements based on scientific facts, during a time of economic growth without any evidence of oil scarcity. That is no longer the case. The economy is slowing down, the future of oil is dubious, climate change is an event of increasing risk and greenhouse gas emissions depend on oil use. Additionally, massive species extinction is occurring and there is a potential for a huge international financial crisis. The main objective of Rio+20 is to reactivate growth of the global economy through the use of "energy-intensive green technology" developed in the Northern Hemisphere. Some periphery countries embrace externally induced development as the only way to escape from poverty. The UNO proposal is business as usual, without any deep ecological or social concern. In order to clarify the ideas of a Green Economy, the critical world problems and their solutions are compared here with the UNO´s proposals.

In Table 2, world problems are listed side by side with the ideas to solve them. From this list, it is evident that a great transformation is necessary.

In Rio+20, international enterprises and UNO in a joint venture between them presented to the World population a Green Economy proposal, that was envisioned within the conceptual framework of prevailing Capitalism using the *paradigm of unlimited and continuous growth* (Foster, 2011, Harvey, 2011).

Green Economy is a powerful inflow of information; therefore, we need to discover how the information subsystem works at the global level (Figures 11 and 12). The term information is used in this paper in an extended form; it makes reference to many intermingled forces: ideological, political,

financing, law and military power. In some studies these forces are improperly considered as a feedback of positive economic services. This feedback flow is no longer reinforcing the lower stages of the energy chain but acting as a destructive force. Information acts as a controlling force indeed, which demands to be measured in emergy terms. It is astonishing but the main driving force of the human economy may be the power of information that creates and maintains the structures of systems. The loosely defined Green Economy proposal calls for the development of a new global order that will continue conventional political and economic control through loan-debt processes, and provide economic control through one-sided determination of prices of commodities and industrial inputs.

Global System Decay

Odum (2000) prepared a model of world behavior using two main energy sources for computer simulation (Figure 13). It depicts the behavior over time of the biosphere with nonrenewable resources (N) and human assets (Q) showing the stages of human growth, climax, decline and steady state. A more complete model should also make explicit how biodiversity decrease could affect the final steady state level.

Table 2. Global problems with possible solutions.

Critical systemic problems	**Potential solutions**
[1] Peak of Oil extraction, supply decline and increased prices of the main inputs for industrial economies.	A new global economic model with fair exchange between partners and progressive transformation of production-consumption systems to sustainable patterns.
[2] High population density with high intensity of consumption in main industrialized countries and Southeast Asia.	Decentralization of urban population by modification of rural and urban systems and promotion of a new sustainable life-style.
[3] Depletion of a wide variety of natural resources and loss of important ecosystem services.	Recovery of ecosystems with native species in continuous areas.
[4] Depletion of environmental resources with loss of biodiversity, top soil and ecological culture.	Adoption of Degrowth paradigm.
[5] Climate change will affect agricultural productivity through drought and cause human migrations.	Change of conventional public policy (financing, incentives) for sustainable watershed planning.
[6] Oceans acidification with loss of ability to sequester carbon and loss of productivity and diversity.	Reduction of chemical fertilizers and machinery use in agriculture and promotion of organic farming.
[7] Presence of toxic substances in water bodies and rivers.	Restriction of biocides production and heavy metals excessive use. Critical changes in chemical, petrochemical and pharmaceutical industries. Wetlands protection for tertiary water treatment.
[8] The attitude of Governments and enterprises to continue economic growth increases demand for vital resources above critical limits, in a time of adjustment to energy decline.	Public discussion regarding world´s development as a cyclical process composed of five sequential steps: balance, growth, peak, decline, and recharge/recovery.
[9] Influence of infrastructure contractors and large corporations on public policy.	Limit financing of political campaigns by corporations or entities associated with them.
[10] The financial sector demonstrates deep egoism and greed; it gets great profits through speculation and does not recognize the social and ecological reality.	Society must organize to assert broader and fair objectives. Continuing Education programs should incorporate the Systems Ecology Approach as soon as possible.

As Odum and Odum (2001) said: “the decay can be either a catastrophic collapse or a peaceful decline depending upon the goals that our society pursues”. It is possible that the Earth system could recover after the pulse of economic growth, but the restoration of the biological capacity will demand a very different social system, one that is no more based on greed, but in Systemic Knowledge (Ecology, Political Science and a new kind of Ethics), something very different than the current visions of either Capitalism or Socialism, both of them industrially minded.

Figure 14 derives from Figure 13, it shows the social evolution process in history showing that the expansion of the economic system, demands at each stage of evolution the creation of money to promote more growth that is achieved by the mobilization of increasing quantities of resources within the national frontiers and abroad.

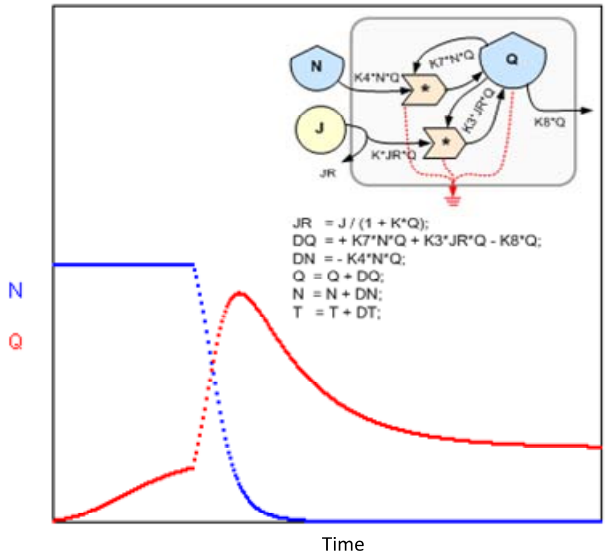
Figure 14 makes it explicit that at the present time there are two opposite processes on a collision course: business as usual and ecological decline. Right now, the Global Society needs good information to decide what to do.

New Political and Economic Systems

We assume that the Global Community can organize a Great Transition. As the current politicians do not demonstrate an appetite for deep social change, it will be necessary for others, to imagine new kinds of socio-political organizations to sustain creative and powerful social movements. What can we do now?

The current system is committed to the preservation of unsustainable structures that will become useless in the future as fossil fuels wane. Instead, as the old system declines, we need to make room for self-organizing, decentralized, sustainable societies and communities.

Therefore, both critical scientific research and at the same time a social effort to formulate, evaluate and discuss new systems are needed, especially, in the coming years, we need to support the development of the basic social units that will support Ecological Societies all over the world, as well as the development of better Human-Environment Interface Science Tools.



http://www.unicamp.br/fea/ortega/extensao/DuasFontes.html

Figure 13. *Simulation of world system. Adapted from Odum & Odum (2000).*

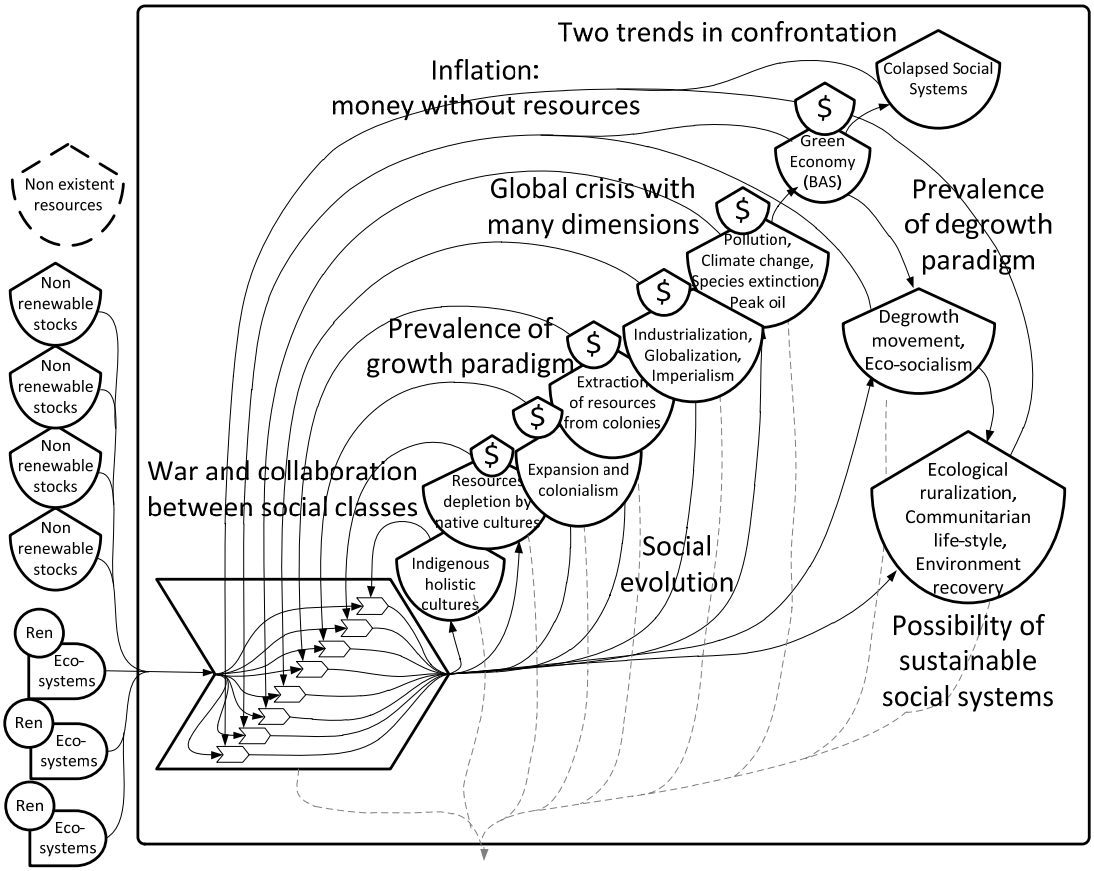


Figure 14. *Two social projects in conflict: (a) business as usual and (b) ecological economy.*

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