Critical Analysis of Green Economy proposal

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Abstract

In the world summit to be held in Rio de Janeiro in June, 2012; the United Nations Environmental Program (UNEP) will present a proposal to led the global economy towards a more sustainable pattern. This summit may be a historical mark in human history. It is the third global attempt to modify the route that the world took in the last five centuries to live based on (a) predatory use of renewable resources and (b) intensive use of non renewable resources. At this time, the summit is not promoted by social movements but by international enterprises that are interested basically in selling green technologies. At Rio+20 it will be offered a new idea for development called "Green Economy", besides that, there is also a proposal to create supra-national institutions to enforce the proposed change. The society all over the world should consider this initiative with a lot of care because of its potential to configure a new global unfair system. It could be another illusion as the Sustainable Development proposed in Rio 92. Even more, it could promote a global disaster instead of being a relevant opportunity for creating new social organizations to avoid global extinction. In this work, it is offered a framework to compare the more important world challenges and the green economy ideas considering a systems perspective. It is necessary to identify the solutions offered by the green economy and to analyze them with scientific systemic tools able to interpret the proposals using open system thermodynamics, general system theory, psycho-social science, political theory and modeling and simulation science. This sceneries construction exercise considers ten critical areas for the future interaction between humanity and nature.

Key words: Green Economy, Sustainable Development, Systemic approach.

1. Introduction

In order to establish a systemic framework to study the Green Economy, it was choose the emergy synthesis. For the purpose of explaining the basic concepts of this methodology, it is used a very interesting paper (Brown *et alli*, 2000) but, at the same time that the methodology is described, it will be made critical observations and suggestions for improvement.

After that, it will commented the previous efforts of Ecological Planning made by United Nations (Stockholm, Rio92) and the general objectives of Rio+20. After that, the real main world problems will be listed side by side with the ideas to overcome them. As the necessary changes are possible but demand an enormous global effort, it will be commented that the main driving force of economy is the power of information. It will be used an extended concept of information that includes political, ideological, financing and military forces, and after that it will be described briefly the structure of world information system.

There is a great possibility of a global economy collapse, due to several crises that are occurring in parallel. The collapse may be catastrophic or it can be a socially commanded process more peaceful, basically a careful decline. Anyhow, through modeling and simulation, it can be predicted the decline of the capitalism, because it is based on continuous growth; that means always increasing flows of resources, including productive land, water resources, increase of economic assets, population, money, pollution, and ecosystems reduction.

Finally, it will be commented that the Great Transition could begin within a modified Capitalism, but a new kind of Eco-Socialism is necessary to be committed Degrowth.

2. Emergy Synthesis

Brown, Brandt-Williams, Tilley & Ulgiati, in 2000, introduced the concept of Emergy Synthesis to be used instead of Emergy Assessment, as a framework to study the Ecology-Economy interface. It was a very valuable contribution but many improvements are necessary. In order to study the performance of ecosystems, biosphere and human economy it is necessary to use Open Systems Thermodynamics, General Systems Theory, Earth´s Bio-geochemical Cycles and also Political Science and Philosophy (Ethics); until now some of these sciences are not considered in proper or sufficient form by Emergy Synthesis. In case of incorporation of missing information then it will be possible a complete synthesis. It will be possible to achieve a perspective of system´s totality, a prerequisite for measuring the system flows and internal stocks in terms of emergy (intrinsic exergy and work previously made on resources used) to obtain systems performance indicators through the comparison of emergy flows and stocks.

2.1. Symbols, basic diagrams, concepts and emergy indices formulas

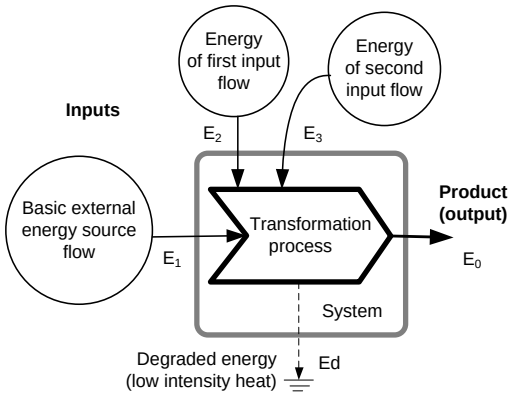

Figure 1. Basic interaction of energy and matter to produce any resource or service. Energies of different intensities (E_1, E_2, E_3) interact to produce a new form of energy with high quality (Eo) and degraded energy (Ed).

Energy inflows = Energy outflows

$E_1 + E_2 + E_3 = Eo + Ed$

Energy of product = Eo

Solar emergy used: $Y = E_1Tr_1 + E_2Tr_2 + E_3Tr_3$

$$System\ Efficiency = \frac{Energy\ of\ product}{Solar\ emergy\ used\ in\ production}$$

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

$$Transformity = \frac{Solar\ emergy\ used\ in\ production}{Energy\ of\ product}$$

In complex system there are recycling loops, internal re-enforcing flows and external inflows.

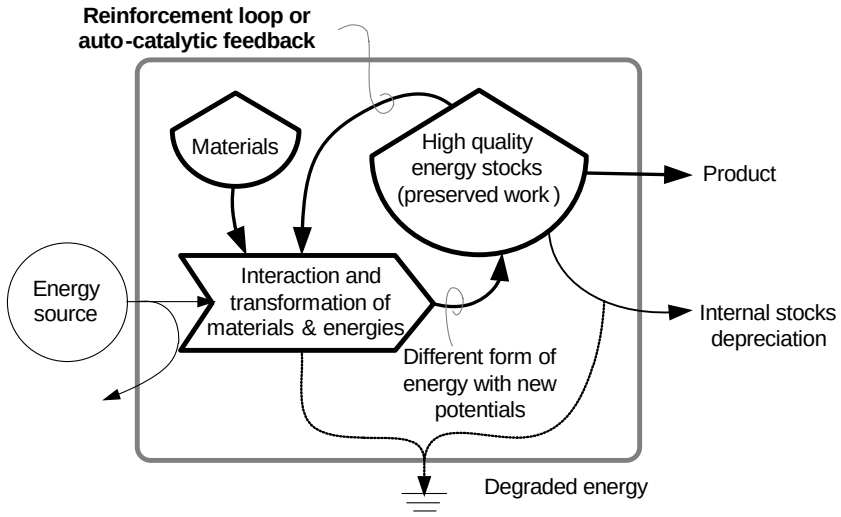

Figure 2. Emergy intake maximization by autocatalytic loops.

The energy transformed by the ecosystem with internal feedback makes it possible to reinforce emergy intake, but this process is limited by internal structures and quality of materials sources.

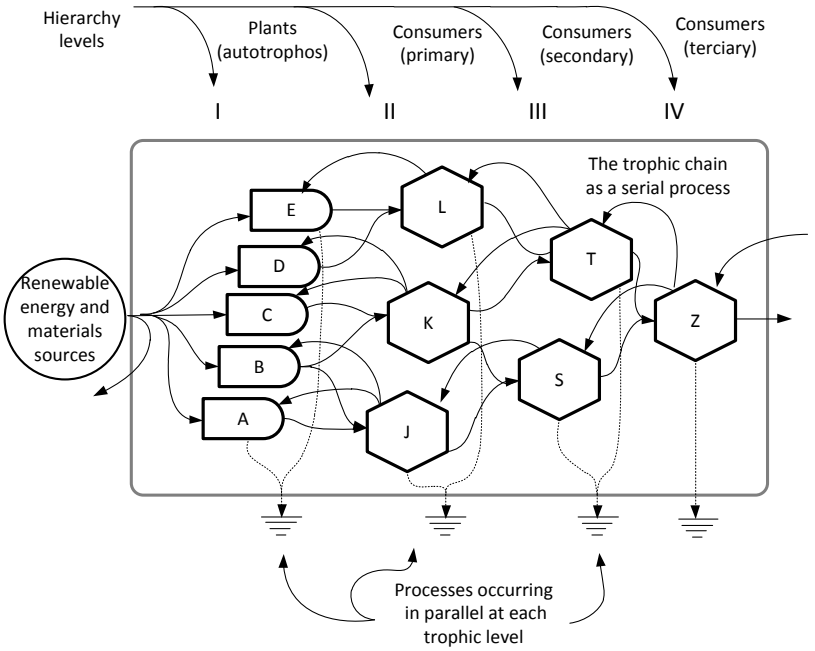

Figure 3. Diagram of a network of autocatalytic systems using renewable resources.

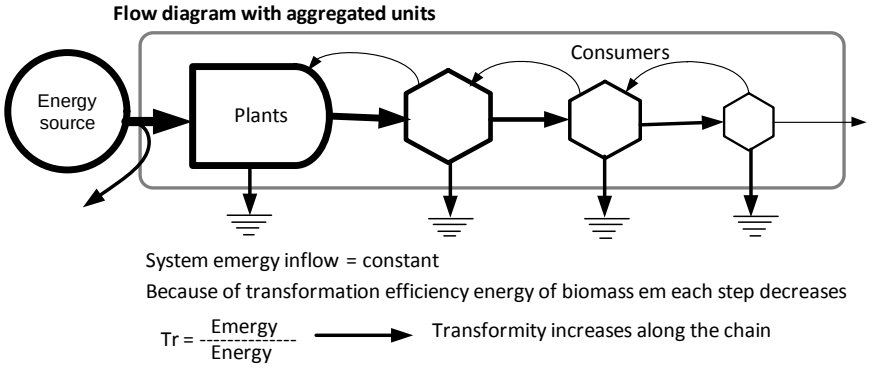

Figure 4. Diagram of a network of aggregated autocatalytic units using renewable sources.

2.2. Present situation.

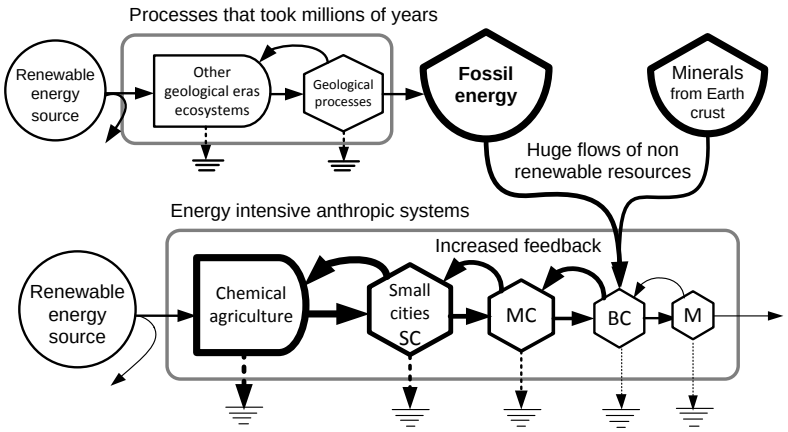

Figure 5. Diagram of a network of aggregated autocatalytic units using non renewable sources.

2.3. Present emergy scope.

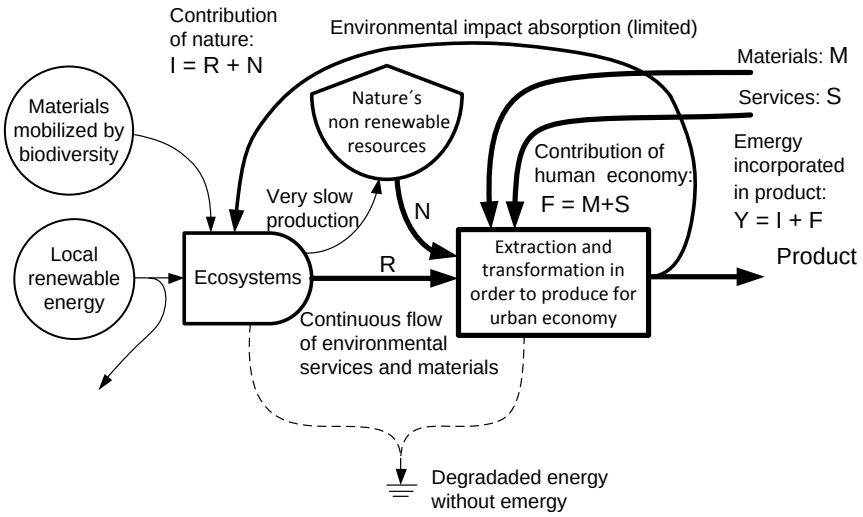

Figure 6. Diagram of an economic production system that uses contributions from environment (R); nature´s non renewable resources (N) and inputs purchased from human economy (F).

Emergy indices are ratios between aggregated emergy flows (R, N, F) that allow the analysts to make the diagnosis of the system modeled in the diagram.

Indices	**Formula**
Transformity:	Tr = Y/Energy of product
Renewability:	%Ren = 100 * R / (R+N+F)
Non renewables and renewables:	NR/R = (N+F) / R
Emergy Yield Ratio:	EYR = Y / F
Emergy Investment Ratio:	EIR = F/ (R+N)

2.4. A more complete diagram of production including part of negative externalities

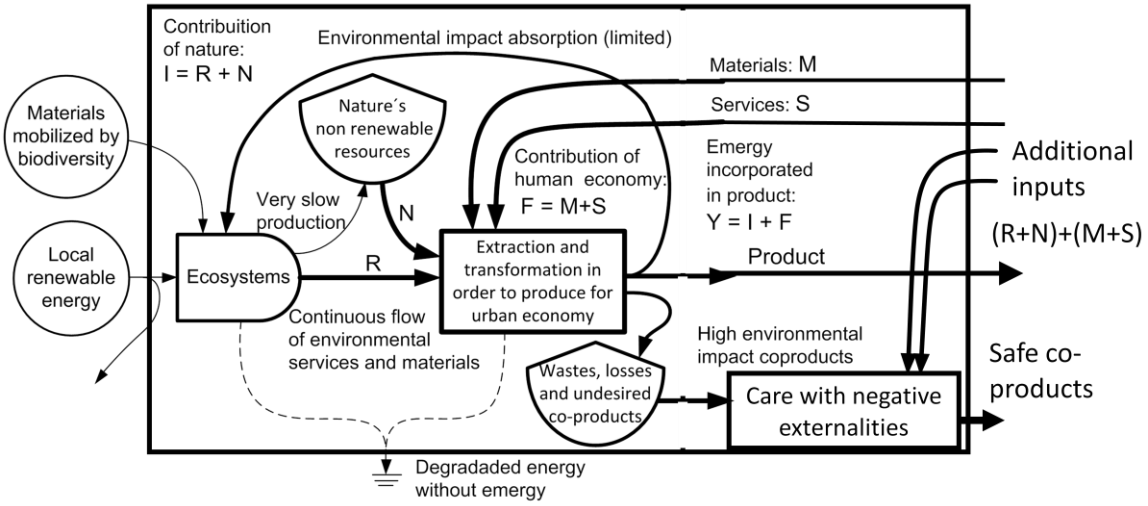

Figure 7. Diagram of an economic production system that includes the costs of care with negative externalities en terms of additional resources (R, N and F).

Through information, investments and infra-structure the ecological systems are destroyed and transformed in simple systems dependent on external systems.

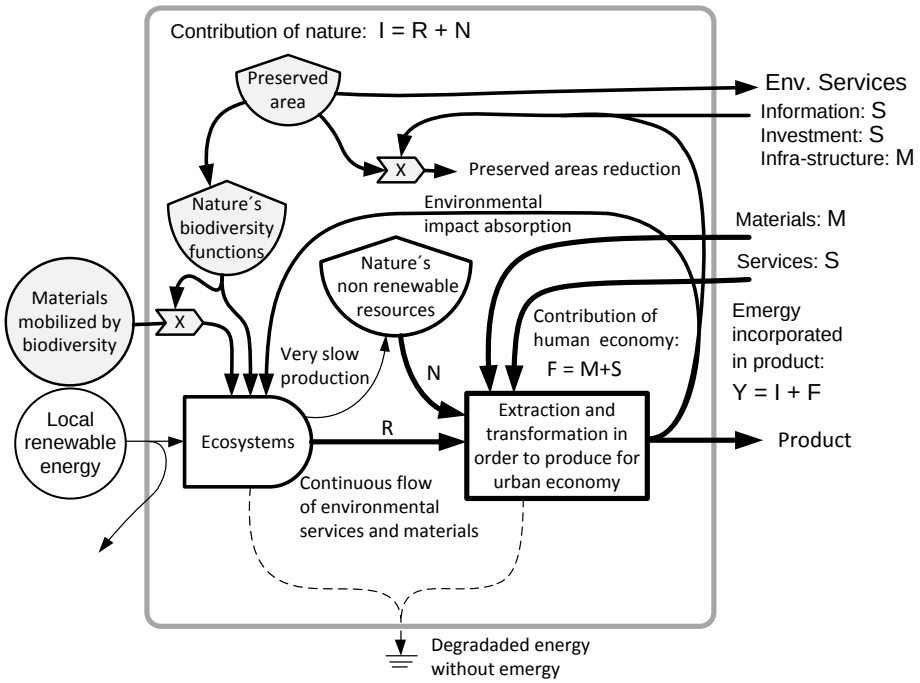

Figure 8. Diagram of an economic production system that includes the costs of loss of environmental services due to native ecosystem area occupation.

2.5. The original ecological system (primitive indigenous societies) and its modification

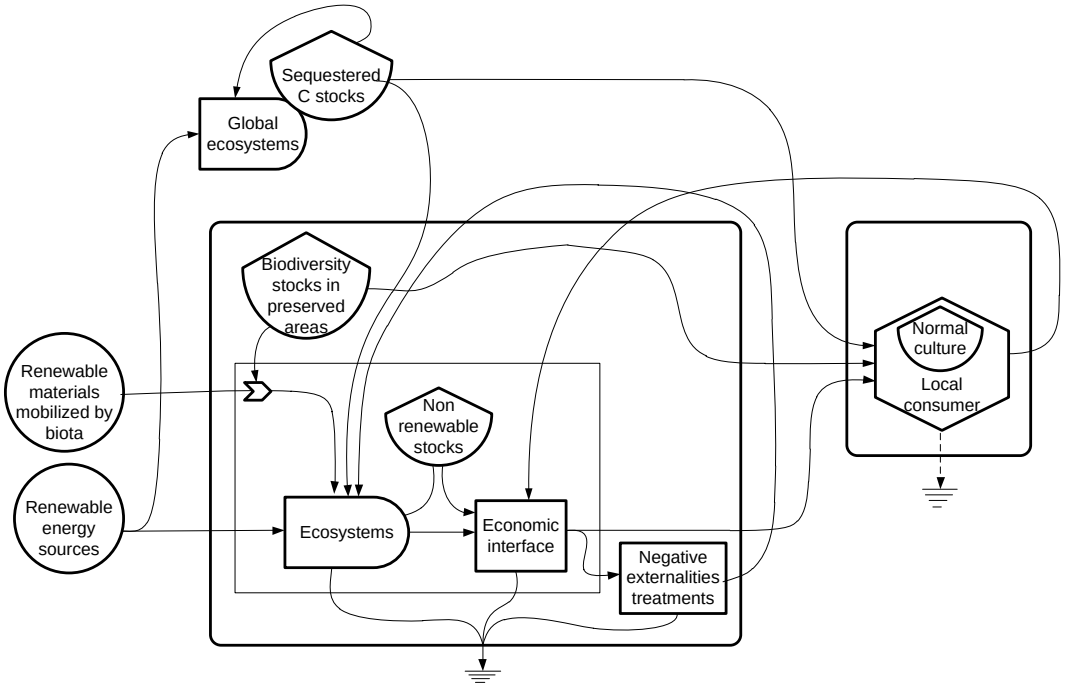

Figure 9. Diagram of a production and consumption system based on renewable resources.

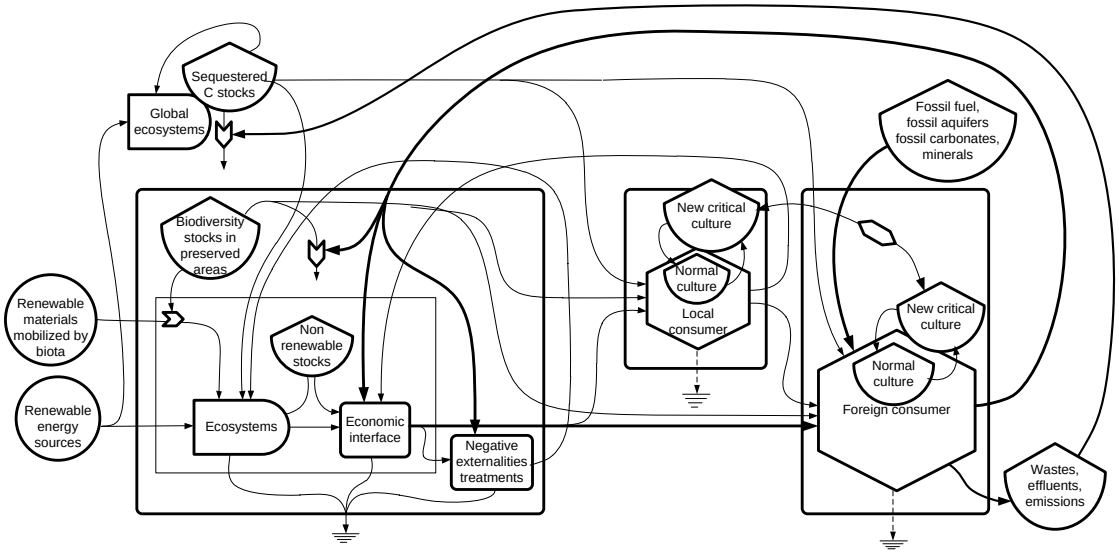

Figure 10. Diagram of a production and consumption system based on non renewable and renewable resources.

2.6. A Prosperous Way Down Future

In this case, even Feedback from Human Economy (F) will be renewable

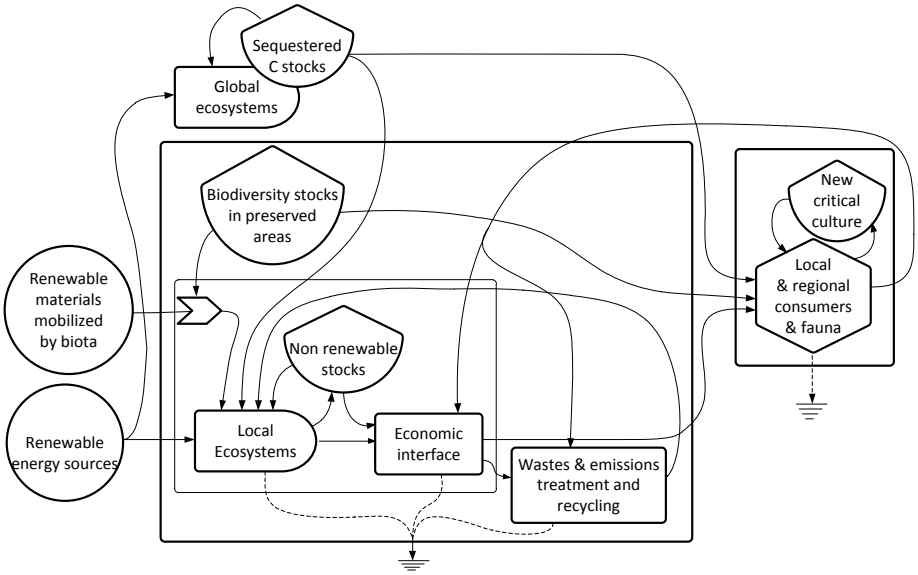

Figure 11. Diagram of a sustainable production and consumption system based on renewable resources, similar to original system after recovering and a new critical organization.

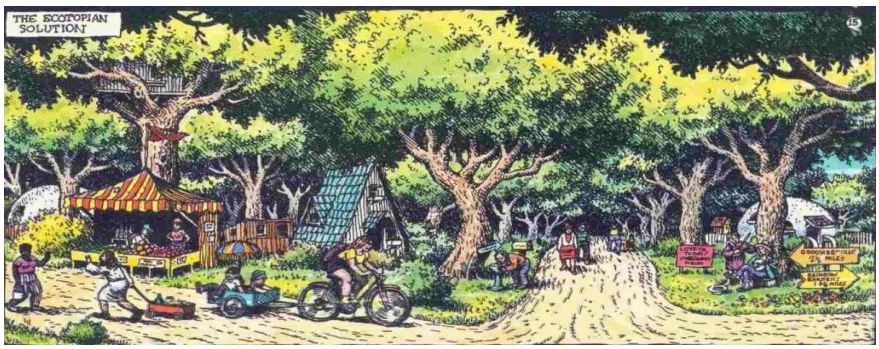

Figure 12. As an image, an example of the ecotopia (the ecological utopia needed)

2.7. The Assessment Criteria using Emergy indices

Table 1. Criteria for assessment of alternatives for public policy or for the enforcement by social movements (different kind of groups)

Criterion	Emergy parameter	Equation
Competitiveness	Emergy power density Solar transformity	ED=Y/area Tr = Y/Eo
Social pressure	Emergy power/application time of force	Eo/DT
Benefit/Impact	Emergy Sustainability Indicator	ESI=EYR/ELR
Fitness	Environmental Loading Ratio Emergy Investment Ratio	ELR =(N+F)/F EIR =F/(R+N)
Sustainability	Renewability Perceptual	%Ren = (100) R/Y
Resilience	(Species)(emergy/specie)(emergy/area) (Function)(emergy/function)(emergy/area)	Vital area Vital area

Table 2. Complementary indicators in the emergy perspective:

Net Emergy	Emergy Yield Ratio	EYR=Y/F
Fair trade	Emergy Exchange Ratio	EER=Y/[$ x (seJ/$)]
Purchasing power of money	Emergy/Gross National Product	seJ/$ = Y/GNP
Individual purchasing power	Emergy per capita	EPC=Y/person

2.8. The analysis of consumption structure

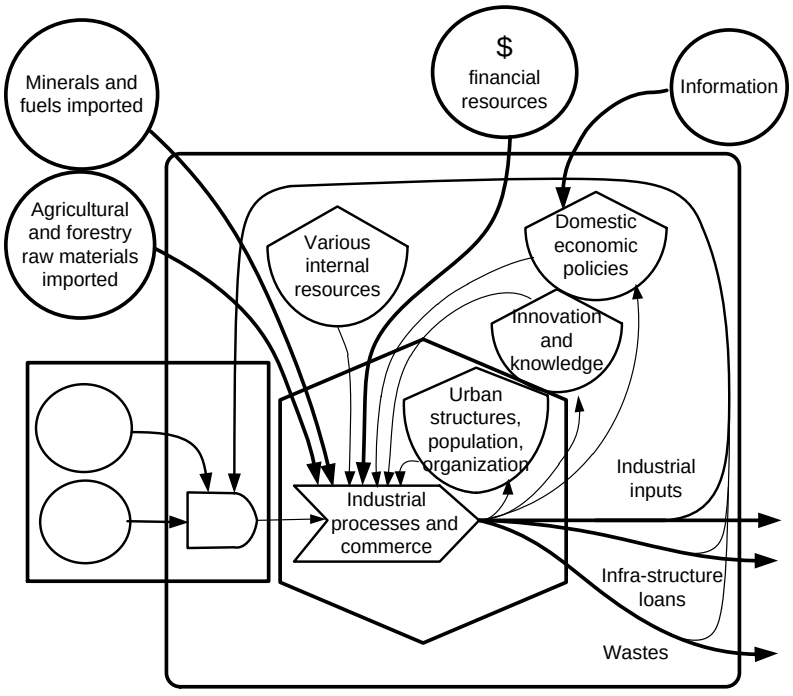

Figure 13. Diagram of the consumption of an industrialized country, much above their local production capacity and depending on imported resources and external information.

2.9. The information structure

According to Emergy Methodology, the exchange of good information could be very helpful to promote organizational changes and new social structures, including political power. But there are different kinds of information. Until now, Information and foreign investments are forces that define the system´s organization. Current consumption is several times larger (in emergy terms) that the global ecosystems´ biological capacity due to the use of fossil fuels and minerals.

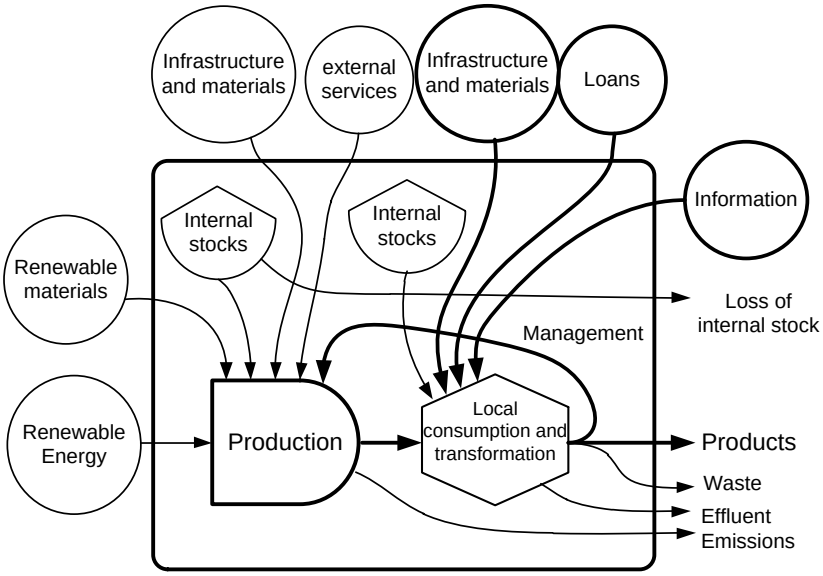

Figure 14. Diagram of the production of a non-developed country, whose production of raw materials is oriented to supply industrial countries and receives as feedback, nonrenewable flows in form of infrastructure, industrial materials, loans and information.

As it can be seen in Figure 13, the consumer´s values and industrial inputs are transferred to the production system through management. The system is linked to a superstructure that is the framework for the operation of the global system for the benefit of certain human groups.

2.10. The super structure

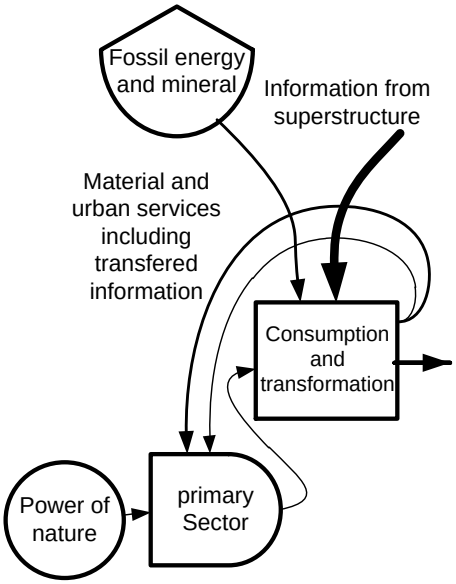

Figure 15. Diagram of subsidiary economy showing links to the super structure.

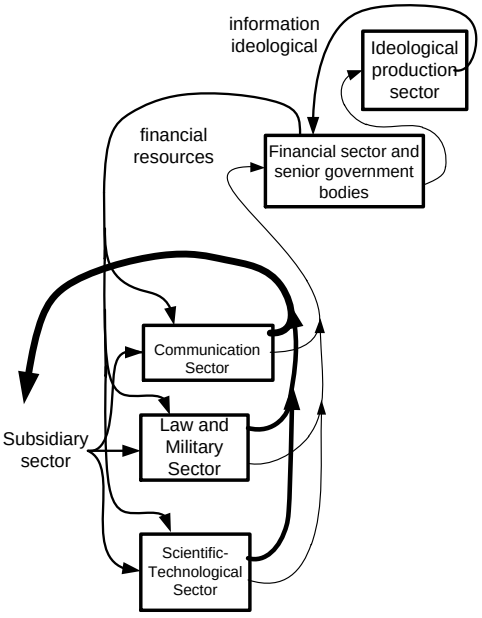

Figure 16. Diagram of the super structure links to subsidiary systems in a more detailed form

Figures 15 and 16 show the political control executed by the super-structure by means of ideology, loans and technology offering and, after that, forcing the payment of debt (at least interests) by coercion means including military forces. Information is political power! Political power has various possibilities of ethical behavior.

The public communication systems provide the idea there is only one kind of information and that it is neutral, it is not the case. Critical and scientific groups of global society should organize to provide alternative information to promote another kind of social organization.

3. UNO´s efforts for a Sustainable Economy

The previous efforts of Ecological Planning of Global Economy made by United Nations (Stockholm, Rio92) were made in response to a important public movement based on scientific facts, in a time of high economic growth with no evidence of oil scarcity.

It is not anymore the case, the economy is slowing down, the future of oil is dubious, climate change is considered of high risk and greenhouse gases emission depends on oil use, besides that, there is a massive extinction of species and a potential huge financial crisis ready to explode.

At this time the objective of Rio+20 is basically to reactivate the global economy, mainly through the use of energy intensive green technologies developed in the Northern Hemisphere industrial countries. The intention is an apparent greening of business as usual capitalist system without any deep ecological or social changes.

Until now, the ideas of Green Economy are not clear enough and probably, even at the time of the meeting, the issues will remain uncertain. Therefore it is convenient to identify, in an independent form, the main world problems and thing about their solutions to compare with the UNO proposals. In the table bellow, the real critical world problems are listed side by side with the ideas to overcome them.

As it can be seen in Table 3, there is necessary a great transformation. Does the Green Economy **focus the problems** cited in the list? In case it considers the critical issues; does it **give the expected answers**?

We will hear in Rio+20 the Green Economy proposals prepared by a joint venture of international enterprises and ONU. Probably their proposals are wrong because they were thought within the conceptual framework of Capitalism that has as paradigm **unlimited and continuous growth**.

Therefore an effort is made to discover how the information subsystem works at global level. Through this analysis it was evident that the main driving force of economy is the power of information. The term information is used in an extended form; it is used to refer to ideological, political, financing, law and military forces.

One proposal of Green Economy, not very well defined, is new kind of political control by means of international courts that will rule on sustainable trade without any legitimacy. Besides that, it will continue the conventional political and economic control through the loan-debt processes. And also the economic control through one-side determination of prices of commodities and industrial inputs.

Table 3. World main problems and their hypothetical solutions.

Critical systemic problems	**Possibility of solution**
[1] Peak of Oil extraction, supply decline and price increase of the main inputs for industrial economy.	A new global economy 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 Asian South-West.	Decentralization of urban population by means of 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.	Recovering 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 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.	Restrictions to biocides production and heavy metals use. Critical changes in chemical, petrochemical and pharmaceutical industries. Priority to wetlands use for tertiary water treatment
[8] The attitude of governments and enterprises to continue economic growth increases the demand for vital resources above critical limits, in a time that should devoted to adjustment to homeostasis.	Public discussion of world´s development in order to consider that development is a cyclic process composed of five sequential steps: balance, growth, peak, decline, and recovery.
[9] Influence of infra-structure contractors and large corporations on public policy.	Prevent the financing of political campaigns by corporations or entities associated with them.
[10] The financial sector shows autism; it gets great profits through speculation and does not recognize the social and ecological reality.	Society must organize to assert their broader and fair objectives. Formal and Continuous Education programs should incorporate the systems Ecology Approach as soon as possible.

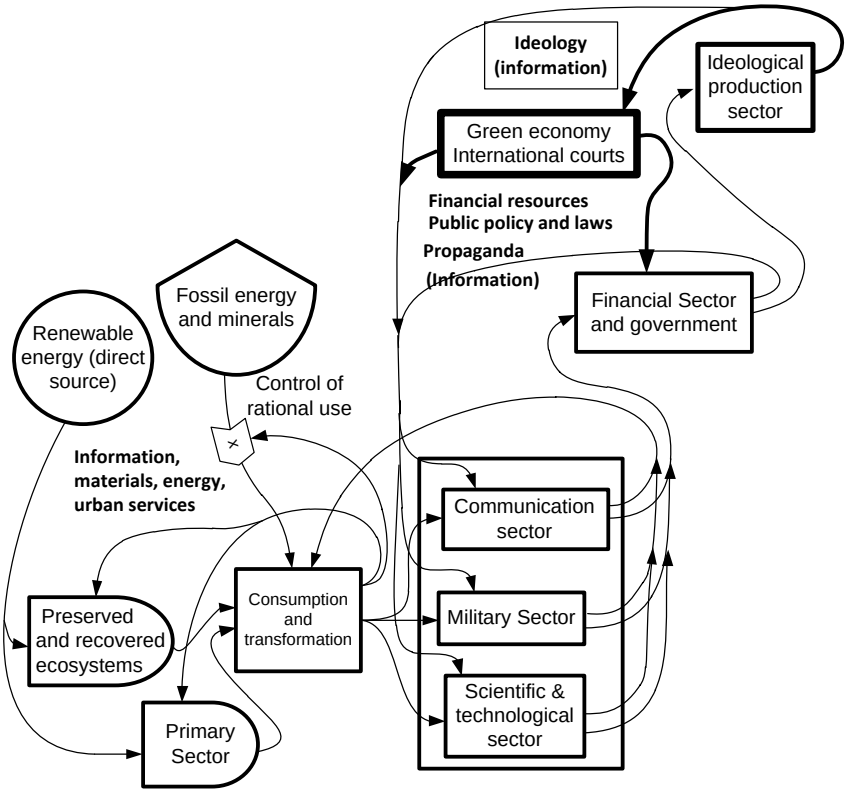

Figure 17. Energy and materials human transformation chain commanded by ideology (information), law enforcement and military power.

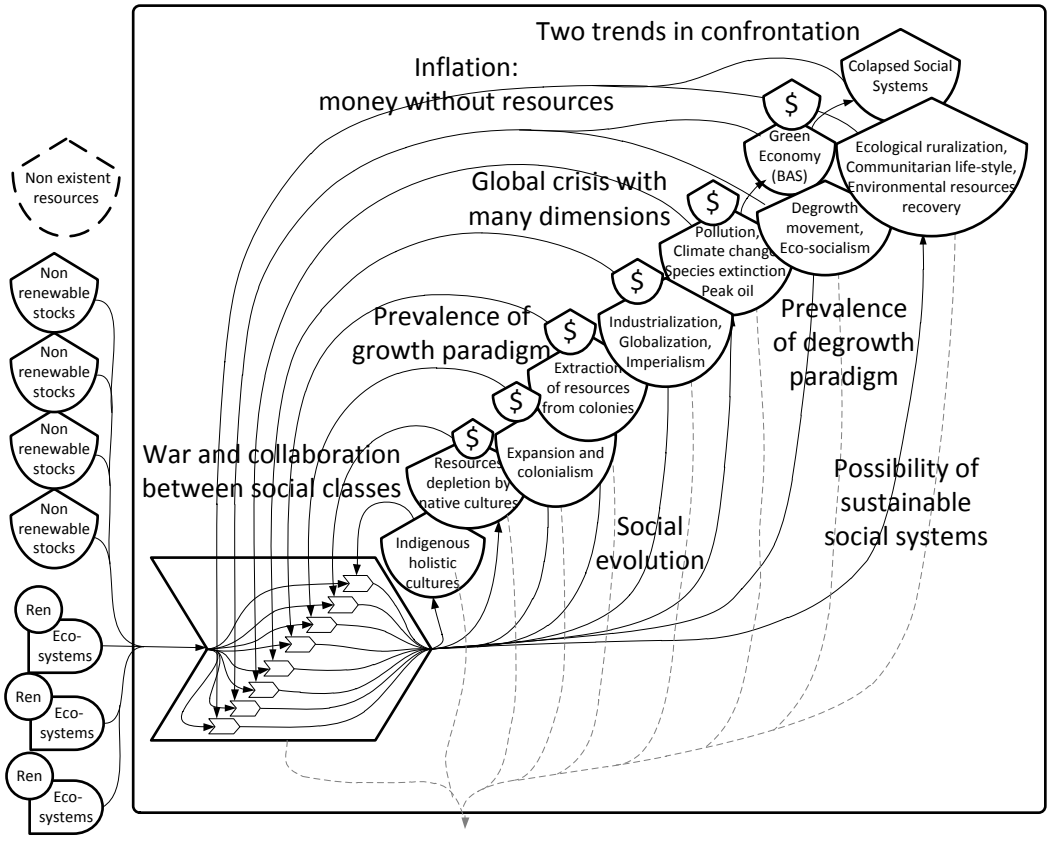

Figure 18. Two social projects in conflict: (a) business as usual and (b) ecological economy.

4. Global System Collapse

There is a great possibility of global economy collapse, due to the several crises that are occurring in parallel form, at these decades. The collapse can be catastrophic or can be a socially commanded process providing a more peaceful and careful decline. Anyhow, it can be predicted the decline of the global capitalism that is based on is a continuous bet on growth.

The use of non-renewable resources generates a growth peak (capitalism) after that, the system will go back again to biological carrying capacity balance through eco-socialism. Figure 18 shows the change with time of oil resources (N) and Q that means economic and human assets (infrastructure, production and consumption, money, pollution, population). The curve of ecosystems assets and services reduction is not shown.

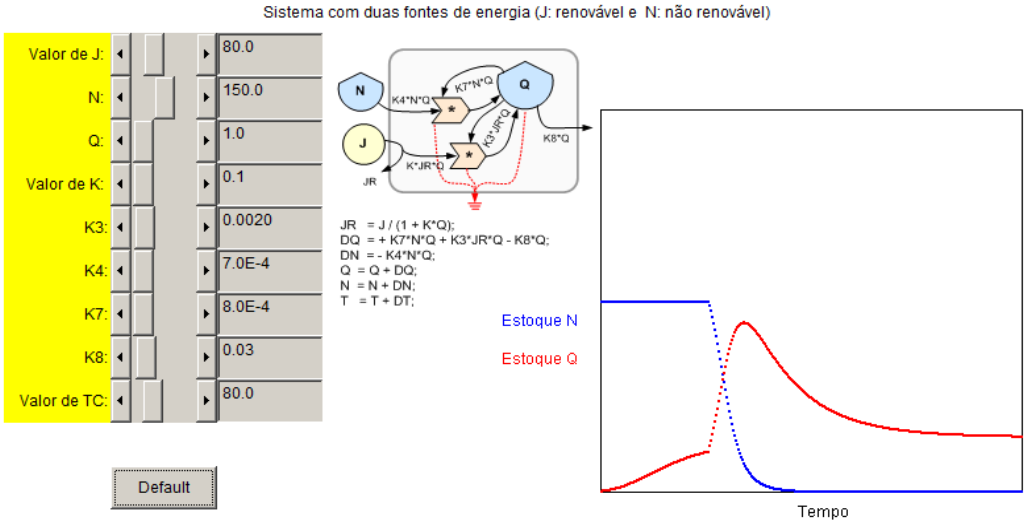

Figure 19. Simulation of world system on a long range basis. Adapted from Odum & Odum (2000).

5. New Political and Economical Systems

It is possible that the Great Transition could begin within a modified Capitalism concerned with environmental issues, but as it does not show enough concern with a deep social change it will be necessary a new kind of socio-political organization model, that should be committed not with preservation of unsustainable structures working in a new social way, but with the decline of that system, which on the other side, means the promotion of sustainable, decentralized, sustainable societies and communities. An important social effort is needed to discuss the best model of Eco-Socialism, as well as the dynamic concepts of Ecological Societies and Human-Environment Interface Development in next decades.

Acknowledgements

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