Inequalities and limits should be at the core of Rio+20

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Foreword

THE ZERO-DRAFT of the outcome document for Rio+20 is silent on two decisive issues for the future of contemporary social organization: inequalities and limits. It therefore contradicts two important studies produced by the United Nations in 2011 showing the mismatch between the pace of global economic growth over the last two decades and the maintenance and regeneration of the ecosystem services that support social life.

It would be unfair to ignore the many positive aspects of the zero-draft (United Nations, 2012), such as the insistence on ending hunger and eradicating all forms of poverty, and the effort to increase the participation of stakeholders in the governance of the technological transformations necessary for a less predatory use of the resources on which the reproduction of human societies depends. The document also strongly emphasizes the promotion of an "integrated and holistic" vision in the planning of sustainable cities, in which efficient transportation and communication systems, green buildings and improved human settlements (starting from the water supply and use system) replace what we have today. It also briefly addresses central issues like climate change, water, energy and biodiversity. It is not within the objectives of this document to delve deeper into any of the aforementioned topics: superficiality in this case is the inevitable result of a monumental effort of synthesis inherent in this kind of political expression.

Despite these caveats, the zero-draft cannot be construed as a basis for the ambitions that the conference should entail. The problem is neither in the inevitable ambiguities of a document whose approval depends on so many protagonists, nor in its timid approach to issues such as climate change, to which no more than two paragraphs are dedicated; and certainly not in the contrast between supposedly noble objectives and the possible parsimony of means by which they would be attained.

It is the general sense, the worldview, the zero-draft *narrative* itself that deviate it from what could arouse the enthusiasm of Rio+20. According to this narrative, redirecting world economic growth toward more renewable energy,

waste reduction and improved eco-efficiency while increasing the inclusion of the poorest through cash transfer programs and improvements linked to the labor market is the path to advancing the changes that sustainable development implies. One can always argue that the document goes beyond that by insisting on the importance of the rights of indigenous communities, the reduction of gender inequality or international technology cooperation itself. But the line of reasoning, what gives life to the text, is making sure that economic growth results in greater success in the fight against poverty and that the pressure on ecosystems is tackled through eco-efficiency.

Could it be that by putting together green economy and fight against poverty the zero-draft would be indicating a promising way toward the emergence of sustainable development? The central idea of this paper is that the governance to which Rio+20 should point is not that of an economy whose continuous growth (although based on the decreased use of materials and energy) would redeem those who are in poverty. Undoubtedly, the twenty first century requires the governance of technological innovation: but it requires, above all, the governance of limits to the use of materials, energy and greenhouse gas emissions. And it is impossible to deal with these limits through technological innovation alone, without facing the inequalities that mark the distribution and use of these material, energy and biotic resources in the global economy and within different countries.

The contemporary world has already put into operation, even if in an uneven, incomplete and fragmentary way, the governance of economic growth, of international cooperation to promote technological change and, to some extent, of the fight against poverty. This, though sprinkled with advances and setbacks, is already happening, as seen for example in the impressive speed at which what many do not hesitate to call the new global middle class is taking shape. A recent study by McKinsey & Company (2011, p.33) estimates that between now and 2030 some three billion people will be added to those who now have a monthly income between $300 and $3,000 (in power parity purchase), and who today do not exceed 1.8 billion. It is true, as the zero-draft itself points out, that extreme poverty still affects a huge proportion of the population, of which the most iconic example is the outrageous one billion people suffering from hunger (http://www.fao.org/do - crep/meeting/024/mc759e.pdf). But the eradication of absolute poverty has never benefited so many people as it does today, although in most cases in a context of increased inequality. Governance mechanisms to reduce poverty do exist and their success is by no means irrelevant.

Similarly, there are governance mechanisms (which undoubtedly need to be improved) to advance the green economy: in 1992, approximately 600 grams of greenhouse gases were emitted to produce the equivalent of one U.S. dollar of global GDP. Twenty years later, the emissions for that same dollar unit had declined nothing less than 23 percent (UNEP, 2011a, p. 22). In the United Sta-

tes and in Great Britain, in 2009 the economy used 40 percent less energy than in 1980 to produce a dollar or pound of goods and services (Jackson, 2009). The advance of eco-efficiency is seen not only in this aggregate performance, but also in a host of government and business initiatives aimed at reducing the amount of water, energy, materials and pollution per unit of goods and services in virtually the entire global economy.

Despite these advances, there is no mechanism and no provision (even if rhetorical) for the emergence of governance aimed at limiting the use of the energy, material and biotic resources on which social life depends, and much less to counter the deep inequality that characterizes them today and that is the major obstacle for these limits to be respected. It all happens as if eco-efficiency were the way to allow the expansion of the economic system and the advances in the fight against poverty to respect the boundaries of ecosystems.

Well, the most informative study on this subject to date shows that as much as 16 of the 24 most important ecosystem services for social life are already severely compromised (Millennium. .., 2005). More recently, the Stockholm Resilience Centre, led by Johan Rockstrom, identified nine ecosystem boundaries which, if crossed, will generate unacceptable environmental change for humanity: climate change, stratospheric ozone depletion, land use, freshwater use, biological diversity, ocean acidification, disruption of the nitrogen and phosphorus cycle, particulate matter (aerosols), and chemical pollution. Three of these boundaries, according to the evidence available thus far, appear to have already been transgressed: climate change, biological diversity and disruption of the nitrogen cycle. And it is clear that these nine points are interconnected: crossing the climate boundary, for example, has consequences for the entire ecosystem of the planet (http://www.stockholmresilience.org/research/ researchnews/tippingtowardstheunknown.5.7cf9c5aa121e17bab42800021543.html).

Extraordinary advances in the use of materials and energy...

The metabolic imbalance of the current relationship between society and ecosystems radically changes the nature, scope and meaning of the inequality issue in the contemporary world. The notions of social metabolism and industrial metabolism invite us to interpret the reproduction of human societies from the study of how the matter and energy they depend on are used and, at the same time, how they manage the waste from their production processes. Metabolism is not strictly biochemical, as it involves the flow of materials and energy on which human societies depend. Even if from the biochemical standpoint the nests are not part of the metabolism of birds, they are fundamental for studying their reproductive processes. The same reasoning applies to human societies with respect to the materials and energy that support their reproduction. It is in this sense that the document of the High Level Panel on Sustainable Development (United Nations Secretary-General's High Level Panel on Global Sustainability, 2012) states that sustainable development is about recognizing, understanding

and acting on interconnections between the economy, society and the natural environment. The decisive basis for understanding social life is the way each human cluster uses the material, energy and biotic resources necessary for their reproduction.

The two most important researchers of social metabolism and industrial metabolism today produced two of the most relevant documents organized by the United Nations for Rio+20. The American physicist and economist Robert Ayres, the most prominent international name in industrial ecology, coordinated the chapter on manufacturing in the powerful Green Economy study released in early 2011 (UNEP, 2011b). His work is important for dispelling the illusion that technological innovations could relatively quickly cause today's world to become independent of fossil energy during the twenty first century. For example, the zero-draft goal of doubling the share of renewable energy in the global energy mix (paragraph 70) may seem ambitious. However, modern renewable energy sources today account for a very small share of the global energy mix: 0.1% for solar, 0.1% for geothermal and 0.2% for wind energy. Hydropower contributes 2.3% to this mix, but like in the case of bioenergy (despite the prospect of cellulosic ethanol), there are clear limits to its global expansion. Advancing these new energy sources is crucial, and doubling their share in the global energy mix in the next twenty years can be a considerable achievement, but it will not significantly reduce the importance of fossils. Nothing would be worse in facing the great social problems of the twenty first century than to feed the myth that there is an abundance of renewable energy just awaiting decision and funds in order to be harnessed. Energy scarcity (and therefore its parsimonious use) is the starting point for any reasonable solution to overcome these problems.

Far from drawing a skeptical conclusion from these data, Robert Ayres shows that there are huge opportunities for efficient energy use (including fossil energy) to contribute to providing the goods and services necessary for social life. Therein lies one of the most important dimensions of the green economy - to improve (far more than what has been done to date) the quality of energy use. According to Ayres, the economic system wastes as much as 80 percent of the primary energy extracted from the earth (Ayres & Ayres, 2011). This is just an indication of the potential of industrial recycling and reuse. Cogeneration for example, which is currently used by about 1,000 U.S. industries, could be immediately multiplied by ten. This would mean ensuring about 10 percent of the U.S. energy generating capacity without using a barrel of oil or an ounce of coal, and at costs far lower than those involved in the construction of power plants (UNEP, 2011b). Still more important is the striking inefficiency of large coal-fueled power plants, which in the past forty years have maintained a virtually unchanged technological standard. Only one out of seven potential work units (i.e., the actual energy service provided) based on coal-fueled power plants translates into something useful for society (Ayres & Ayres, 2011). The

contrast between the progress represented by the iPad and the backwardness of the energy base upon which it rests is overwhelming. At the heart of the green economy is an industrial design effort, not only within each company, but in the very relationship between companies: technology parks could be converted into ecological parks, thus guaranteeing symbiosis in the use of materials and energy between different industries, as already happens in Denmark. This is an example of the promising processes capable of promoting some decoupling of production growth from the use of the materials and energy on which it has relied thus far.

The chapter on manufacturing in the Green Economy report is a required reading for industrial planning, as it shows a huge number of opportunities for economic gains based on the substitution of "green" inputs for "brown" inputs, recycling and change in the industrial design itself (UNEP, 2011b, p.259).

The other paper published in 2011 and which is also underpinned by the idea of social metabolism was led by Marina Fischer Kowalski from the Institute of Social Ecology in Vienna. The work is part of a very advanced international research program in Germany, Austria and the Netherlands, of which the World Resources Institute in Washington is one of the most important dissemination centers. The book, whose title mimics Adam Smith's book (The Weight of Nations - Material outflows from industrial economies - Matthews, 2000) is a required reference on the subject.

Marina Fischer Kowalski coordinated the study released in mid-2011 by UNEP (2011c) on decoupling the supply of goods and services from the material, energy and biotic base it relies on. Her conclusion corroborates the results achieved by both the World Resources Institute and Robert Ayres: since 1980, the growth rate of global wealth has clearly exceeded the speed at which the use of the material, energy and biotic resources it rests upon has increased. The six charts (relating to food, metals, building materials, wood, industrial minerals and fossil fuels) shown on page 12 of the UNEP report, 2011c) follow the same pattern: greater value is obtained for each unit of the resource exploited. The only and concerning exception is agriculture: while more products are extracted from each unit of cultivated land, the use of nitrogen fertilizers increases far more than the supply of grain. This tripled between 1960 and 2008, keeping farmland steady but demanding nine times more nitrogen fertilizers. But in general, the studies by the World Resource Institute and the United Nations Development Program converge by concluding that for each unit of wealth placed on the market the amount of materials and energy used by contemporary economies decreases, with the important and concerning exception of agriculture.

...contrast with a metabolism that suffers from excess and inequality

If that is the case (and this is the crucial dimension of the green economy,

i.e., contribute to changing the metabolism of contemporary social organization through the dwindling use of resources for obtaining goods and services), why do so many agree that despite these advances degradation is accelerating and in some cases exceeding the dangerous boundaries beyond which the consequences can be catastrophic? The response implied in the zero-draft is that the advance in eco-efficiency has been insufficient, and that therefore it is necessary to establish good governance for a green economy capable of accelerating the pace of current technological gains. But both the World Resources Institute and documents from the UNDP and the United Nations Department of Economic and Social Affairs released in 2011 provide empirical evidence that contradicts the assumption that technological advance may be a necessary and sufficient condition to actually promote the decoupling of the supply of goods and services from the material, energy and biotic base it rests upon. Technological innovation is crucial and has contributed, in fact, to the relative decoupling of wealth from the use of materials. *But this mismatch is only relative: in absolute terms the pressure on ecosystems is increasingly higher.*

It is true that the contemporary world uses fewer and fewer materials to produce the same unit of wealth. However, production growth is such that this gain is only relative. In absolute terms, the pressure on resources continues to grow. And the pace of this growth is not declining. Moreover, it is true that the rising incomes of the poorest puts pressure on the ecosystems; the fact is that inequalities are so great that phrases like "changes in consumption patterns" or "sustainable consumption" (contained in the zero-draft) become merciful and empty vows unless they are understood from the perspective of the urgent need to limit the power over resources of those who are at the top of the social pyramid. Let us take a closer look at the issue using the examples of materials, energy and greenhouse gas emissions.

The extraction of four materials alone (industrial minerals, fossil fuels, biomass, and construction materials) has increased by 41 percent in the past twenty years, although in relation to each unit of wealth, production has been more efficient thanks to the technological innovations underway. Back in 2000, Matthew and his collaborators in their work for the World Resources Institute showed that "structural economic change [toward a service economy] and the efficiencies of technology alone are unlikely to bring about real reduction in the use of resources and production of waste. Even if the "material intensity" of contemporary economic life has been reduced (through the use of less material per unit of wealth placed on the market), the absolute amount of these materials continues to grow. It is obvious that technological progress can reduce this pressure by using polymers instead of conventional materials, for example, and there is no doubt that the role of research and of international cooperation is key to guide innovation along this is central. But the increase in the use of resources

in recent years has been so much greater than world GDP growth - despite the technical progress – that it does not seem realistic to bet on innovation capacity alone as a strategy to reduce this pressure. But what does that have to do with inequality?

Currently the world economic system extracts 60 billion tons from the Earth's surface, considering only the four aforementioned materials - biomass, fossil fuels, industrial minerals and construction materials. This corresponds to nine tons per person per year. The problem is that a person born in India today will consume four tons throughout his or her life. One person more in Canada or in the U.S. means 25 tons, or nearly six times as much (UNEP, 2011c). Proposing to fight poverty without integrating it organically into the fight against inequality means believing that the distance between India and Canada could be shortened only in the upward direction, as if it were possible to have enough resources for the average per capita global consumption to rise from the current nine to 25 tons per year.

Should the current trends continue (in population growth, economic expansion and technological innovation), annual resource extraction would amount to 140 billion tons by 2050, which is absolutely incompatible with the ecosystem boundaries (UNEP, 2011c, p.73). If the number seems unrealistic, it is important to remember that throughout the twentieth century the global average metabolic rate (the use of materials per capita) increased from 4.5 to nine tons (ibid, p.72). And one of the most important results of the study led by Marina Fischer Kowalski is to show that in a world that is likely to have a population of 10 billion people by the end of the next century, the average per capita consumption of materials will have to be reduced over time from the current nine to six tons per capita per year. The role of the green economy is to allow the quantity, quality and social meaning of the goods obtained through these six tons to provide more services and greater well-being than what is achieved today using nine tons. But one cannot dispute the conclusion that while the six tons recommended by the UNEP study (and this figure is reaffirmed in the presentation of the study by Achim Steiner, director of the Agency, i.e., it is not just a technical opinion, but rather a figure endorsed by a United Nations authority) enable expanding the Indian aspirations, but there is no way they can be achieved through a mere marginal reduction in the 25 annual tons used on average by Canadians, Americans and certainly by important segments of the population in developing countries. In the only study of its kind conducted for Latin America, per capita consumption of materials in Mexico increased from an annual average of 7.4 tons in 1970 to 11.2 tons in 2003 (UNEP, 2011).

The study of the metabolic relation between human societies and the material bases of their reproduction shows the urgency to implement (as advocated by the zero-draft) innovation systems focused on sustainability: those whose main challenge lies not in increasing labor or capital productivity but in

the income taken from the material, energy and biotic resources exploited by the economy. But regardless of how ingenious and efficient these innovation systems may be, the figures show that they will not achieve their goals unless they are accompanied by limits. And there is no way these limits can be equally distributed among all people on the planet, not only for ethical reasons, but for the very material rationality involved in their use. Inequalities are such that it is impossible to even up the limits required for the economy to fit into the ecosystem unless inequalities are seriously addressed. The problem is that there is no international mechanism available to implement the urgent global governance of the inequality reduction process.

The case of energy is similar. The zero-draft rightly insists on the fact that 1.4 billion people live without access to electricity and that traditional biomass is the main fuel used by 2.7 billion people or no less than 40 percent of the world's population. Household electricity from firewood, cattle dung and charcoal kills more children than malaria, tuberculosis and AIDS. Therefore, universal access to electricity and clean energy sources is a crucial issue. But the social gap in energy consumption is still gigantic. On average, developed countries consume 12 times more energy per capita than developing nations. And this happens despite the extraordinary progress that has allowed richer nations to reduce their consumption per capita by15% in the last twenty years, and despite the 15% increase in energy availability per person in the developing world (UNEP, 2011a, p.74). That is why the United Nations Department of Economic and Social Affairs (2011, p.27) advocates that the energy transition to sustainable development should happen over the next four decades through the enhancement, obviously, of technological innovation and the increased share of renewable sources in the global energy mix, but without losing sight of the limits. These should be set at the level of 70 gigajoules per capita of primary energy. It is obvious that converting this primary energy into what physicists call "useful work" (actually useful energy) and, all the more, obtaining goods and services from this energy depends on technological innovation. But the horizon within which it would be possible to improve the conditions of the 40% of the human species who live on the basis of traditional and harmful sources of energy, without access to what is currently available to those on the higher levels of the social hierarchy is but an illusion. And yet, it is precisely in this illusion that the zero-draft is caught up. Raising the living standards of those at the base of the social pyramid is vital: but in a world that is moving towards 10 billion people, it is impossible to achieve this goal while maintaining the power of those who currently control such an important share of energy, material and biotic resources.

In the case of climate change, it can be said that inequalities have been recognized in the expression (resumed in the zero-draft) "common but differentiated responsibilities". But this recognition is coy, incomplete and little efficient. The challenge here is also the governance of limits, which cannot be

solved unless it is focused on the fight against inequality. In 2000 the per capita emission of a Bangladeshi citizen was 0.27 tons. That same year, an American citizen emitted on average 20.01 tons, or 74 times as much as the person in Bangladesh (World Bank, 2007). The governance of climate policies needs to take into account (what has not happened to date in the Kyoto protocol, for example) the dual character of greenhouse gas emissions, especially carbon dioxide: on the one hand, they are the cause of global warming and, therefore, it is essential that they are drastically reduced; on the other, however, for the vast majority of developing countries they are inherent in the increased supply of goods and services required for the development process (Kanitkar et al., 2010, p.7). This, to some extent, leads to the inevitable increase in their emissions. Sharing the burden of GHG mitigation between different countries and between different social sectors raises a dual question: How to reduce the emissions of an economic system that is still so dependent on fossil fuels and, at the same time, who has the right to occupy the remaining carbon space, whatever its definition may be? Carbon space (whose physical boundaries are established according to an ethical and political objective) and carbon budget (how much carbon can be emitted and who has the right to emit it), which are vital concepts to the governance of the transition to a green economy, are not even mentioned in the zero-draft.

The Durban Conference made clear the distance between the urgency for limits and the absence of governance systems to prevent these limits from being transgresses. While many celebrated as historical the decision that commitments to be undertaken in 2015 might make the reduction of emissions mandatory by 2020, the global economic recovery in 2010 and 2011 relied, as it has not occurred since the beginning of the millennium, on the use of the worst of all fossil fuels, namely coal. PricewaterhouseCoopers (2011, p.6) does not hesitate to refer to the beginning of the recovery from the economic crisis started in 2007/2008 as "dirty" recovery: not only has carbon intensity failed to decline as much as necessary for a consistent path towards the global reduction of emissions, but now it increases when compared to global GDP. If until then, as noted earlier, each unit of GDP was produced based on fewer emissions and these increased because of the increase in global wealth, now the increase is both absolute and relative. As or more important than the innovations needed to transform the global energy mix and reduce emissions in the same way the energy sources currently available are used, is the fact that the carbon space cannot be indefinitely occupied without increasing the risk of catastrophic events.

There is no doubt that international cooperation for a low carbon economy is crucial. But here too, as in the examples of energy and materials, it is not about promoting growth based on the hope that new technologies will allow it to rely on lower emissions in the short term. Especially for the poorest countries in the world, building the infrastructure necessary for the provision of goods

and services to meet the basic needs of the population will still have to depend on cheap sources of energy, among which fossil fuels play the lead role. The challenge of governance is to find out how the burden of reducing emissions will be shared between individuals, social groups, economic sectors, regions and countries, i.e., who will occupy the remaining carbon space. At the core of this governance effort are issues related to the very social meaning of what emerges from the economic system: Before the crisis of 2007, the U.S. auto industry focused its innovations on larger, heavier cars, with higher fuel consumption, less time to reach the 100 miles per hour mark and in a system in which individual transportation becomes increasingly important (Gordon & Sperling, 2009). The governance of climate change will only be effective if it takes into account the merit, the usefulness and the social purpose of what results from economic activities. Therefore, it was not out of naiveté that the excellent document of the High Level Panel on Sustainable Development (United Nations ..., 2012b) was named after Mahatma Ghandi's motto "the Earth provides enough to satisfy every man's need, but not every man's greed."

Conclusions

The governance of the green economy and fight against poverty, as expressed in the document that served as the basis for Rio+20, suffers from a fundamental mistake. It is designed for a world whose challenge would be to produce increasingly more and better. Indeed, the challenge of contemporary governance is to manage the excess, and especially the excesses arising from massive inequalities, of which some material- and energy-related examples were mentioned in this paper. It is true that modern societies have not yet succeeded in generalizing innovation systems aimed at sustainability, whose linchpin would be to increase the productivity of the energy, material and biotic resources which economic activities rely on. Therefore, it is important to implement a type of global governance that transforms science, knowledge and information into common goods of humanity, focused on meting the most serious challenge it has ever faced, namely the compatibility between the size of the economic system and the limits of the ecosystems. But the information available on materials, energy and emissions does not enable cherishing the hope that these technological changes (undoubtedly indispensable and that should advance even further) can be seen as a shortcut that along with the achievements in the fight against poverty would put present societies on the pathway to sustainable development. Growth with eco-efficiency and poverty reduction is something today's world is already doing; it is business as usual, the ordinary way of doing business. But as appropriately pointed out by the Department of Economic and Social Affairs "business as usual" is not an option. Following this path is unsustainable; it will lead to crossing even more boundaries beyond those whose limits we have already reached, thereby undermining the very foundations on which lie the recent achievements in the fight against poverty. The necessary governance - and which

the zero-draft unfortunately does not point to – consists in organizing ourselves so that the limits of the ecosystems and the reduction of inequality are at the core of public and private economic decisions.

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Abstract – Many studies published last year (including some organized by the United Nations) show that the world economic system has dangerously crossed the ecosystem boundaries, mainly as climate, biodiversity and nitrogen cycle are concerned. Far from using these data and conclusions, the Rio+20 zero-draft envisions a business as usual solution to contemporary socio-environmental problems: strengthen the fight against poverty and deepen international cooperation toward eco-efficiency. This paper recognizes the huge progress made in these two domains over the last twenty years. But there will be no material conditions to maintain the success in poverty reduction if the illusion remains that inequality can be fought without altering the power over the natural resources of those on the top of the social pyramid.

Keywords: Inequalities, Ecosystem, Material intensity, Energy intensity, Climate change, Biodiversity.

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