Mudanças de Uso da Terra e do Clima
Climate and Land Use Change

Saulo Rodrigues Filho

Apresentação - *Foreword*

Tropical forests, which comprise about half of the forested areas of the globe, play a central role as far as climate and land use change (CLUC) is concerned. Deforestation and changes in natural habitats of tropical forests have contributed significantly to emissions of greenhouse gases, particularly in developing countries, where emissions from land use change are even higher than those derived from combustion of fossil fuels. In addition, CLUC threatens the provision of environmental services and biodiversity, being therefore detrimental to society under different scales, whether global or local, while the subsistence of traditional populations is at stake. In the context of climate change, the Amazon rainforest is responsible for releasing each year hundreds of millions of tons of carbon into the atmosphere. Deforestation open clearings in the forest, making the incidence of solar radiation more efficient, while global warming, in turn, contributes to the increasing susceptibility to forest fires. Thus, land use change and global warming act synergistically in the transformation of the Amazon Biome.

The fourth issue of the journal ***Sustainability in Debate*** addresses CLUC from different perspectives, as presented in the research articles from Brazil, India and Tunisia. Except the article on climate change in the state of São Paulo, which was presented in the International Seminar on at the 2011 Colorado Conference on Earth System Governance: Crossing Boundaries and Building Bridges, held at Colorado State University (Fort Collins, Colorado, May 2011) at the Colorado State University, the three other articles that compose the Dossier CLUC are derived from researches conducted within the LUPIS Project - Land Use Policies and Sustainable Development in Developing Countries (FP6-GOCE-036955) – with financial support from the European Commission.

This century announces that our civilization is facing one of its greatest challenges, derived from the way society has been connected with nature. From the scientific evidence pointing to severe climatic disasters due to increasing emissions of greenhouse gases, there is an urgent need to revise the concept of development that has followed closely our civilization. After the World War II, mankind has experienced a pace of unprecedented economic growth, which required an accelerated exploitation of natural resources, especially energy and minerals, associated with large-scale food production. Severe environmental impacts have arisen as a result of this extraordinary consumption of resources.

The XXI century has began with an important inflection of the historically decreasing values of natural resources, as mirrored in the prices of commodities through the XX century. Since 2003, however, we are likely entering a new age of valuation of raw material and energy, arguably caused by both high growth rates in populous emerging countries and the increasingly shared notion of a finite world, as reflected in evidence of a human-driven climate change, an overshooting ecological footprint and the ever increasing loss of biodiversity and other natural assets. If this interpretation is consistent, it is very likely to lead to the revision of an important mainstream economic argument that states that the losses of natural capital can ever be compensated by technological innovation. This assumption seems no longer to be valid.

Markets alone have never been able to incorporate an appropriate valuation of some important aspects associated with human wellbeing, such as social equity, environmental services, human rights, less useful living species and ethical principles. Due to their inherent inability to deal with those important aspects of development, as far as the sustainability of life is concerned, markets require a proper regulation from states and international organizations. The roots of this inability might also explain the recent and long-lasting financial crisis initiated in 2008.

Following the principle of an infinite world, market forces have now managed to include green economy as a directive for the Rio+20 meeting scheduled for 2012. Green economy is all and only about efficiency in the use and management of materials and energy. This strongly depends on the intensity of capital and technological investments, and gives more industrialized countries an evident competitive advantage in international trade.

There are two possible ways to make the matter of the green economy to an interesting pathway for emerging countries: one is expressed in the Brazilian Official Document - for the UN Conference Rio+20, in which a concept of inclusive green economy is proposed, so that social equity is incorporated. Another way is to support the revision of the neo-classic economic assumption, towards the recognition a finite carrying capacity from natural systems. This would lead to the higher valuation of goods and services, such as artisanal products, smallholder business, extractive natural products, food, energy and minerals, to mention just some key products and processes as far as a sustainable society is concerned. Sustainability of natural resource use is likely to be achieved only after a significant higher market valuation for primary products and services thereof.

It is important to highlight that the prescriptions of neoliberal economic policies adopted by many countries since the late 1980s, as a precondition for achieving higher levels of development, are out of step with current needs to review the concept of development. The so-called market instruments for environmental management, although more efficient in narrow economic terms, fail to consider important principles of ethics and environmental justice, so that the regulation by national and multilateral institutions becomes increasingly recognized as indispensable. An example of this recognition was the recent decision to regulate the financial market in the United States, as a result of global economic crisis started in that country in September 2008.

The unsustainable consumption patterns of our society have become better understood with the advent in the mid-1990s of a methodology for assessing the environmental pressure that each

consumed item has on nature, both in terms of productions and of waste disposal. This evaluation methodology was called the "Footprint".

The concept and methodology of the "Ecological Footprint" were presented to the scientific community by the pioneering work by Mathis Wackernagel and William Rees. The publication of the book *Our Ecological Footprint,* in 1996, marks the beginning of an innovative and powerful concept, used to communicate, measure and point the way to a more sustainable society, particularly with respect to consumption patterns.

While in the 20th century food safety was a strategic target of scientific research and public policy, today energy security has been added as a central part of geopolitical interests. Rising oil prices and political instability in producer countries make the issue a global priority. In addition, mitigating the negative impacts of climate change also requires fundamental changes in the energy mix of all countries. The early XXI century foreshadows what might be called a post-industrial revolution, an event that leaves behind the legacy of the industrial revolution, intensive in fossil energy, for a new production model further powered by fossil fuels but with an increasing share of solar and biomass. Energy and food security thus become intrinsically linked, since both depend on the maintenance of soil fertility and water availability.

Carbon sequestration by the growth of sugar cane means that the ethanol biofuel has a clear positive contribution to climate sustainability on a global scale.

However, the social and environmental cost of this type of bioenergy production in local and regional scales must be highlighted. The social and environmental impacts arising from expansion of monoculture of sugar cane and soybeans, the latter also used for the production of biodiesel, should be regulated by public policies to prevent the expelling of rural populations and traditional family farmers, who account for 70% of the production of the food consumed in Brazil.

It is therefore essential to adopt a standard accounting system for assessing sustainable development, considering the aforementioned trade-offs related to different scales of multi-dimensional impacts.