

**THE CONSTRUCTION OF AN ECOLOGICAL MACROECONOMICS:  
THEORETICAL PARADIGM SHIFT AND AN INTEGRATION OF THE  
ENVIRONMENTAL VARIABLE IN THE ECONOMIC GROWTH MODELS**

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Abstract:

The historical disregard of environmental variable as a factor of production in economic growth models shows an inherent and evident ideological point: the resistance in accepting environment as a limiting factor, based on the assured overcoming of any alleged border by continuing technological progress (VEIGA, 2005). Concepts such as critical natural capital, ecosystem services, entropy, irreversibility, resilience and hysteresis don't belong to the theoretical framework of orthodox economics (BEINHOCHER, 2006). Such limitation is substantial because the environmental impacts and their attributes in utility – or human well-being – are straightforward. In this sense, the inclusion of natural capital as a strategic asset, as well as its mechanisms and dynamic relations has implications both on the reorientation of macroeconomic growth policies and proposals of development projects.

It is evident that the effects of relations between two systems essentially complex as the economic and ecological are not trivial and have high levels of uncertainty associated with its dynamics. Inside the so-called theory of economic growth, there are any models that can capture and provide minimally satisfactory explanations on these issues.

However, this lack cannot be regarded as the single point of weakness on theories of economic growth. The overcoming of the paradigms related to classical mechanics and the resulting assumptions of rationality of economic agents and equilibrium – the main bases of neoclassical thought (BEINHOCKER, 2006) – are essential to reflect, evaluate and rethink contemporary macroeconomic reality. Consider macroeconomic phenomena as dynamic and interdependent of other areas – like environment – is a necessary step that should be taken at some point.

Even the question of technological progress – and its role in mediation of environmental problems, as hardly advocated by the neoclassical current (VEIGA, 2005) – must be understood as an emergent property of a complex ecological-economic system (NELSON & WINTER, 2005, BEINHOCKER, 2006).

In this sense, the redesign of economic growth modeling should start from establishing adequate and true premises, as necessary condition for the better explaining to the macroeconomic reality.

The evolutionary theory could be seen as a methodological solution for treating these questions. Overcoming analogy or metaphorical relations with biological context, the evolutionary theory is guided by broader questions that consider evolution as an algorithm applied to universal phenomena and has some certain rules that can be applied in many contexts (BEINHOCKER, 2006). This approach has potential to advance over the main fragilities of current models, based on the economic mainstream, and allows adapting for other variables with dynamic behavior, as natural capital.

The evaluation of economic growth theories from this new point of view – macroeconomic phenomena inserted on something bigger: the environmental system, based on simple evolutionary rules, with potential to contribute for important considerations about the main points of the physical limits to economic growth, sustainability and strategic view of development. In this sense, this paper intend to dialog about the construction of an ecological macroeconomic view, taking as premise the evolutionary approach, by elaborating an agent-based model to evaluate economic growth including the environmental variable.

The proposed model aims to simulate a stylized market, based on a construction of heterogeneous economic agents, gifted with imperfect information and adaptive capacity for different scenarios, which evolve through time. The environmental variable – the natural capital – is introduced in terms of exergy, and aims to simulate the impacts of natural capital as a resource and inputs provider, and as an important ecosystem services provider to human well-being.

The main purpose is to evaluate possibilities from scenarios, guiding the relations between the economic productive systems, the natural capital and human well-being and, from them, elaborate reflections and discussions to contribute to strengthen the basic premises of ecological economics.

#### References

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