GREAT TRANSITION INITIATIVE
TOWARD A TRANSFORMATIVE VISION AND PRAXIS

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Global Scenarios: Explorations in the Scientific Imagination

An Interview with Gilberto Gallopín

Gilberto Gallopín, a pioneer in the field of scenario-based modeling of global futures, talks with Tellus Senior Fellow Allen White about the origins of contemporary scenario analysis and how this approach can help us to explore pathways toward a just and sustainable planetary future.

Your career in global modeling has spanned over four decades. What drew you to the field?

In 1972, shortly after finishing my Ph.D. and post-doctoral work, I was invited to join a new research team in Argentina to develop a mathematical simulation model of the world in response to the Club of Rome's *Limits to Growth* report. *Limits to Growth* had broken new ground in demonstrating that global modeling could move beyond academic circles to address a wide public audience. The report argued that the prevailing global trajectory would end in collapse because of the physical resource constraints humanity was already starting to push up against. It emphasized the need for population control and a halt to industrial growth, and argued that population growth was the greatest impediment to a more equal distribution of the world's resources.

I was a young systems ecologist, focused mostly on population and ecosystems models, but also with some experience in interdisciplinary models of the natural, social, and economic aspects of development. I could not resist the challenge, so I joined the newly formed group at the Bariloche Foundation, coordinated by Amílcar Herrera, to help develop the integrated global model, later known as the "Latin American World Model" (LAWM). In contrast to *Limits to Growth*, our model demonstrated the possibility of an alternative sustainable development path that embraced redistribution, environmental sustainability, equity, and human well-being.

You were highly critical of the *Limits to Growth* model, were you not?

Yes, but not for the same reasons cited by most critics of the model. Techno-optimists strongly criticized *Limits to Growth* because they disagreed with the premise of physical limits, arguing that any limit could be transcended through technological innovation. My colleagues and I,

on the other hand, believed that the focus on physical limits provided only a partial picture of possible global futures. Yes, there are physical limits to growth, but there are also socio-political forces threatening future well-being, forces such as inequality, consumerism, and asymmetrical power structures. In other words, if business-as-usual persisted for the ensuing decades, we would see a breakdown, but more for social and economic reasons than for ecological ones. Our approach combined both technical and ethical dimensions, a major departure from the unidimensional approach of the time.

Our effort to focus on the human dimension of the global future led to key modeling innovations. We discarded GDP as the leading indicator of development because if our goal is increasing quality of life, GDP is only a means, not an end. We determined that a reasonable proxy for quality of life was life expectancy at birth, which correlates closely with the satisfaction of basic human needs, the foundation of well-being. We used nonlinear optimization—a way of identifying the best path to a normative result—to build a mathematical simulation model that demonstrated the material feasibility of pursuing an "optimal" trajectory toward a sustainable and equitable global future. This laid out the quantitative basis for a vision of a new society.

How do normative scenarios differ from conventional approaches?

Most models and scenarios are *implicitly* normative. *Explicitly* normative ones show openly the set of ethical values adopted and the desired future situation of the world. Stating the foundational value judgments and assumptions is key for the critical assessment of the scenarios or models.

Scenarios can include both qualitative and quantitative factors, while mathematical models are limited to quantitative ones. Qualitative scenarios can account for many critical cultural and political forces that influence the future. Normative scenarios that blend the qualitative and quantitative help explore possible paths towards desirable futures. So-called "exploratory" models and scenarios, on the other hand, describe one or more trajectories the system may follow "left to itself" or under alternative sets of initial conditions. "Backcasting scenarios" define a desired future state of the world and then search for feasible trajectories to achieve it.

Normative scenarios of socio-ecological systems stir the imagination, provide a basis for hope and enlightenment, and, in the best of cases, foster mobilization for positive change.

What impact did the neoliberal turn of the late 1970s and 1980s have on modeling?

The 1970s were called "the second development decade." Global debates about the need for new development pathways, "a new international order," and long-term and global perspectives flourished. This changed during the 1980s with the clear entrenchment of short-term thinking and a loss of interest in the fate of the poor. The emphasis on solidarity in the 1970s was replaced by one on competition. Different explanations have been proposed for this change, ranging from ideological shifts to disappointment with planning and poor predictive power of extant models. But whatever the reason, it had a damaging impact on global, long-term modeling. Many of the groups that had produced these global studies were dissolved. Our experience was

an extreme case. Our team, and the institution that hosted it, was dismembered by the pressures of the military dictatorship that took power in Argentina in 1976 and savagely repressed dissent. All over the world, models and projections became generally dominated by short- or mid-term studies, many of them of an economic nature and bound by the prevailing growth paradigm.

A "second wave" of global assessment came in the 1990s. What triggered this?

The emergence of global environmental problems played a significant role, as did the increasing public and political attention to them. The UN-commissioned report *Our Common Future*, published in 1987, highlighted the unsustainability of the current global trajectory, and the Intergovernmental Panel on Climate Change, created in 1988, brought scientific attention to the issue of global climate change. Interestingly, none of the major global environmental problems—such as climate change and depletion of the ozone layer—were anticipated by the global models produced in the 1970s.

You were the co-coordinator of the Global Scenario Group (GSG), which formed in 1995. What inspired the creation of the GSG, and how did GSG position itself with regard to past modeling efforts?

The GSG was convened by the Stockholm Environment Institute to serve as a resource for researchers and policymakers to discuss and reflect upon the possible transitions to a sustainable world. We sought to identify possible future trajectories of the world (or Earth System, as it would be called today) and to explore in depth those that seemed desirable, using qualitative scenario analysis supported by quantitative assessments. A unique characteristic of the GSG was its independent, international, and interdisciplinary nature: it reflected a wide variety of geographic, professional, and cultural perspectives. This was essential for minimizing the unavoidable biases when discussing complex global issues. The GSG was informed by the modeling efforts of the 1970s, but it improved upon them and presented a sharp, and much needed, break from the dominant trends of the 1980s.

What do you see as the legacy of the GSG?

The GSG made an important contribution to the ongoing process of rethinking the destiny of humanity. The GSG's legacy includes the group's three major reports, plus a number of papers and books directly or indirectly derived from its work. The central ideas of the GSG were diffused through conferences, online media, and the engagement of a wide and enthusiastic international community. Its legacy also includes the non-quantifiable, even unknown, influence of its work on the ideas of the wider community of thinkers and doers, which may well be its most important contribution in the long run. The subsequent launch of the Great Transition Initiative as heir to the GSG continues the dissemination of its core concepts.

How can one create scenarios that resonate cross-culturally, given the vast differences in values and worldviews across regions and nations?

It is a challenge; however, thoughtful scenarios developed collectively by a cross-cultural group such as the GSG can overcome, complement, or at least reconcile these differences to achieve universal resonance. Some of the major values included in our scenarios have universal, or almost universal, appeal. While we sometimes differed in explaining various global social, economic, and technological developments, our basic agreements on GSG's core values kept us coherent and motivated. The active, participatory nature of the GSG further ensured that differences were constructively vetted and resolved, and we agreed that, in our desirable futures, societies would be able to choose their specific solutions on the basis of cultural preferences.

Perhaps scenarios that embody universally shared values appeal more readily to people than governments?

Yes, that is possible, and perhaps even to be expected. Very few governments can be described as altruistic. However, the prevalence of geopolitical power games, increasing inequity, and egoistic and consumeristic values are leading us towards a world in which we all will be losers, even the so-called "winners." I believe that even governments are gradually realizing that it is in their self-interest to change course towards a sustainable and equitable world.

In any case, our focus was on engaging the public to facilitate creative thinking and on providing greater understanding of alternatives to the conventional development paradigm. Over time, my colleagues and I have worked with a wide array of scenarios involving various levels of quantification and narrative detail. One lesson we learned is that the more transparent the tools, the more powerful the public engagement. Opaque mathematical models that appeal only to the expert community have little capacity to change minds and mobilize action.

What do you see in the future for scenario-based global modeling?

I see scenario-based modeling on the rise. The IPCC assessments offer a notable example. The second generation of the Global Water Scenarios, now being developed, is expected to combine scenarios with hydrological and economic mathematical models, building on the success of the first generation.

In the longer term, I expect that advances in complexity theory will facilitate the formal integration of qualitative and quantitative factors and possibly the development of hybrid scenarios/mathematical models. I also expect to see methodological advances that help us better understand and deal with uncertainty, thus making possible new ways of thinking and acting, as well as providing clearer criteria for identifying what can and cannot be predicted.

In the perilous decades ahead, we need mechanisms that, at once, account for and deal with uncertainty while providing instruments for imagining a better world. I believe that this fundamental need will lead to continued innovation and refinement of scenario-based modeling in the years to come.

About the Interviewee

Gilberto Gallopín has had a long international career as a sustainability scientist, scenario builder, and systems analyst. He has served as Regional Adviser on Environmental Policies for the UN Economic Commission for Latin America and the Caribbean; Program Director at the Stockholm Environment Institute; Leader of the Land Use Program of the International Center for Tropical Agriculture; Senior Fellow of the International Institute for Sustainable Development; and Senior Expert on Environment and Development in the International Institute for Applied Systems Analysis (IIASA). He was Full Professor at the University of Buenos Aires and at the Fundación Bariloche, Argentina, as well as Executive President of the latter. From 1995 to 2002, he served as Co-coordinator of the Global Scenario Group, the international and interdisciplinary forerunner of GTI. Gallopín holds a Ph.D. from Cornell University.

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About the Great Transition Initiative

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