Ethics for degrowth: some insights from N. Georgescu-Roegen's bioeconomics

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Outline

(1906-1994)

I. Anthropocene and planetary boundaries
II. Bioeconomics in a few words
III. Georgescu-Roegen's ethics: some main features
IV. Bioeconomic ethics: a new ethics for degrowth perspectives

I. Anthropocene and planetary boundaries

Geology of mankind

Paul J. Crutzen

For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behaviour for many millennia to come. It seems appropriate to assign the term 'Anthropocene' to the present, in many ways human-dominated, geological epoch, supplementing the Holocene — the warm period of the past 10–12 millennia. The Anthropocene could be said to have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784.

Mankind's growing influence on the environment was recognized as long ago as 1873, when the Italian geologist Antonio Stoppani spoke about a "new telluric force which in power and universality may be compared to the greater forces of earth,"

referring to the "anthropozoic era". And in 1926, V. I. Vernadsky acknowledged the increasing impact of mankind: "The direction in which the processes of evolution must proceed, namely towards increasing consciousness and thought, and forms having greater and greater influence on their surroundings." Teilhard de Chardin and Vernadsky used the term 'noösphere' — the 'world of thought' — to mark the growing role of human brain-power in shaping its own future and environment.

The rapid expansion of mankind in numbers and per capita exploitation of Earth's resources has continued apace. During the past three centuries, the human population has increased tenfold to more than 6 billion and is expected to reach 10 billion in this century. The methane-producing cattle population has risen to 1.4 billion. About 30–50% of the planet's land surface is exploited by humans. Tropical rainforests disappear at a fast pace, releasing carbon dioxide and strongly increasing species extinction. Dam building and river diversion have become commonplace. More than half of all accessible fresh water is used by mankind. Fisheries remove more than 25% of the primary production in upwelling ocean regions and 35% in the temperate continental shelf. Energy use has grown 16-fold during the twentieth century, causing 160 million tonnes of atmospheric sulphur dioxide emissions per year, more than twice the sum of its natural emissions. More nitrogen fertilizer is applied in agriculture than is fixed naturally in all terrestrial ecosystems; nitric oxide production by the burning of fossil fuel and biomass also overrides natural emissions. Fossil-fuel burning and agriculture have caused substantial increases in the concentrations of 'greenhouse' gases — carbon dioxide by 30% and methane by more than 100% — reaching their highest levels over the past 400 millennia, with more to follow.

So far, these effects have largely been caused by only 25% of the world population. The consequences are, among others, acid precipitation, photochemical 'smog' and climate warming. Hence, according to the latest estimates by the Intergovernmental Panel on Climate Change (IPCC), the Earth will warm by 1.4–5.8 °C during this century.

Many toxic substances are released into the environment, even some that are not toxic at all but nevertheless have severely damaging effects, for example the chlorofluorocarbons that caused the Antarctic 'ozone hole' (and which are now regulated). Things could have become much worse: the ozone-destroying properties of the halogens have been studied since the mid-1970s. If it had turned out that chlorine behaved chemically like bromine, the ozone hole would by then have been a global, year-round phenomenon, not just an event of the Antarctic spring. More by luck than by wisdom, this catastrophic situation did not develop.

Unless there is a global catastrophe — a meteorite impact, a world war or a pandemic — mankind will remain a major environmental force for many millennia. A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the era of the Anthropocene. This will require appropriate human behaviour at all scales, and may well involve internationally accepted, large-scale geo-engineering projects, for instance to 'optimize' climate. At this stage, however, we are still largely treading on *terra incognita*. ■

The Anthropocene

The Anthropocene could be said to have started in the late eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane.

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A safe operating space for humanity

Identifying and quantifying planetary boundaries that must not be transgressed could help prevent human activities from causing unacceptable environmental change, argue **Johan Rockström** and colleagues.

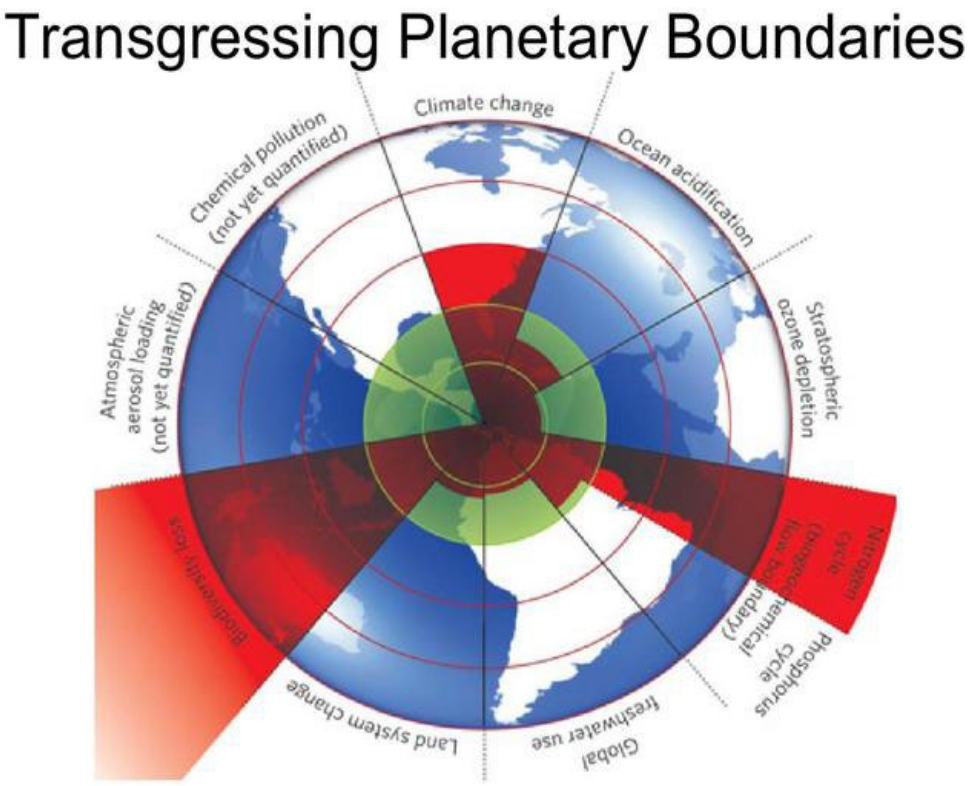

Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

ENVIRONMENTAL STUDIES

Earth beyond six of nine planetary boundaries

Richardson *et al.*, *Sci. Adv.* **9**, eadh2458 (2023) 13 September 2023

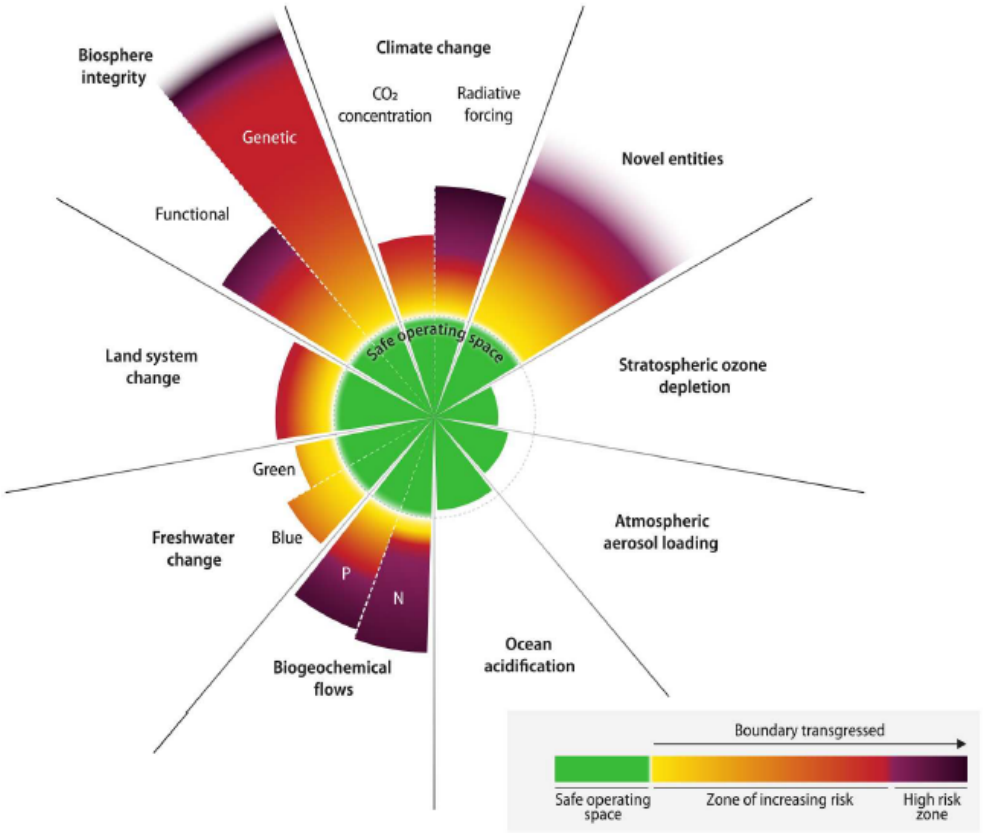

Fig. 1. Current status of control variables for all nine planetary boundaries. Six of the nine boundaries are transgressed. In addition, ocean acidification is approaching its planetary boundary. The green zone is the safe operating space (below the boundary). Yellow to red represents the zone of increasing risk. Purple indicates the high-risk zone where interglacial Earth system conditions are transgressed with high confidence. Values for control variables are normalized so that the origin represents mean Holocene conditions and the planetary boundary (lower end of zone of increasing risk, dotted circle) lies at the same radius for all boundaries (except for the wedges representing green and blue water, see main text). Wedge lengths are scaled logarithmically. The upper edges of the wedges for the novel entities and the genetic diversity component of the biosphere integrity boundaries are blurred either because the upper end of the zone of increasing risk has not yet been quantitatively defined (novel entities) or because the current value is known only with great uncertainty (loss of genetic diversity). Both, however, are well outside of the safe operating space. Transgression of these boundaries reflects unprecedented human disruption of Earth system but is associated with large scientific uncertainties.

Planetary boundaries and justice in a global context:

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Growth, A-Growth or to Stay within Planetary

Jeroen C.J.M. v

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Measuring progress in the degrowth

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ARTICLES
https://doi.org/10.1038/s41893-018-0021-4
nature sustainability

A good life for all within planetary boundaries

PERSPECTIVE
https://doi.org/10.1038/s41893-018-0194-x
nature sustainability

Policy design for the Anthropocene

Thomas Sterner[1*], Edward B. Barbier[2], Ian Bateman[3], Inge van den Bijgaart[1], Anne-Sophie Crépin[4,5], Ottmar Edenhofer[6,7,8], Carolyn Fischer[9], Wolfgang Habla[10], John Hassler[1,11], Olof Johansson-Stenman[1], Andreas Lange[12], Stephen Polasky[13], Johan Rockström[5], Henrik G. Smith[14], Will Steffen[5,15], Gernot Wagner[16], James E. Wilen[17], Francisco Alpízar[18], Christian Azar[19], Donna Carless[20], Carlos Chávez[21], Jessica Coria[1], Gustav Engström[4], Sverker C. Jagers[22], Gunnar Köhlin[1], Åsa Löfgren[1], Håkan Pleijel[23] and Amanda Robinson[20]

Today, more than ever, 'Spaceship Earth' is an apt metaphor as we chart the boundaries for a safe planet[1]. Social scientists both analyse why society courts disaster by approaching or even overstepping these boundaries and try to design suitable policies to avoid these perils. Because the threats of transgressing planetary boundaries are global, long-run, uncertain and interconnected, they must be analysed together to avoid conflicts and take advantage of synergies. To obtain policies that are effective at both international and local levels requires careful analysis of the underlying mechanisms across scientific disciplines and approaches, and must take politics into account. In this Perspective, we examine the complexities of designing policies that can keep Earth within the biophysical limits favourable to human life.

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tents lists available at ScienceDirect

l Environmental Change

page: www.elsevier.com/locate/gloenvcha

orld economy: Drain from the global 1990–2015

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Sustainability, well-being and planetary boundaries: the question of the Earth's habitability

II. Bioeconomics in a few words

- The question of the biophysical limits to the economic development of societies over a long period of time.

- The economic sphere is as a subset of the biosphere and this is a key to understand the historical dimension of development because of the limited access to a stock of resources that can be drawn from Nature.

Why bioeconomics?

- A better understanding of the role of qualitative changes in the analysis of economic phenomena to guide the transition to a sustainable economic model
- A global perspective (biosphere) of economic systems allowing co-evolutionary processes

II. Bioeconomics in a few words

- Nicholas Georgescu-Roegen (1906-1994)
  - *The Entropy Law and the Economic Process (1971)*
- A new approach about the relationship between economic activity and the environment, which is inseparable from the historical dimension of the development of societies (historical time).
- A vision of economics deeply rooted in physics and biology (material feature)

II. Bioeconomics in a few words

- Biological dimension:
  - The economic process appears to be an extension of the endosomatic evolution, *i. e.* the continuation of the biological evolution (Lotka's influence) ;
  - Exosomatic instruments (tools, objects, techniques, innovations) which are produced with energy and material resources from the environment, for the satisfaction of human needs.
  - "*The term [bioeconomics] is intended to make us bear in mind continuously the biological origin of the economic process and thus spotlights the problem of mankind's existence with a limited store of accessible resources, unevenly located and unequally appropriated*" (1977).

II. Bioeconomics in a few words

- Physical dimension: The entropy law
  - "*From the viewpoint of thermodynamics, matter-energy enters the economic process in a state of low entropy and comes out of it in a state of high entropy*" (1976).
  - *« The material universe (...) continuously undergoes a qualitative change, actually a qualitative degradation of energy* » (1971).
  - An evolutionary law which explains the existence of waste

II. Bioeconomics in a few words

- The entropy law:
  - In a closed system (which exchanges energy but not matter with its environment), entropy is continuously increasing.
  - Every real process is irreversible: there is dissipation of energy (heat, pollutions…) and energy cannot be recycled.

→NGR outlined the role of the entropy law which is directly related to the notion of irreversibility in physics.

II. Bioeconomics in a few words

- An extension of the entropy law: the fourth law stated by NGR (1981):
  - "*In a closed system, available matter continuously and irrevocably dissipates, thus becoming unavailable*"

    → matter maters too!

    →matter cannot be completely recycled
- Entropy can account for qualitative changes and outlines the direction of any economic process (matter-energy dissipation)

II. Bioeconomics in a few words

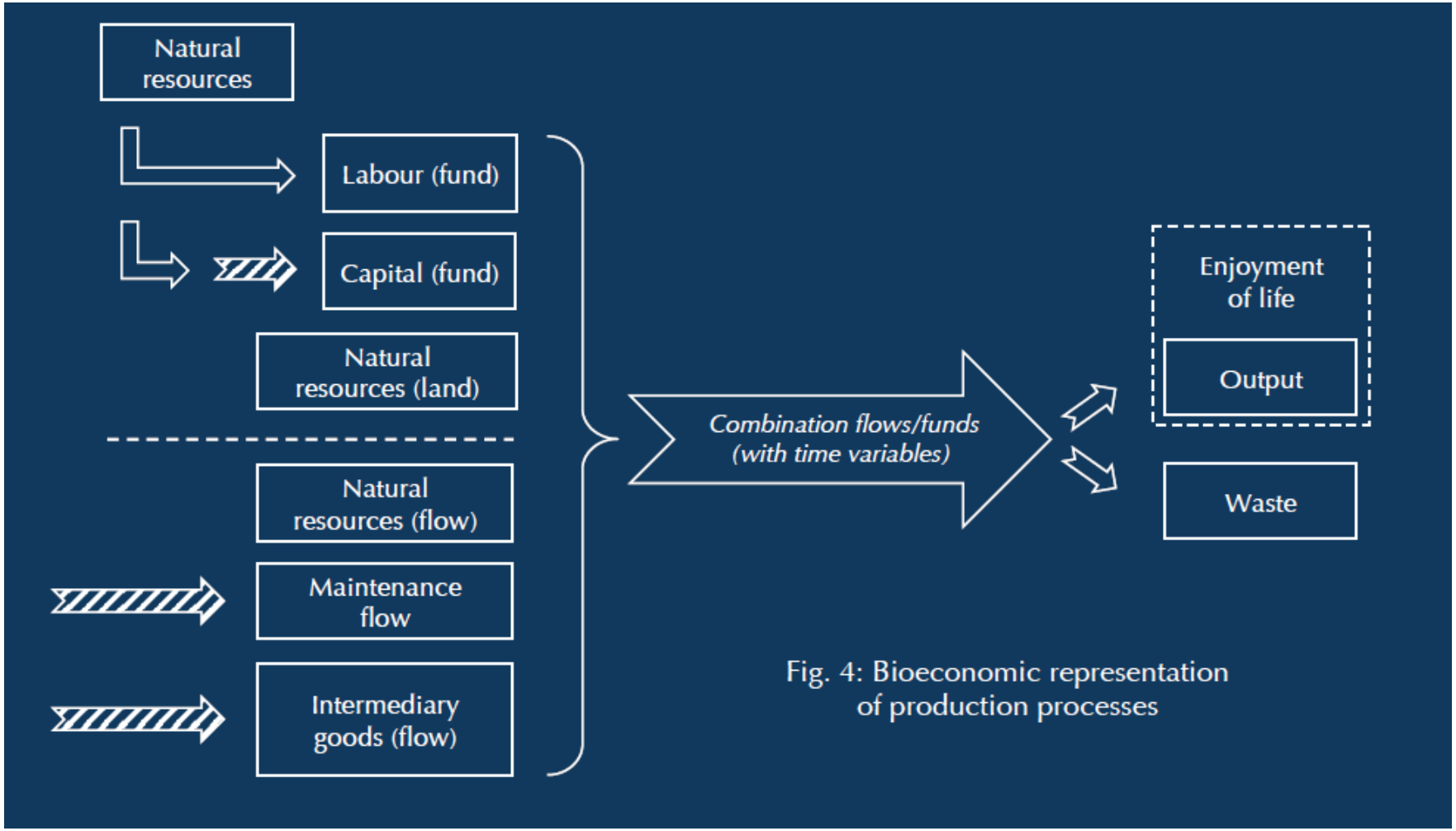

Fig. 4: Bioeconomic representation of production processes

II. Bioeconomics in a few words

- A "natural" trend outlines the direction of any economic process: irreversibility (for the first time, the irreversibility is introduced in economics)
- Irreversibility is driven by the matter-energy dissipation
- Matter-energy dissipation is the physical feature of all the economic activities; no production without waste!
- The immaterial feature of bioeconomics:
  - The enjoyment of life

II. Bioeconomics in a few words

- Bioeconomics involves to reconsider economics as a new relationship to nature and time.

- If the purpose of economic activity is the satisfaction of human needs and therefore finally the conservation of the human species over a long period of time, then some principles of ethics and justice must be introduced into economics.

III. Georgescu-Roegen's ethics: some main features

- We and the others
  - The preservation of the human species through the satisfaction of needs ; "*the enjoyment of life*"
  - "*Humankind must be*"
  - Linking economics, nature and ethics

- Ethics: do not forget future generations!
  - *« Thou shalt love they species as thyself (…) each generation must take into account the demand (i.e. the needs) of future generations, for these generations cannot yet be present to bid their share of mankind's dowry of available matter-energy*" (1977).

III. Georgescu-Roegen's ethics: some main features

- The problem stands at a global level:

- How to share the ressources between generations?
- Intergenerational equity:
  - *« One of the most important ecological problems for mankind, therefore, is the relationship of the quality of life of one generation with another –more specifically, the distribution of mankind's dowry among all generations. »* (1976)

- How to preserve available energy and material endowments? and how to ensure that the needs of all generations are harmonized?
  - 2 ethical principles are introduced by NGR

III. Georgescu-Roegen's ethics: some main features

- First bioeconomic principle: Principle of maximizing the life span of the human species (instead of the principle of maximizing well-being):
  - "*if the present inflow from nature is incommensurate with the safety of our species, it is only because the population is too large and part of it enjoys excessive comfort. Economic decisions will always forcibly involve both flows and stocks. Is it not true that mankind's problem is to economize a stock for as large an amount of life as possible, which implies to minimize a flow for some "good life"?*"(1975)
  - How?
  - "*The only way to protect the future generations, at least from the excessive consumption of resources during the present bonanza, is by reeducating ourselves so as to feel some sympathy for our future fellow humans in the same way in which we have come to be interested in the well-being of our contemporary « neighbors »*" (1975)
  - **"to do with less"**

III. Georgescu-Roegen's ethics: some main features

- Second bioeconomic principle: Principle of minimizing regrets:
  - « *As a guide for mankind's conduct, I urge that we should adopt the principle of minimizing regrets* » (1977).
  - A principle for an historical time
  - To care about the future: present generations have a duty towards future generations (the legacy of a stock of matter-energy resources)
  - **A conservation strategy** for the future: a new "job" for the humanity!

III. Georgescu-Roegen's ethics: some main features

- Philosophical scope of bioeconomics:

An **ethics of limits** which is based on the acknowledgement of interdependencies, qualitative changes, dissipation of energy-matter resources.

- A perspective which is rooted in a form of ecocentrism:
  - Ecological solidarity inspired from A. Leopold (land ethics; integrity; biotic community)
  - Moral community is global: it concerns biosphere and living species
  - Interdependencies between human and the biosphere: (historical time; biogeochemical cycles)

III. Georgescu-Roegen's ethics: some main features

- Ecocentrism: humans and Nature are not separate.
- They form a "biotic community", where only the whole has value and not the individual elements: an expression of solidarity between living beings.
- A Sand County Almanac (1949), Aldo Leopold's "The Land Ethic" essay is an appeal for moral responsibility to the natural world. The 'community' includes animals, plants and the land itself.

III. Georgescu-Roegen's ethics: some main features

Finally, a strong feature of the ethics of limits is based on an **interdependence principle:**

- There is a human duty for preserving the biosphere as well as the quality of life of successive generations .
- Considering the two bioeconomic principles and the last one mentioned above, 3 major consequences:
  - The economic process is bounded by ecological and ethical constraints;
  - The « *declining state* »; no growth, no steady-state economy but degrowth. "[…] *not only growth, but also a zero-growth state, nay, even a declining state which does not converge toward annihilation, cannot exist forever in a finite environment.*"
  - The distribution of matter-energy resources at a global level (global justice).

IV. Bioeconomic ethics: a new ethics for degrowth perspectives

- What are the challenges?
  - To ensure a good life for all within planetary boundaries (Rockström et alii, 2009);
  - To stay within a safe and just operating space for humanity (Raworth, 2017).
- Basically, the real challenge for economics is:
  - To redefine its ultimate purpose - the conservation of the human species over a long period of time - while remaining in solidarity with the biosphere (interdependencies).
  - The enjoyment of life (immaterial flow) + to do with less (« less is more »)

IV. Bioeconomic ethics: a new ethics for degrowth perspectives

- First of all, it is necessary to adopt a holistic ecological approach that questions the **habitability** of the biosphere.
- We find it in N. Georgescu-Roegen's work:

  An **ethics which is open to the biosphere** (links between transformations of Nature and the evolution of societies) and where **moral actions must aim at its protection over time** (ethics of limits).

IV. Bioeconomic ethics: a new ethics for degrowth perspectives

- Second, the ethics of limits implies moving towards an **economy of sufficiency** to access a good life for all over a long time (historical time).
- This is a necessary condition for the prior redistribution of wealth on the scale of the biosphere in order to be able to distribute goods and ills more fairly among the inhabitants of the planet (global justice).
- The implementation of **resource conservation strategies** to preserve the quality of life of future generations is a path that implies limiting the needs, but not the well-being, of the better-off present generations.

IV. Bioeconomic ethics: a new ethics for degrowth perspectives

- Bioeconomic ethics:
  - A new vision of the relationship to nature (interdependencies; co-evolution paths)
  - An historical time (irreversibility, qualitative changes, evolution with new structures)
  - A global justice (distribution of resources at intra/intergenerational levels)
- Design of bioeconomic policies for degrowth strategies:
  - Justice and ecological goals have to be linked
  - Ecological salvation of the human species is supported by the links with the biosphere
  - Nature conservation strategies focusing on interdependencies
  - Evolution paths for slowing down and downscaling the economic process (production and consumption) ; energy and material efficiency, substitutions…

Bioeconomic program (1975, 1978)

- 2 principles: maximising the life span of the human species + minimising regrets (to do with less + conservation strategies)
- Some proposals:
  - No military expenditures (no weapons)
  - To reduce waste of energy
  - Durability of goods: repairable; “to despise fashion”; no futile goods
  - To help developing countries to arrive at a good life (« not luxurious »)
  - To reduce our « addiction to exosomatic comfort »

To conclude:

- Bioeconomic ethics is fully compatible with a degrowth economic perspective (biophysical limits to the expansion of material production)
- It can help to build an ecological and just transition.
- Ethics for degrowth has to combine 3 pillars:
  - Fairness, sufficiency and ecological sustainability