



## Degrowth, the past, the future, and the human nature

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### ABSTRACT

In the last years, different sources point to a same message: industrial civilization has entered an overshoot mode, the natural limits to growth have been already surpassed. This frontier does not wait for us in the future; it already belongs to our past. If population and the economy are truly beyond the limits, then current visions and theories of social change would be deeply perturbed. If the development era is approaching its end, then many sociological theories on current societies will share the same destiny, sustainable development doctrines between them. It is worth to examine theories that explicitly look at the social world this way or that – at least – are not incompatible with it. Differences between these theories depend on sociological, psychological and anthropological questions; or, in other words, they depend on the human nature. Exploring the relationship between degrowth and the human nature gives rise to debates about selective pressures under conditions of scarcity (human evolution), historical and anthropological evidence, philosophy, and sociology (institutional resilience, utopias as whole society experiments...). As its conclusion, the argument accepts that an evolutionary perspective supports that there are some potentials for conscious social change even in a way-down era, but it does not justify the belief in a particular only line of history. This conclusion does not satisfy the desire of knowing the future; nevertheless it may be the only one possible. The future is not written. Neither in history nor in evolution; not even in the mixture of history and evolution that conforms us as inhabitants of the Earth.

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### 1. Degrowth

The degrowth notion is drawn from the perception that natural limits to growth have already been surpassed, that the planet's carrying capacity has either been reached or that we are so close that overshooting it is no longer avoidable. Thus, the inevitable establishment of a new balance at a sustainable scale will take place through a more or less prolonged phase of demographic and economic decline. Alternatively, even if the limits were not yet overshoot or if the overshooting point could be temporarily postponed by means of technological innovations or political changes, a planned and conscious degrowth would be desirable, for it would minimise the costs of the transition: the only alternative possible to an organised voluntary degrowth, one that would occur in the near future and would have lower costs, is a chaotic degrowth imposed by nature, further away in time but with tremendously huge costs.

Degrowth is a necessary perspective once demographic and economic expansion have been pushed to unsustainable limits. And that perspective has become more prominent in recent years precisely because the warning about the threats derived from the environment's degradation – raised quite some time ago – was not listened to. Over the past four decades,

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the answer to the warning was suspended over and over, always postponed to a later time, always the object of an uncertain future. The problem is that there are signs of the announced future already. . . we have already exceeded the planet's limits or we are about to inevitably overshoot them. . . more and more signs are there, in more detail and more mutually consistent.

Those that argue in this direction often rely on sources of information like the ones next:

- The review, thirty years later, of the report to the Club of Rome on the limits to growth, which underlines that the announcement made in the early 1970s (that the continuation of certain trends would result in an overshooting situation by the second decade of the 21st century) is now a matter of fact, even earlier than foreseen [1,2].
- Estimations of the world ecological footprint, according to which this footprint surpassed the regenerative capacity of the biosphere in 1985 and, ever since, it has continued being used up non-stop, having already exceeded the sustainable level by more than 20% [3].
- The closeness of the “peak oil”: oil is used five times faster than new oil sites are discovered, the gap between the growing demand and the supply of new waning reserves increasing. The situation is now critical and we are very close to the start of an irreversible production drop [4,5]. In addition, for the time being, no energy alternatives are yet able to maintain the current forms and dimensions of the industrial society, let alone its historic expansive tendency (and no guarantee can be offered that such alternatives will be found or that, if they are eventually found, they will be developed on time).
- The possibility that climate change may have already reached the point of non-return, this meaning that the deployment of non-linear changes would be totally uncontrollable [6,7].
- The fact that the relationship between population, food production and fresh water supply has started to move within extremely tight margins [8,9].

The degrowth viewpoint is usually associated to the statement that the best available data on the link between the society's physical scale and the planet's recovery capacity, on the unavoidable dissipation of irreplaceable resources, on the condition of ecosystems, and on the flexibility to make up for mistakes (“sustainability”), show that we are already in an overshoot situation. . . we have gone beyond our limits [10]. Or that such a situation is so imminent that it would be better to anticipate it in order to make its effects less unacceptable.

Theoretically, the foundations of degrowth are found in the bioeconomics of Georgescu-Roegen [11,12] and the philosophy of Illich [13], but degrowth also incorporates elements from the socio-historical and anthropological critique of development [14,15], from post-development doctrines [16] and from other sources. The degrowth perspective is characterised by insistence, on the one hand, on the fact that overshooting is unsustainable and, on the other, that it is therefore necessary to find answers, *outside development*, to social and political problems. This dual position has caused strong, open and persistent criticism of the concept of sustainable development, considering it theoretically contradictory and inconsistent (a lullaby with strong sleeping powers, as Georgescu-Roegen [17] put it) and, from a practical viewpoint, a mere attempt to inject some credibility into the always deferred and consequently worn out promise of a universal economic development [18]. As an example, *La décroissance*, the French magazine, has a regular section devoted to reporting the “nonsense” of sustainable development.

## 2. Visions of the decline: pessimism, optimism and the human condition

Of all the questions posed by a degrowth process that would lead to an environmentally sustainable and more or less stable state, the most striking issue is that regarding the point or level at which degrowth should stop. What should be the end point of a degrowth process? Should the end state involve population or consumption that is more modest and frugal than current levels but still within the range of standards known to industrial societies? Or should we go even further, to the stone age?

Naturally, the problem has no real technical solution. The future states of a system as complex as society are not predictable. They depend, in a non-linear fashion, on interactions between multiple system states and multiple collective decisions taken by social actors. The dynamics are radically indeterministic. Still, the moral and political burden of the various initial positions is enormous. In effect the debate is configuring itself around two, already rather well-formed basic visions regarding the meaning of degrowth: *degrowth as a path towards extinction* and *degrowth as a transition to a society constructed at the human scale* [19].

The conviction that the historical cycle of ascending fossil fuel use is reaching its end, along with a justified scepticism regarding the existence of alternative sources of energy that are sufficiently cheap and abundant, lies at the heart of the view that a population collapse on Earth is quite near and cannot be put off any longer. Some versions, such as that by Price [20], also include a prediction that this collapse will represent the end of civilisation as we know it, not only, as one might think, reaching a lower, more sustainable scale; for any survivors, should they exist, will not be able to maintain the complex association of cultural elements that characterise present societies. Societies still existing after the collapse would have to live a simpler life based on hunting and subsistence agriculture. Usually, another line of deterministic reasoning (biological determinism, in this case) is also invoked here. For example, the thesis that evolution drives any population of organisms to reproduce limitlessly until it uses up the resources that have made its reproduction possible, as stated by Morrison [21]. Other views sustain that a combination of both deterministic perspectives – that derived from the decrease in the supply of fossil fuels (imposing a drastic reduction in population and complexity) and that derived from selective pressures existing in

a context characterised by scarcity (which implies that the abovementioned reductions will take place via conflict and fight for survival) – would mean that degrowth could take on a catastrophic and uncontrollable shape, leading to extinction [22]. A path leading to the Olduvai Gorge, according to the comparison introduced by Duncan [23,24].

The assumption of human freedom, and the progress of history through collective, conscious decisions, lies at the heart of opposing views which consider degrowth to be an opportunity to adapt societies to a more sustainable scale. Peak oil is therefore the point of departure for a prolonged crisis, its most characteristic feature being a chronic and generalised contraction, seen also as an opportunity for change towards a smaller, slower and more local state of affairs, and a movement from competition to cooperation and from unlimited growth to self-limitation [25–30]. Indeed, an opportunity is not the same as a certainty. People who state that degrowth could open the doors to desirable social re-organisation usually also state that it is just one of many possible paths. And after all it is probable that a series of erroneous decisions could also result in permanent economic regression and increasing social conflict.

The more optimistic views that see degrowth as an opportunity to enact a change for the better, have, for the most part, rooted in Southern Europe – France, Italy and Spain – specifically as part of an intellectual movement based around the *Institut d'Études Économiques et Sociales por la Décroissance Soutenable* (<http://www.decroissance.org>) and the various publications under its influence either directly or indirectly. They have developed a visible coherence as a current of thought and their own programmatic dimension through campaigns and regular opinions, including the incipient characteristics of a social movement. It should be added that similar groups and currents of thought, many of which not using the term “degrowth”, exist in many countries all around the world. The more “pessimistic” views generally do not have practical projections, unless one wants to view certain “survivalist” groups as such. Deciding which of these visions are right is not a technically feasible task: when we speak of prophecies, we must stress that uncertainty is the key word. There are no deterministic laws of social evolution [31]. The future is not written. Yet it would be useful to ask what lessons we can learn from an examination of the boundary conditions present in the various possible paths of degrowth.

Generally speaking, this question is related to the disjunctive premise mentioned above: degrowth, catastrophe or opportunity? It is interesting that one of the oldest and most fundamental problems posed by philosophy and social theory, the problem regarding freedom and self-determination, powerfully condition the answers. The visions of degrowth as an inevitable catastrophe tend to be based on deterministic considerations, within which a choice between various alternatives is not possible (“We are genetically driven just like any other animal. We have no mind other than the body, and we lack behavioural choice,” is what Morrison writes [21, p. 242] as he sets forth his arguments on the inevitability of an ecological disaster). Visions of degrowth as an opportunity tend, on the contrary, to stress that we are facing an important, decisive moment, but that the decision, after all, is ours to make.

And so here lies the connection between degrowth and the human condition. This idea has been taken up, albeit in an incipient state [32], at the Barcelona Conference on Economic Degrowth in 2010 [33]. This is a theme that can be developed along various lines; the following have been selected.

### 3. Old philosophies for imagined futures

From the philosophical presuppositions of social theory, the old considerations regarding whether human is, by nature, good or evil take on an unexpected cogency. It would be interesting to study the extent of Rousseauian thought within the more “optimistic” versions of degrowth, and as a counterpoint, any traces of Hobbes in those considered more “pessimistic”.

In my view, contemporary sociology, at least at the macro level, depends greatly on preferences not always well founded by their authors for a sort of pre-theoretical anthropology whose origins often can be found in centuries past. And, to be fair, Rousseau and Hobbes were philosophers of sufficient interest, but their ideas are too feeble if used to support an entire structure of conflict and social change. Contemporary sociology should devote more attention to what modern science has learned about human nature – or natures – as Ehrlich [34] quite rightly says. It would not find anything final on the matter but something more than the typical unformed prejudices it usually contents itself with.

The reason why sociology shows scarce interest in the scientific study of the human condition is no secret. In general terms, we cannot deny that human nature (the “inner” environment), like the external environment, conditions social action and in general human behaviour. Yet, in the industrial era, this conditioning has been nothing more than a sort of immutable backdrop to social dynamics. Sociology was interested in change, and change was a matter of technology, politics, economy and culture. The environment (both internal and external) may have been perceived as a constant and therefore was considered practically irrelevant in explaining situations in flux. And therefore a few vague notions of genetic determinism or absolute free will arising from our conscience could be called upon to do the trick.

The viewpoint summarised in the preceding paragraph has never been theoretically correct. Yet in practice, it functioned during the ascendant phase of industrial civilisation, when natural resources were abundant and the scale of environmental impact was not yet geologic. This was an era during which the only limiting factors were technology and social organisation. Now, in the era of climate change and genetic manipulation, “outer” nature and human nature have fully recuperated their condition as fundamental sociological variables. In the degrowth perspective this conclusion is even more inevitable: individualism and altruism are significant categories when evaluating the range of possible social answers to a situation of growing environmental constraints.

Some significant answers could come from the field of research we could describe as that falling under the heading of “human ecology”. This area straddles fields such as genetics, evolutionary biology, palaeontology, archaeology, prehistory,

evolutionary psychology and others, and its multidisciplinary nature is probably why it has never become a consolidated field or ever acquired a “normalised” continuity, having been more often than not the scene of occasional visits from researchers with an adventurous spirit. There are several questions posed by this field that could serve to delineate the limits and understand the conditions of social change in this era of contraction; in particular it could offer a possible theory on the range and types of human adaptation during times of growing scarcity of material and energy resources. The relation between genes and culture is surely, of all the problems in this sphere, the one which can serve us the most in assessing possible social responses to the prospect of degrowth.

#### 4. Getting lessons from the past for imagining futures?

In the field of environmental history, we should stress the sudden renewal of interest in processes of decline of past civilisations, in the relationship between degrowth and another concept that responds to similar concerns: collapse [35–37]. Past human response to severe environmental restrictions do not give us much information about what the social reaction *will be* with respect to the present environmental constraints, but they could tell us something about what they *could be*.

The processes of growth and decline of civilisations is a classical topic in historical research, which has recently been associated with the problem of degrowth by way of studies on the collapse of past societies in which the overloading of natural support systems played a relevant or determining role. One the one hand, with abstract theories regarding the relationship between social cycles of expansion and decline and the general systems theory, as it is the case with Tainter’s hypothesis [38,39] which states that collapse does not necessarily entail extinction or a catastrophic fall leading to a chaotic breakdown of society, but a shift towards a less complex human condition. On the other hand, we have seen theories that reflect in detail upon conceptual aspects or also specific studies on local historical experiences [40–42].

Tainter argues that collapses lead societies to situations of lower economic activity and trade, smaller material structures and organisations, less-polarised social stratification, less division of labour and less centralisation. He synthesises all of these characteristics, seeing them all as indicating a loss of complexity, with a drastic and sudden simplification. Tainter’s considerations possess aspects that are quite instructive: in effect, any process of collapse/degrowth will generate decentralisation, relocation, deceleration, a greater emphasis placed on community and more leeway given to policy-making at the local level. That the sum of all this can be adequately described as simplification or reduction in complexity, however, is debatable. Formulated vaguely, without precisely defining complexity as a term, the idea that social change follows a path towards growing complexity is too steeped in social evolutionism, too influenced by the topical themes of modernisation: the idea that societies deemed “primitive” are simpler has been rightly criticised for its ethnocentric bias. This idea could be upheld under certain conditions: for example, by postulating a relationship between energy used and the degrees and rhythms of social organisation; but there are many unknowns and ill-defined aspects, even in these relatively less convoluted theoretical formulations.

It may be better to set aside complexity, a notion that is too confusing to really be useful, and concentrate on some of the more expected characteristics of degrowth: decentralisation, reduction in scales, relocation, community, etc. From a sociological standpoint, all these issues have many facets and all are the object of opposing opinions and ceaseless analyses. . . Let’s take a look at one of its many aspects, the community-association polarity. The warning that degrowth results in relocation, which in turn entails a relative strengthening of community prompts immediate discussion on its pros and cons: solidarity and control over individuals, opportunity for grassroots democracy and the perils of petty tyranny (or *caciquismo*), defence against alienation and the loss of spaces fostering diversity. . . The lesson we should extract from this is clear: degrowth, as in all historical processes, cannot be seen in shades of rose or black.

In academic debates on degrowth we sometimes hear references made to one of history’s most significant precedents: the fall of the Roman Empire. An interesting unknown from this context is that regarding the status of the Empire’s enormous rural base after the collapse. The decline of the great cities was large-scale and quite visible. Of course, for the individuals who populated the far reaches of the agricultural base which had supported the Empire during its splendour, did the crisis mean a life lived under worsened conditions or better ones? I suspect that the correct answer is that it depends. It is very probable that for those communities richer in natural resources, which featured more internal cohesion and more creativity politically, the withdrawal of the legions and tax collectors was a blessing; and it is also possible that for those communities established in poorer lands, or those suffering from internal division and despotic local lords, on the other hand, the fall of the Empire may have meant a worsening of conditions. The “natural” result of the crisis in a centralised structure does not lead to general improvement or worsening, but to diversity.

Using an analogy, we can ask ourselves whether the collapse of the great “global” cities of the contemporary world would benefit or harm that half of the world population living in subsistence economies, outside of the globalised markets and beyond the reach of social intervention of the state. I imagine that, moved by a fondness for controversy, some proponents of alterglobalization have answered that surely benefits would be the result of any crisis of this nature, as the pressure exerted on the resources around the world by the global economic centres of power would ease, and therefore local resources would be utilised by local communities [43]. The fall of Rome probably meant very little to its vast agricultural basis, and some areas even saw improvements in their material existence; the collapse of modern capitalism could be disastrous for inhabitants of Manhattan or Frankfurt but would have little effect on the living conditions of most of humanity (or make it a little less difficult). As an exercise in controversy it is interesting, although the hypothetical situation that this discourse uses as reference is far from having just one reading. The country as refuge in crisis situations is an old formula, seen on many

occasions throughout history. In today's world, with much of that “half the world” marginalised from markets and social safety nets, living in the large metropolises of the Third World, the repetition of that old formula would be quite problematic. But who knows?

The analogy of the Western Roman Empire contains, I think, an element that is especially doubtful: the depletion of the natural sources that support us could very well be even greater today, due to our dependence on fossil fuels and the narrow margins involved in supplying food and drinking water to a population of seven billion people. This seems to suggest that a better comparison could be established between past cases in which excessive pressure on supporting ecosystems seemed to have played a more decisive role: Mesopotamia, the Maya or Easter Island, for example.

## 5. Closer to nature, better degrowth?

Lately we have heard much regarding the idea that the cultures that Eurocentric social science, erected upon the prejudices of colonialism, had heretofore perceived as being “primitive”, “pre-modern”, etc., possessed value systems less oriented to domination and transformation of the natural environment, very precise knowledge of local ecosystems, etc., in short, cultures that are more respectful towards nature, more sustainable. This idea is significant for the paradigm of degrowth in that it suggests that a change towards smaller, slower and more local would not also involve regression, but a way to overcome the deformations caused by “false modernisation”. Not a return to caves but salvation for our civilised life as opposed to the excess which presently threatens it.

I suspect that the affinity between the pre-modern and sustainable that we see in many idealised descriptions of indigenous cultures is really the inverted image of that old Eurocentric prejudice. And it would be more realistic to acknowledge that there is an almost inexhaustible plurality of examples and experiences here as well.

The rational nucleus of the belief in a “spontaneous ecological conscience of primitives” can be found, at any rate, in the fact that subsistence economies depend on local natural resources to survive and therefore, they have a vested interest in utilising these resources prudently and sparingly (in contrast to, for example, transnational corporations which have no local ties and can therefore deplete the resources of a particular territory and promptly move on to another area whose resources are not yet depleted). But this interest in the prudent and sparing use could be overwhelmed by demographic pressure, competition with other groups (or lack thereof), aspirations for expansion or power, environmental changes, technological innovations, etc., and no culture can offer guaranteed or infallible protection against conditioning factors of this type.

If the issue is examined from the perspective of science and technology of industrial modernity, the most relevant nucleus of the debate was identified by Bateson [44] when he wrote that a civilisation that believes that it owns nature to dominate it and that *moreover it possesses powerful technology* had a snowball's chance in hell of surviving. Cultural error or delusions of superiority over the rest of the universe are not enough to bring about a truly grave situation; you also need the power to change the environment. It only takes powerful technology and good science, to cause real destruction to so many places in such a short period of time! The dilemma, then, more than the complex duality between “Western science and anthropocentrism” and “local and ecocentric knowledge” lies in the radical ambiguity of science and technology within industrial society. The first humans were already capable of killing off all the great mammals of Europe using stone axes; only it took them thousands of years to finish the job [45]. Not like now, where we are able to bring about larger extinctions with a proven efficiency and great speed. . .

The ecological crisis of contemporary mankind is not new in that it is ecological. Many human societies in the past were met with limits imposed by its natural sources of sustenance, with various results (not always successful, to say the least, as is well-known). What is new is that we are a civilisation with a global reach which now faces its ecological limits, and also that overshoot has occurred quite rapidly, taking just a few decades. The current ecological crisis is not new because it is an environmental crisis; it's new because it's a crisis of global magnitude and speed. This is the variable that presents a challenge to humanity.

## 6. Sociology and utopia

The sociological questions that arise in the view of a “benign degrowth paradigm” possess a normative dimension, a descriptive dimension and an alternative or utopian dimension. Some can be examined from “positive” sociology; others only make sense within a “critical” sociology.

Some authors have evoked, either prompting acceptance or repulsion, the possibility of a decline not voluntary, but oppressively imposed by a despotic but well-informed regime aware of the severity of the ecological crisis [46,47]. Yet no one has been able to offer an acceptable solution to the ancient objection seen in political theory: *quis custodiat ipsos custodes?* The most common response is then to discuss those paths that are compatible with democracy, and the key questions will inquire about the conditions under which degrowth would be seen as desirable by the majority. The normative answer is that all of our problems would have a simpler solution with more reduced population and smaller physical scale and that degrowth is therefore desirable because it would minimise the costs inherent to transition.

There are many studies of the normative dimensions of degrowth. Indeed, they have been around for some time. We can mention for example, Illich's analysis [13] of expansion of modern institutions that eventually becomes counterproductive. Or Gorz's reflections [48] on the conditions that give rise to a social sphere that is free of heteronomy. It is no coincidence that these two authors are still cited frequently in current texts written by proponents of degrowth. And similar reflections can be



made regarding Schumacher's considerations on appropriate technologies and scales [49]. Or Bahro's thoughts on the conditions that brought about a surplus consciousness [50]. Or many other contributions, especially since the 1970s. What sociology can contribute (in its *critical* dimension) is just that: the data and arguments that show the counterproductivity and unsustainability of the structures and institutions of growth.

In its *positive* dimensions, sociology could examine the connection between the lifestyles created by development and the needs of people, helping to cast aside illusory projects and reduce the proliferation of uselessly moralising discourse. It can also provide analysis of local experiments, often at the small scale, of examples of people's initiatives and mobilisation which show the incipient desire to live another way, more in keeping with sustainable criteria which rejects excess. And it could help us understand what can be taken away from these experiments in a generalised context of degrowth, how they can be taken to a larger scale and made universal. There is much uncertainty in all of this. The fact is that there are many specific and interesting examples, many processes that have managed to improve the lives – either completely or partially – of people, outside the logic of globalised development, both in poorer countries and in depressed areas of richer countries. And the study of these cases could prove to be a valuable lesson vis-à-vis the future paths taken by our society.

Finally, there is one connection between sociological analysis and *utopian* thinking, inasmuch as the latter can be described as a search for “complete societies”, a search that is free of “the heavy burden of immediate politics and practicalities of the world that really exists” [51, p. 382]. If empirical information indicates that the “world that really exists” is nearing its end, then the onus is on social theory to try to read the signs of changes and construct possible and/or desirable visions of this new world. In the nineteenth century, during the still-incipient industrial capitalism, utopian socialism and the birth of sociology went hand in hand. We now witness a new wave of utopian thinking. And it is no coincidence, given that even the most conventional and continuistic visions talk about a different society. Hence, for example, almost everyone (including those that emphatically reject the simple possibility of degrowth) accepts the advent of a post-carbon or low-carbon society. And certainly a post-carbon society will have material and institutional structures very different from the current structures (even those who do not let their imagination run wild must envision different transport, urban planning and energy production). That is, accepting the co-existence of sociology and utopia, and the effort of articulating their mutual influence instructively, is not simply a matter for degrowth and other alternatives, but also for any conscious reading of human trajectory at the present time.

## 7. Conclusion

In the twenty-first century humanity faces two enormous challenges: substituting fossil fuels with a new source of energy and the production of food for a population of more than seven billion people. Taken separately, each of these is capable of generating anxiety. Together, they can very easily invite one to desperation. The perspective of degrowth inscribes itself in this horizon. The visions of social change in degrowth (the era of decline, past the Earth's limits, post-carbon society or whichever term one wishes to use) are not interesting because of what they say about the future – whatever that may be – but because they free up the imagination and allow us to think outside the constraints of the maddening dogma of growth, beyond the dying paradigm of development. And the programmatic, propositive, proactive versions of this perspective offer positive solutions, a vision of affirmation and betterment of life.

## References

- [1] D.H. Meadows, D.L. Meadows, J. Randers, W.W. Behrens, *Los límites del crecimiento: Informe al Club de Roma sobre el predicamento de la humanidad*, Fondo de Cultura Económica, México, 1972.
- [2] D. Meadows, J. Randers, D. Meadows, *Limits to Growth: The 30-year Update*, Chelsea Green, White River Junction, VT, 2004.
- [3] WWF, *Living Planet Report 2010: Biodiversity, Biocapacity and Development*, WWF, International, Gland, 2010 [http://wwf.panda.org/about\\_our\\_earth/all\\_publications/living\\_planet\\_report/2010\\_lpr/](http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2010_lpr/).
- [4] K.S. Deffeyes, *Hubbert's Peak: The Impending World Oil Shortage*, Princeton University Press, Princeton, NJ, 2001.
- [5] C.J. Campbell, *The Essence of Oil and Gas Depletion: Collected Papers and Excerpts*, MultiScience Publishing Co., Brentwood, 2003.
- [6] A. Gras, *Le choix du feu: aux origines de la crise climatique*, Fayard, Paris, 2007.
- [7] F. Pearce, *The Last Generation: How Nature Will Take Her Revenge for Climate Change*, Eden Project Books, London, 2006.
- [8] V. Smil, *Alimentar al mundo: un reto del siglo XXI*, Siglo XXI, Madrid, 2003.
- [9] D. Pimentel, M.H. Pimentel, *Food, Energy and Society*, Taylor & Francis, Boca Raton, FL, 2008.
- [10] E. Garcia, *La technologie et les dilemmes de la décroissance*, *Entropia – Revue d'étude théorique et politique de la décroissance* 3 (2007) 142–156.
- [11] N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Harvard University Press, Cambridge, MA, 1971.
- [12] N. Georgescu-Roegen, *The steady-state and ecological salvation: a thermodynamic analysis*, *BioScience* 27 (4) (1977) 266–271.
- [13] I. Illich, *Oeuvres complètes*, 2 vols., Fayard, Paris, 2004–2005.
- [14] G. Rist, *The History of Development*, Zed Books, London, 1997.
- [15] V. Shiva, *Staying Alive: Women, Ecology and Development*, Zed Books, London, 1989.
- [16] M. Rahnama, V. Bawtree (Eds.), *The Post-development Reader*, Zed Books, London, 1997.
- [17] N. Georgescu-Roegen, *Looking back*, in: *European Association for Bioeconomic Studies, Entropy and Bioeconomics – First International Conference of the EABS – Proceedings*, Nagard, Milano, (1993), pp. 11–21.
- [18] E. Garcia, *El trampolí faústico: ciencia, mite i poder en el desenvolupament sostenible*, Germania, Alzira, 1995.
- [19] M. Martínez-Iglesias, E. Garcia, *La décroissance: Le changement social au delà des limites de la planète*, in: Y.M. Abraham, L. Marion, H. Philippe (Eds.), *Développement durable versus décroissance: Débat pour la suite du monde*, Écosociété, Montréal, 2011, pp. 187–202.
- [20] D. Price, *Energy and human evolution*, *Population and Environment* 16 (4) (1995) 301–319.
- [21] R. Morrison, *The Spirit in the Gene: Humanity's Proud Illusion and the Laws of Nature*, Cornell University Press, Ithaca, NY, 1999.
- [22] J. Hanson, *Thermo/gene collision: on human nature, energy, and collapse*, *The Social Contract* 17 (spring) (2007) <http://www.thesocialcontract.com> (12.02.07).

- [23] R.C. Duncan, World energy production, population growth, and the road to the Olduvai Gorge, *Population and Environment* 22 (5) (2001) 503–522.
- [24] R.C. Duncan, The Olduvai theory: energy, population, and industrial civilization, *The Social Contract* 16 (winter (2)) (2005–2006) <http://www.hubbertpeak.com/duncan/OlduvaiTheorySocialContract.pdf>.
- [25] H.T. Odum, E.C. Odum, *A Prosperous Way Down: Principles and Policies*, University Press of Colorado, Boulder, 2001.
- [26] Colectivo Revista Silence, *Objetivo Decrecimiento*, Leqtor, Barcelona, 2006.
- [27] S. Latouche, *Le pari de la décroissance*, Paris, Fayard, 2006.
- [28] R. Heinberg, *Powerdown: Options and Actions for a Post-Carbon World*, New Society, Gabriola, Island, 2004.
- [29] J.H. Kunstler, *The Long Emergency: Surviving the Converging Catastrophes of the Twenty-first Century*, Atlantic Monthly Press, New York, 2005.
- [30] J. Sempere, *Mejor con menos: necesidades, explosión consumista y crisis ecológica*, Crítica, Barcelona, 2009.
- [31] S. Juan, *Critique de la déraison évolutionniste: animalisation de l'homme et processus de civilisation*, L'Harmattan, Paris, 2006.
- [32] F. Flipo, Human nature and degrowth – stirring paper. <http://www.degrowth.eu/v1/uploads/media/Fabrice-Flipo-human-nature-en.pdf>, 2010 (24.04.10).
- [33] II International Conference on Economic Degrowth for Ecological Sustainability and Social Equity, Conference Proceedings, Barcelona, March 26–29. <http://www.degrowth.org/Proceedings-new.122.0.html>, 2010.
- [34] P.R. Ehrlich, *Naturalezas Humanas: Genes, Culturas y la Perspectiva Humana*, Fondo de Cultura Económica, Mexico, 2004.
- [35] J. Diamond, *Collapse How Societies Choose to Fail or Survive*, Allen Lane, London, 2005.
- [36] R. Costanza, L.J. Graumlich, W. Steffen, Sustainability or Collapse?: An Integrated History and Future of People on Earth, The MIT Press, Cambridge, MA, 2007
- [37] P.A. McAnany, N. Yoffee (Eds.), *Questioning Collapse: Human Resilience, Ecological Vulnerability, and the Aftermath of Empire*, Cambridge University Press, New York, 2010.
- [38] J. Tainter, *The Collapse of Complex Societies*, Cambridge University Press, Cambridge, 1995.
- [39] J. Tainter, Complexity, problem solving, and sustainable societies, in: R. Costanza (Ed.), *Getting Down to Earth: Practical Applications of Ecological Economics*, Island Press, Washington, 1996, pp. 61–76.
- [40] J. Gowdy, Sustainability and collapse. What can economics bring to the debate? *Global Environmental Change* 15 (2005) 181–183.
- [41] B. Orlove, Human adaptation to climate change: a review of three historical cases and some general perspectives, *Environmental Science & Policy* 8 (2005) 589–600. , <http://dx.doi.org/10.1016/j.envsci.2005.06.009>.
- [42] M. Bunce, L. Mee, L.D. Rodwell, R. Gibb, Collapse and recovery in a remote small island: a tale of adaptive cycles or downward spirals? *Global Environmental Change* 19 (2) (2009) 213–226.
- [43] M. Khor, Global economy and the Third World, in: J. Mander, E. Goldsmith (Eds.), *The Case Against the Global Economy: And for a Turn Toward the Local*, Sierra Club Books, San Francisco, 1996, pp. 47–59.
- [44] G. Bateson, *Steps to an Ecology of Mind*, Jason Aronson, London, 1987.
- [45] K. Sale, *After Eden the Evolution of Human Domination*, Duke University Press, Durham, 2006.
- [46] W. Harich, *¿Comunismo sin crecimiento? Babeuf y el Club de Roma*, Materiales, Barcelona, 1978.
- [47] R.L. Heilbroner, *An Inquiry into the Human Prospect (Updated and Reconsidered for the 1980)*, Norton, New York, 1980.
- [48] A. Gorz, *Adieu au prolétariat*, Seuil, Paris, 1980.
- [49] E.F. Schumacher, *Small is Beautiful*, Abacus, London, 1973.
- [50] R. Bahro, *Building the Green Movement*, GMP Publishers, London, 1986.
- [51] M. Redclift, The environment and carbon dependence: landscapes of sustainability and materiality, *Current Sociology* 57 (3) (2009) 369–388.