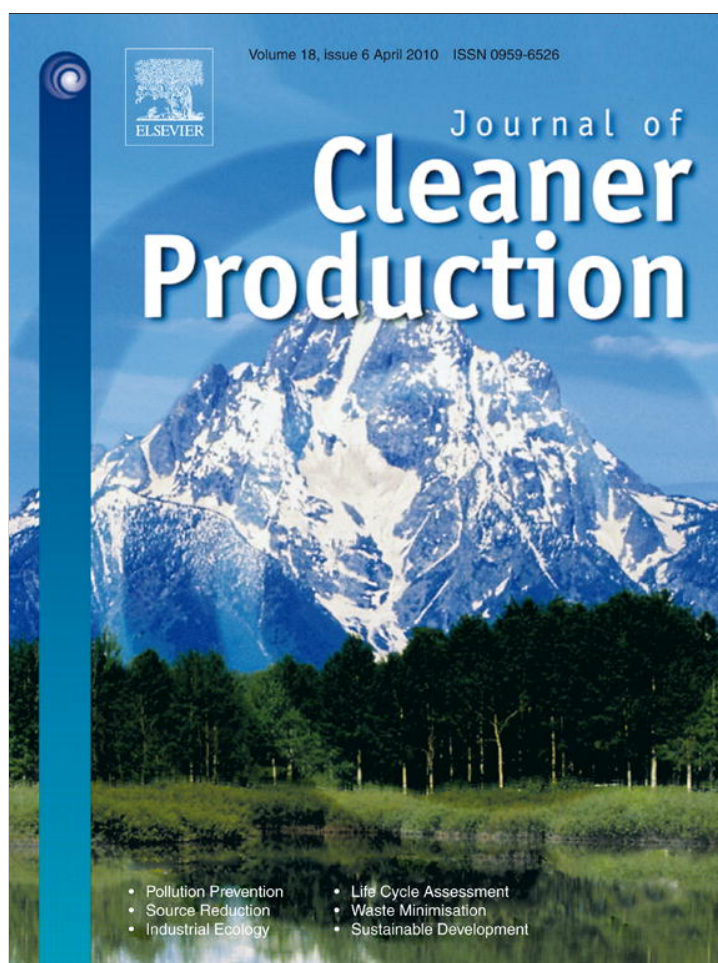


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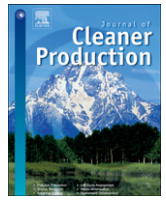
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## Economic de-growth vs. steady-state economy

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## ABSTRACT

In recent years the concept of economic de-growth (decroissance) based on the literature of Nicolas Georgescu-Roegen e.g. [1–3] has found a revival in France, Italy, Spain and other countries, in the popular as well as in the academic literature. Therein authors took on board Georgescu-Roegen's categorical rejection of a steady-state economy (SSE), as proposed by Herman Daly [4]. They argue that economic de-growth is the only viable alternative goal to the growing economy. This position is challenged in this article and it is concluded that the two concepts are in fact complements. Economic de-growth is not a goal in itself, but the rich North's path towards a globally equitable SSE. Moreover the de-growth literature can benefit from the strong economic historic roots of the SSE and from Daly's macroeconomic concepts, while in return being able to give lessons about bottom-up approaches. This would be particularly important for the population issue, where Daly proposes limited birth licences. Unfortunately statements on demography are inconsistent and underdeveloped in the de-growth literature. Further it is concluded that most criticisms of the SSE are due to a too narrow and technocratic interpretation of the concept. Instead the SSE should be defined as a quasi steady-state, resting in a dynamic equilibrium and as an "unattainable goal", which can and probably should be approximated.

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## 1. Introduction

Economic de-growth in its somewhat smoother sounding French version 'la décroissance', first appeared in the scientific and political arena when Jacques Grinevald and Ivo Rens [5] translated some of the major works of Nicholas Georgescu-Roegen into French. The main idea behind the concept has recently been defined as: "An equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long-term" [6, p. 3]. Georgescu-Roegen, the author of *The entropy law and the economic process*, challenged, what he called the 'growth mania' [3] of mainstream economists [e.g. 2,7,8].<sup>1</sup> Best represented in the literature by Barnett and Morse [10], Solow [11,12], and the like, this paradigm still dominates the mainstream

economic thought [e.g. 13,14] which proclaims that unlimited economic growth is both possible and desirable.<sup>2</sup>

Georgescu-Roegen's views coincided with and partly inspired those of other growth critics at the time: Hardin [16], Daly [4,17], Meadows et al., [18], etc. However with regard to the alternatives of the growing economy or "ecological salvation", Georgescu-Roegen [e.g. 3,19] fundamentally disagreed with the former. Just as Meadows et al. [18, Ch. 5] in their *Limits to Growth*, Herman Daly argued that attaining a sustainable state of the human economy was possible: namely the stationary or steady-state [4,17,20–22]. Strongly influenced by John Stuart Mill's [23] description of a stationary state and based on the thermodynamic world view of Georgescu-Roegen (who was his mentor [24]), Daly developed the first macroeconomic concept of such a desirable zero-growth economy. This proposition was met with fierce rejection from Georgescu-Roegen, who insisted that only a *declining* state was both feasible and desirable [3,19,25]. The de-growth movement in France, Italy and Spain,<sup>3</sup> to judge from its literature [26–30] is strongly influenced by this position of Georgescu-Roegen.

In this article diverging viewpoints regarding the steady-state economy (SSE) are revisited and it is argued that the de-growth authors' categorical rejection of the concept of a steady-state – if

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E-mail address: [christian.kerschner@gmail.com](mailto:christian.kerschner@gmail.com)<sup>1</sup> Georgescu-Roegen was however neither the only, nor the most famous growth critic. For an overview see for example J.C.J.M. van den Bergh and R.A. de Mooij [9].<sup>2</sup> It is supposedly physically possible because of a dematerialising economy and the substitutability of non-renewable resources, both of which are the results of equally limitless technological progress. Moreover it is implicitly desirable, as it is seen as an "axiomatic necessity" [3, p. 266] to rid society of most social evils like unemployment, poverty, overpopulation and pollution [13–15].<sup>3</sup> See the respective websites: [www.decroissance.org](http://www.decroissance.org); [www.decrecita.it](http://www.decrecita.it); <http://decreixement.net>;

properly defined – merits reconsideration. Section 2 highlights the strong historical roots of stationarity in the classical and modern economic literature. Section 3 briefly describes Herman Daly's elaborated concept of a SSE. Section 4 is dedicated to population, an issue that is considered as being of utmost importance, but which appears to be mostly ignored or tabooed not only in the de-growth community, but also in the general sustainability discourse. Section 5 confronts the two positions, shows weaknesses and provides criticism of both, and section 6 introduces 'unattainable goals' and 'moral growth'. Section 7 concludes.

## 2. History of the steady-state economy

The term 'stationary state' was first mentioned by Adam Smith [31, p. 34]. Like Smith most classical writers had their own distinct theories about this state. Daly [21] believes that this may be due to the fact that they still had a strong concern to adapt the economy to physical realities, whereas thereafter most economists have been busy engaging in the opposite. However many classical economists feared stationarity as the ontologically inevitable endpoint of economic growth and development caused by population growth and decreasing returns [32]. Smith for example was convinced that economic growth was the source of all wealth and therewith laid the foundations of the neoclassical 'economic growth paradigm' mentioned above. To him "...the stationary is (a) dull..." [31, p. 34] state to be in and equal to poverty.

For Thomas Malthus [33,34] it was indeed the inability of the human society to establish a stationary state that convinced him of its eternal condemnation to 'vice and misery'. This was the inevitable outcome of his 'population principle': On the one hand humans are unable to control their exponential population growth. On the other hand food production is growing only linearly or indeed less than proportionately to the increased labour input because of decreasing returns, causing humanity's continuous overshooting of the carrying capacity<sup>4</sup> of its habitat. The result, according to Malthus, was 'misery' as the overshoot was to be cut back by positive checks, which increase the death rate (wars, famines and diseases) and preventive checks in the form of 'vices' (abortion, birth control, prostitution) [Ibid]. He somewhat softened his dire conclusion in the second edition of his essays, when he introduced 'moral restraint' (chastity and late marriage) as another possible preventive check [36].

Known as the last important economist of the classical tradition [37], John Stuart Mill did not share the pessimistic vision of Smith and Malthus regarding stationarity. In fact his Victorian prose on the subject provides the historical inspiration for Daly's 'normative' (i.e. desirable) steady-state. Mill in his own words thought of it as a situation with "... a well-paid and affluent body of labourers; no enormous fortunes, except what were earned and accumulated during a single lifetime; but a much larger body of persons than at present, not only exempt from coarser toils, but with sufficient leisure, both physical and mental, from mechanical details, to cultivate freely the graces of life..." [23, p. 454]. He was convinced that humans would "... be content to be stationary, long before necessity compels them to it" [23, p. 454]. He believed it would be a considerable improvement to the present state of social life, characterised by endless struggles to get on and by "... trampling, crushing, elbowing, and treading on each other's heels ..." [23, p. 453].

<sup>4</sup> Malthus did not use the concept of 'carrying capacity', which was developed much later, but his 'population principle' could be seen as the historical basis for this concept [35].

The experience of the enormous technological progress during and after the industrial revolution, fuelled by coal first and both coal and petroleum later,<sup>5</sup> changed the economist's vision of the stationary state fundamentally. Classical worries about the limits imposed to the expansion of the human economy by decreasing returns in agriculture [33,34], the finiteness of arable land and decreasing returns [38] and the exhaustibility of non-renewable resources [39], were brushed aside as dusty remainders of the early modern period. Economic growth now appeared unlimited and the stationary state mutated from an ontological reality to an analytical fiction [32]. This tendency was already visible in the works of Karl Marx, to whom land was not anymore as important as capital and labour in the production process. However in his very own concept of stationarity (simple reproduction as compared to "expanded reproduction") [40, Ch. 23], though mostly analytical, Marx *does* seem to foresee a possible real state of equilibrium beyond capitalism. In socialism, he believed, diminishing relative marginal utility would induce society to decide "enough is enough" at some point [32].

Joseph Schumpeter, a mentor of Georgescu-Roegen, was a notable exception to the above tendency. He dedicated a considerable amount of his work to the stationary state, which he called 'circulation' (Kreislauf): an economy which consumes everything produced in each period i.e. without accumulation, credit, savings or profits [41,42], similar to Marx's "simple reproduction" above. This Schumpeter thought would be followed by the collapse of capitalism, to be replaced by socialism [32]. John Maynard Keynes also maintained his reservations with regard to the technophilia of his neoclassical peers and continued to write about an ontological (rather than an analytical) steady-state. He described a 'quasi stationary community' [43, Ch. 16], which would be characterised by a stable population, the absence of wars and several generations of full employment. The 'marginal efficiency of capital' would fall to zero, leading to a near zero interest rate and consequently the 'euthanasia of the rentier' [43, Ch. 24] – the inability to live of one's accumulated wealth.

## 3. Daly's SSE concept and institutions

Herman Daly's normative concept of an ontological steady-state is inspired by this rich history above and by Georgescu-Roegen's [44] flow-fund model and thermodynamic growth critique. The former analytical model distinguishes between stocks, funds, flows and services. Stocks can be transformed into flows, serving as inputs for the economic process at any rate until they are depleted e.g. the transformation of fossil fuels (stock) into heat (flow). Flows are those factors of production that are transformed by the funds (capital, people and ricardian land) into either "useful" outputs (e.g. consumer goods) or unwanted outputs (e.g. waste). The funds, as described above, produce services just like stocks produce flows, however only at a limited rate. A labourer can only do so much work and so many hours a day, then she needs to rest. In a bakery, the baker (*labour-fund*) uses a furnace (*capital-fund*) to transform a *flow* of heat (coming from a *stock* e.g. coal or a *land-fund* e.g. wood) and flour into a *flow* of bread (consumer good) and ash (waste). Georgescu-Roegen insisted that humans should live of the services of renewable funds, and not of the flows from depletable stock [19].

As we shall see Daly's own analytical approach uses services and stocks in a different way, does not distinguish between flows and funds and introduces "throughput" instead. These changes allow

<sup>5</sup> Contrary to popular believe the use of coal has not declined since petroleum became more popular as a fuel. In fact, coal extraction increased seven times in the 20th century while population increased "only" four times.

him to describe his normative concept of an ontological steady-state as: “an economy with constant stocks of people and artefacts, maintained at some desired, sufficient levels by low rates of maintenance ‘throughput’, that is, by the lowest feasible flows of matter and energy from the first stage of production (depletion of low entropy materials from the environment) to the last stage of consumption (pollution of the environment with high entropy wastes and exotic materials).” Daly [22, p. 16].

The ratios and efficiency measures given in Equation (1) constitute the core of this SSE concept. Therein the economy is described as a stock of people and artefacts, which require maintenance via throughput of a flow of physical matter and energy. Stocks provide service, and as shown in ratio 2 and 3, cancel each other out just as they wear out in the real world. Ratio 2 constitutes the stock-service-efficiency<sup>6</sup> and ratio 3 the stock-maintenance-efficiency.<sup>7</sup> Service is the ultimate benefit of economic activity and should be maximised while throughput is the ultimate cost of this service and should be minimised. De-growth ‘prophet’ Serge Latouche’s eloquently popularized recommendations for socio-economic transformation, wrapped up in an ever increasing number of ‘R’s (Restructure, Redistribute, Reduce, Reuse and Recycle) [e.g. 27],<sup>8</sup> are all entailed in Daly’s stock-service-throughput equation and can be seen as useful and stimulating keywords for putting it into practice.

$$\frac{(1) \text{ service}}{\text{throughput}} \equiv \frac{(2) \text{ service}}{\text{stock}} \times \frac{(3) \text{ stock}}{\text{throughput}} \quad (1)$$

Equation (1): Service, Stock and Throughput [adapted from: 22, p. 36]

Just like John Stuart Mill at his time, Daly is convinced that it would be of great benefit to the human society to establish a SSE before it is inevitable. For this purpose he [22] offers three institutions: (1) Aggregate physical depletion quotas for stabilizing the stock of physical artefacts and to keep throughput below ecological limits i.e. to address ratio 3. (2) A “distributionist” institution for limiting the degree of inequality in sharing the constant stocks (ratio 2/3)<sup>9</sup> and (3) some form of population control to address the “stock” of people e.g.: Boulding’s [46] transferable birth licences.<sup>10</sup> The latter is an issue that is often conveniently omitted, not only by the mainstream sustainability discourse but also in the more radical de-growth literature [26, e.g. 27–30]. The next section is therefore solely dedicated to highlighting the importance of demography for critics of economic growth and to underline the inappropriate treatment of the issue in the de-growth literature.

#### 4. Population

Writing about the need for population control is still a taboo and being labelled as Neo-Malthusian is usually considered something negative. Moreover the Anti-Malthusian mainstream tends to argue that Malthus was too pessimistic with regard to technological

progress and that his theories have been proven wrong by history [e.g. 47]. This line of reasoning resembles the absurd argument that humanity will *not* “run out” of non-renewable resources, because this has never happened in the past either [e.g. 48]. Instead, it is much more likely that the effects of Malthus’ population principle have only been postponed because of the enormous energetic subsidy that the human economy obtained and continues to obtain by tapping the underground storage of solar energy of millions of Palaeolithic summers, called fossil fuels.<sup>11</sup> This subsidy allows us to support our so called “modern agriculture”, which uses more energy in fossil fuel inputs, than it produces in food calories [52]. Once this subsidy begins to decline we might see the “Malthusian devil” [53, in 54] unleashed again.

Hence stabilisation or de-growth of the economy inevitably requires stabilisation or de-growth of the number of humans respectively. The planet’s carrying capacity of our species is defined by the maximum sustainable impact (I) of our society. Impact (I) in turn is given by the well known equation  $I = PAT$ : population size (P), times its affluence (or consumption) (A), times the environmental damage (T) caused [55]. The reduction of (A) by sufficiency and frugality as well as that of (T) by acting more environmentally conscious and by technological progress cannot proceed indefinitely [56], so (I) will inevitably continue to grow if population is not stabilized or decreased.

However Boulding’s top-down market-based approach mentioned above, may not be the most appropriate policy option for such a delicate issue. Instead one may find inspiration in the Euro-American neo-malthusianist bottom-up women’s freedom movement of 1900 (of Emma Goldman and other activists), as suggested by Joan Martinez-Alier [57], Ronsin [58], or Masjuan [57,59]. It demanded “conscious procreation” to prevent low wages and pressures on natural resources, in opposition to the interests of the state, who wanted more soldiers, and the churches, whose objective was (is) to outnumber the members of other religious groups [60].

The treatment of the population problem by de-growth authors is either missing, patchy or incoherent. Georgescu-Roegen himself was already unclear about policy recommendations. Instead he focused on the question of *how many* people the planet could potentially support [e.g. 2, Ch. 10], which in his view were as many as could be adequately fed by organic agriculture [19]. He therefore implicitly proposed a steady-state population, which is clearly incompatible with economic de-growth *towards zero*: Just as the growing economy requires the augmentation of the labour force, the declining economy needs it to shrink – at least over the long run. Latouche, avoiding demography in earlier writings, did finally address it more recently [45, Ch. 5]. However he downplays the issue as an easy-way-out for the rich and powerful, who wish to uphold the present economic system – implicitly postulating that the current economic system could be maintained *without* population growth and immigration.

#### 5. Criticisms, challenges and discussion

Rather un-confrontational counterattacks by the orthodoxy [11,61,62] aside,<sup>12</sup> most common academic critiques of the SSE are focused on thermodynamics – the science of energy. According to the

<sup>6</sup> The goal being to produce a maximum of service from a minimum of stock.

<sup>7</sup> The goal being to maintain a maximum of stock with a minimum of throughput (low entropy matter and energy).

<sup>8</sup> In a more recent publication this list has been amplified by three more ‘R’s: Re-evaluate, Re-conceptualize and Re-localize [45].

<sup>9</sup> There are diminishing returns (services) to material wealth e.g. a sweet given to the child of a billionaire does not cause the same excitement than if given to a poor child in Africa.

<sup>10</sup> Boulding suggested creating a market for birth licences, where every couple would initially be issued 2.1 licences. Hence for having more than 2 children i.e. more than the simple reproduction rate one would have to find other couples, who were willing to sell all or part of their licences.

<sup>11</sup> Although Boserup [49] showed convincingly that population growth is a cause of changes in the agricultural system (from slash-and-burn to intensive rotation with irrigation feeds more and more people), firstly her work in 1965 stopped before the period of “farming with petroleum” [50] and secondly did she not analyze the decreasing energy efficiency of modern agriculture [51].

<sup>12</sup> Orthodox, neoclassical economists like Solow and Stiglitz have avoided any direct referencing of Georgescu-Roegen, Daly or other growth critics, until they were directly challenged by Daly [63–66].

second law, entropy increases in an isolated system. Entropy, which could roughly be defined as ‘the level of disorder’ has also been described as ‘time’s arrow’ [67] because it moves continuously in one direction. A standstill or steady-state is therefore an entropic impossibility, a fact that Daly [68] was well aware of. Two points have to be made in this respect: Firstly, while energy cannot be recycled – i.e. depleted stocks of coal, oil and gas are lost forever – entropy can indeed increase in one system at the cost of another. Hence the energy dissipated by the sun due to nuclear combustion of its mass, could serve to withstand the entropic arrow until the end of the lifetime of the sun<sup>13</sup> – at least theoretically. This is in fact the argument brought forward by Robert Ayres [69,70] (see discussion below).

The fiercest critique of the SSE came from Daly’s mentor Georgescu-Roegen [1,3] himself. Just like ‘sustainable development’ [71] and ‘small is beautiful’ [72], to him it was mere ‘snake oil’ [73,74, cited in 75] and evidence of the hopeless search for “ecological salvation” by a human society which did not accept its mortality. Georgescu-Roegen’s “fourth law of thermodynamics”, which – as a practical observation – is vigorously defended by Daly, reads: “in a closed system, the material entropy must ultimately reach a maximum” [3, p. 269]. This “law” implies that “[c]omplete recycling is impossible” [2, p. 60], as the wear and tear of material objects causes an irretrievable dissipation of small particles (e.g. the rubber of a tire). Since even in a SSE non-renewable materials are dispersed in such a way, it cannot escape the “fourth law” leaving the declining state [3, p. 270] as the only viable alternative.

Georgescu-Roegen continues that “... even a declining state which does not converge toward *annihilation*, cannot exist forever in a finite environment [25, p. 23 own emphasis].” The last part of this quote is of course a contradiction, as something that moves towards annihilation equally cannot exist forever.<sup>14</sup> This certainly does not mean that Georgescu-Roegen advocated the earliest possible disappearance of the human species from the planet. The quote originates in a rather polemical article, where he used strong words in order to emphasise his disliking for the concept of a steady-state. The term “annihilation” in this context probably refers to the entropic heat death of the universe. So rather than the *desired* policy end-goal of economic de-growth, it is the eventual *inevitable* future of the planet earth over the very long run (see also footnote 15). Nevertheless the above quote is important as it shows that economic de-growth, as proposed by Georgescu-Roegen, is a path without a constructive goal for policy making and appears inconsistent with his earlier mentioned goal of a steady-state-population.<sup>15</sup>

The “fourth law” could be regarded as the essence of a third view, which was added much later in the polemic over the steady-state between Daly and Georgescu-Roegen. On many occasions Robert

Ayres [69,70,77–80] criticised both scholars for their interpretation of thermodynamics: Firstly the law of conservation of mass [81] states that matter is neither produced nor destroyed. Secondly the earth is not an isolated but a closed system,<sup>16</sup> as it receives a huge amount of solar energy influx<sup>17</sup> of which only about 3% or so are used by plant metabolism [69,70]. Thus, Ayres [69,70,83,84] argues that advances in solar energy technology, will eventually secure huge amounts of energy.<sup>18</sup> Enough to re-concentrate the dissipated matter, which is trapped by the gravitation of the earth, i.e. 100% recycling becomes feasible if enough energy is available. This position, the so called ‘energetic dogma’ [86], is actually an unintentional defense of the SSE against Georgescu-Roegen’s “fourth-law-based” rejection thereof. If economic growth can be sustained almost indefinitely (as Ayres partially suggest), then so could also a steady-state.

Ayres consideration may be true in theoretical terms, of which Georgescu-Roegen [e.g. 3] was and Daly [68] and Latouche [26] are well aware. However there are many practical limitations to Ayres’ technological optimism, some of which were addressed by himself more recently [85,87]. Two more shall be mentioned here: First, given sufficient energy, all concentrated deposits of minerals would be depleted first and then dissipated in the respective sinks of the lithosphere in a high entropy state (minuscule concentrations). Then one would have to start “mining” the sinks or the “waste-basket”, as Ayres [70] indeed proposes, in order to recover (recycle) the dissipated materials. Considering the social and environmental impacts that “concentrated” mining all around the world has already [e.g. 88,89], it is not difficult to imagine the practical impossibility of converting a large part of the lithosphere into a huge mine. As Ayres [69] himself emphasises, the capacity of sinks to absorb waste products of the human economy (CO<sub>2</sub> in the atmosphere, nitrates in the water body, heavy metals in the soil) may have become more limiting than natural resource scarcity.<sup>19</sup> Secondly, it is rather questionable, whether the material structures necessary to harvest solar energy could be maintained over the long run just by the energy produced by them [91,92]. This is especially true with regard to some rare elements (e.g. indium), on which the most efficient PV cells currently depend [93].<sup>20</sup>

An aspect usually overseen by technological optimists is that with current unsustainable lifestyles, it would be very dangerous indeed if humans found an inexhaustible and cheap source of energy, even if it were environmentally benign. Availability of surplus energy has always been one of the most important limiting factors to the expansion of the human economy [94–96].<sup>21</sup> Hence if

<sup>13</sup> About 5 billion years (<http://en.wikipedia.org/wiki/Sun>), “only” 500 million of which are supposed to provide adequate conditions for complex life forms on the planet, then it will get too hot.

<sup>14</sup> Having said that, on the same page Georgescu-Roegen exempts the “berry-picking economy” [25, p. 23] from his dire verdict. Indeed, such hunter-gatherer societies, in the absence of population growth, could probably exist in a steady-state throughout the sun’s lifetime. This of course would imply that our present economy and population must have had collapsed already. The population of Georgescu-Roegen’s “berry-picking economy” could thus be regarded as the minimum possible level of “stock” of a quasi-eternal steady-state.

<sup>15</sup> Kozo Mayumi, one of Georgescu-Roegen’s last students, holds the following view regarding this matter: “Given the finite amount of resources including solar energy, the time horizon is finite regardless of people’s attitude toward continual growth, steady-state, decreasing consumption. Thus far nobody including G-R, tried to investigate the three issues: Sustainability for whom? Sustainability of what? Sustainability for how long?” [76] I would argue that Daly’s quasi SSE is an important reorientation of our economic attitude toward a long-term sustainability policy goal. If his view is properly linked with the ongoing de-growth debate, it will be a good starting point for answering the above questions on a suitable time scale for human existence on this planet.

<sup>16</sup> The difference is that an isolated system exchanges neither energy nor matter with the outside, whereas a closed system does receive an external energy influx. The earth is a closed system, with no inputs of matter (except for the odd meteorite), but an influx of energy from the sun.

<sup>17</sup> The amount of energy received by the sun each day is about 6000 times larger than all the primary energy consumed (source [52,82]).

<sup>18</sup> The earth’s surface is no limit to Ayres [83–85] as he is convinced that one day we will be able to mount solar collectors on satellites or the moon and microwave the energy back down to earth.

<sup>19</sup> Ayres’ argument in fact is that we *only* have to fear the collapse of environmental services, which will bring upon us a disguised version of the *Malthusian dilemma* [90, p. 198].

<sup>20</sup> For a more detailed and technical defense of Georgescu-Roegen’s fourth law against the “energetic dogma”, see Mayumi [86].

<sup>21</sup> Tainter [95] argues that humans need energy for problem solving. The encounter of and utilization of coal for example was a result of a search for an energy resource in order to alleviate the hardship caused by overpopulation and deforestation in the Middle Ages and Renaissance. If we would not have found that resource then our society would have most likely collapsed as the Roman Empire did [96]. Tainter [95] therefore concludes that for our society to become sustainable, we may need to consume more rather than less in order not to lose our capacity to solve problems. In the face of Peak Oil [97] I think this verdict may mean that the collapse of our present society is inevitable.

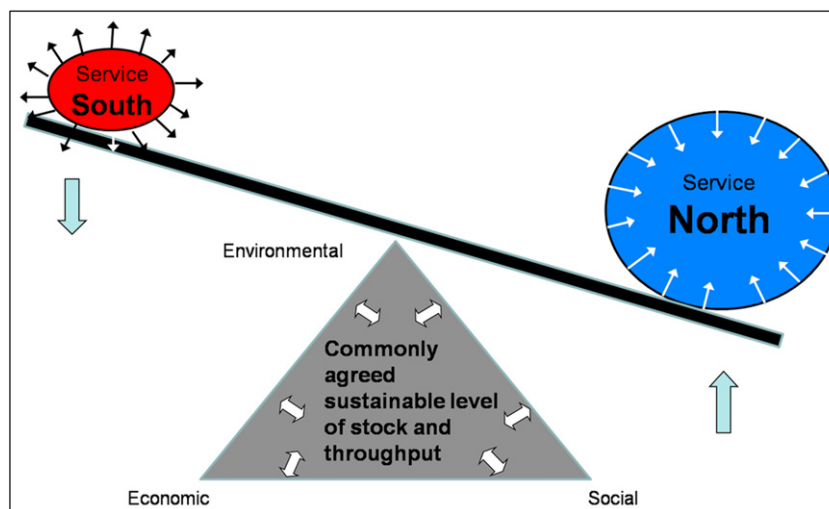


Fig. 1. Balancing an equitable quasi steady-state world economy.

we discovered some ‘miracle’ source of energy now, a massive explosion of the human population (P) and its consumption (A) and therefore a huge impact (I) would probably be the result. The stress that our economy is exerting on ecosystems, since we have discovered and learned to utilize fossil fuels, is good evidence thereof. In other words it is more than likely that there is some direct relationship between the amount of energy consumed and environmental damage caused [98,99].

De-growth authors have barely touched the controversies analysed above and have religiously adopted Georgescu-Roegen's position against the steady-state. Moreover they equally fail to adequately ask questions about the end-point of what they propagate, conveniently omitting the word “annihilation” when they cite Georgescu-Roegen. Instead the focus of the argument is placed on the fact that rich industrialised countries have evidently surpassed sustainable limits already, and de-growth is therefore essential. Although certainly true, this alone is no reason for rejecting the objective of a SSE on a global level at some mutually agreed upon sustainable level of throughput. Rather it is an argument in favour of combining the two concepts (see Fig. 1). In order for the SSE to be equitable not only on a national (see Daly's second institution above) but also on an international basis, the rich North will need to de-grow in order to allow for some more *economic* (vs. uneconomic) growth [100–104]<sup>22</sup> in the poor South. This is to balance the service obtained from the steady-state level of stock and throughput between the rich and the poor, as illustrated in Fig. 1. Economic de-growth can therefore be seen as a *path* that leads to a globally equitable SSE.

In summary many of the above criticisms of the SSE can be attributed to an erroneously narrow and technocratic definition of the concept. Daly later advocated a *quasi* SSE [21,105] which is “... neither static nor eternal – it is a system in dynamic equilibrium within its containing, sustaining, and entropic biosphere” [21, p. 117]. In other words the stock-throughput triangle of Fig. 1, representing both a quasi SSE and (strong) social, environmental and economic sustainability, will most likely have to shrink over time. The smaller the triangle is however, the longer it can be maintained. To actually define its size, even for a short period, is admittedly extremely problematic – if not practically impossible.

## 6. Unattainable goals and moral growth

In my view it is therefore important *not* to define the SSE as a goal that can actually be arrived at in terms of an end-point. This is practically impossible due to the difficulties in resisting entropic dissipation of materials [2] over the long run<sup>23</sup> and the socio-economic, political and ecological complexity involved in determining and deciding upon a steady-state throughput level. Instead I shall turn to psychology in order to define a SSE as an “unattainable goal”, thereby embracing that complexity, without taking away the validity of the goal itself.

From Viktor Frankl's [106] Logotherapy, we know how important it is for us humans to find meaning in life. Certain goals, for example having one's own house, can give such meaning. To some that goal might remain unattainable, possibly causing distress and illness in the absence of successful goal disengagement [107,108]. Some goals however are per definition unattainable during one's lifetime, like those in religious contexts (salvation, enlightenment, ever lasting happiness...). Far from being distressing, following these goals (i.e. being religious) has been shown to be beneficial to psychological well-being and health [109]<sup>24</sup>. Moreover, they stimulate the creation of long-term visions and paths in order to approach/approximate them. The SSE could serve as a common goal of that sort, which could hardly be said about annihilation, the apparent “destination” of economic de-growth according to Georgescu-Roegen.

It is worth mentioning here that what has been argued above is equally true for a strong definition of sustainability.<sup>25</sup> In fact the SSE and (strong) sustainability could be regarded as identical concepts [compare: 111], for which both could be defined as unattainable goals. It is regrettable that what should have been the path towards this goal, ‘sustainable development’ [71], has become to mean ‘environmentally friendly economic growth’ [27,91] or ‘sustaining the unsustainable’ [112]. Latouche's [27] elaboration of Georgescu-Roegen's [91] critique of sustainable development is – in my view – indeed one of the de-growth literature's most important

<sup>23</sup> The factor time was very important for Georgescu-Roegen [75], nevertheless when rejecting the SSE, he neglects the possibility that a “quasi-steady-state” could theoretically exist over the short run, maybe even over several generations.

<sup>24</sup> In fact it could be argued, that “mundane” goals, which to many are unattainable as described by Wrosch [107,108] i.e. building a house, etc. have replaced earlier religious goals in modernity.

<sup>25</sup> For an overview on the two definitions see Neumayer [110].

<sup>22</sup> Many studies show that in the North economic growth is not contributing to welfare anymore i.e. it is un-economic [compare: 100–104].

contributions. However “sustainability” itself (without development) still can be a valid goal, if it is defined as above.

Returning to the studies of Wrosch [107] and others one could further intuitively argue, that many of us, at least in the industrialised world, are driven by unattainable goals which are formulated in an individualistic and relative sense. We strive to be wealthier, prettier, more skilled, more admired or more powerful than everyone else. Since not everybody can be relatively better than everyone else, these are clearly unattainable goals, many of which collectively constitute the goal or end-point of the economic growth path. The SSE on the other hand can be an objective that is both motivating and solidary.

Unfortunately, as Daly [22] and Latouche [26] themselves admit, the SSE and the de-growth economy respectively are socio-politically utopian at the present state of affairs. This is of course true no matter how we define the SSE or economic de-growth. They are not ideas that people would voluntarily vote for, unless there was what Daly [22] calls ‘moral growth’. Moreover some of those who might be willing to push for a radical change towards a different economy, would probably not be enthused by the imposition of Daly’s institutions, which have an air of authoritarian top-down decision making. This and the unappealing sound of ‘standstill’ might explain why the concept steady-state has not resulted in the creation of grass-root movements such as those found under the heading of ‘la décroissance’ in France, ‘la decrescita’ in Italy or ‘el decreixement’ in Catalonia<sup>26</sup>. Their revolutionary spirit and provocative slogans may indeed be more suited to overthrow Georgescu-Roegen’s [3] ‘growthmania’ [citing: 113] or Latouche’s [27] ‘tyranny of growth’, than does the concept of a SSE. Nevertheless these movements, are also unlikely to be relevant on a large scale, in the absence of ‘moral growth’.

The advancement of the ethical properties of our society – in favour of de-growth as a path towards the “unattainable goal” of a SSE – may appear utopian at this moment, but could indeed occur in the presence of a radical external shock or crises. In fact, Peak Oil [e.g. 97], Peak Coal [114] or the current economic crises, which is most likely related to the former [e.g. 115], could possibly produce such a situation. If unanticipated and without plans for adaptation however, the very opposite i.e. moral de-growth might take place, which could have us witness the return of authoritarian regimes like in the 1930s [116,117].

Even more than a well managed crisis, moral growth will require an ‘ultimate ends’ discussion i.e. deliberations about the true purpose of the economic process, depending on each context (cultural, political,...). De-growth movements and writers have gone a long way already, when promoting social justice, solidarity [e.g. 26,30], ‘joy of life’ [5], the pursuit of “relational goods” rather than material goods and the cultivation of human relationships [29]. However this may not go far enough and other immaterial endeavours such as ‘love’ or ‘compassion’, which appear to be too esoteric even for the revolutionary spirit of the de-growth community, might have to be called upon as well.<sup>27</sup>

## 7. Conclusion

Based on the above arguments it is argued here that the categorical rejection of a steady-state economy by Georgescu-Roegen

and by the emerging movement of “de-growth economics” should be reconsidered. In fact, instead of contradictory, the two concepts complement each other. As illustrated in Fig. 1, economic de-growth in the North provides a *path* for approximating the *goal* of a globally equitable SSE, by allowing some more *economic* growth in the South. Moreover Daly’s SSE has deep roots in economic history and offers concrete macroeconomic policies, both of which the de-growth literature lacks. Daly’s SSE, with its air of top-down decision making, on the other hand, could learn from the focus on grass-root initiatives by the de-growth movements and literature. This is especially so when addressing Malthusian concerns, which Daly’s SSE notably does, but in a rather top-down manner. Unfortunately the issue of population is not given the importance it merits by de-growth writers and activists.

Related to the above mentioned rejection of the SSE, are criticisms based on the entropy law and the “fourth law” [3,26,70]. However these problems, together with the utopian critique, can easily be healed, if we focus on the goal of a quasi SSE, resting in a dynamic equilibrium. Adopting the provocative spirit of de-growth writers, this *goal* should openly be defined as “unattainable”. Same is true for sustainability and many other worthy policy goals promoted by economists (e.g. full employment). Despite being elusive, they can (and should) be approximated. Leading towards these “unattainable goals”, are a multitude of different *paths*, consisting of top-down and bottom-up approaches in differing proportions for every particular geographic and socio-cultural context. Economic de-growth is only one of these paths, but undoubtedly a necessary one for the rich North over a certain period of time. For this to be able to happen we may need growth in what is indeed limitless – the moral properties of our society.

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<sup>26</sup> There is a Centre for the Advancement of the SSE ([www.steadystate.org](http://www.steadystate.org)), but this is more an academic think-tank, than a social movement.

<sup>27</sup> I am aware that this and earlier affirmations may sound as if I was to promote religiousness or some specific religion. This is not the case, instead these are values that can contribute to the good of all and exist not only inside (all) religions but also outside. Daly [105] on the other hand is explicit about the fact that “ultimate ends” for him are religious. Nevertheless his theories do not depend in any way on this fact.

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