Degrowth: How much is needed?

Ted Trainer

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The considerable literature on Degrowth has focused mainly on the case for it and on elements of a desirable new economy. Little attention has been given to the magnitude of the required Degrowth and the common implicit assumption is that it would not be very great, enabling a desirable economy to be achieved by reforms within the existing economy. The following discussion argues that this is mistaken and that the reductions must be so large that they cannot be implemented within the existing structures and must involve extremely radical system change. Implications for the form a sustainable and just society must take and for the way it might be achieved it are explored.

The possibility that economic growth might constitute a sustainability problem has been recognised for many decades, but until recently has received little attention. However since the 1990s there has been a remarkable surge in attempts to get the issue on the agenda and there is now a considerable literature arguing the need for Degrowth. Understandably the discussion has focused on elaborating the case that Degrowth is necessary and has given little attention to the amount that might be necessary or the form that a society that has undergone sufficient Degrowth must take, and less to the means by which it might be achieved. The argument below is that rich world per capita levels of resource use and environmental impact, and thus levels of production and consumption, and thus GDP would have to be cut to less than 10% of current levels.

Most if not all current discussions do not recognise that the task is of that magnitude and consequently they proceed as if reductions within the present basically industrialised, globalised, urbanised, market led, capital and energy intensive system will be capable of achieving sufficient Degrowth. It will be argued that this is incorrect and that an extreme transition to radically different systems will be necessary. This in turn sets immense theoretical and practical problems regarding goals and strategy.

2. **The magnitude of the degrowth task.**

Following are some of the arguments and evidence supporting the claim that the required Degrowth must be far greater than is commonly assumed. The general logic is to examine various measures of consumption in high income and low income countries. order to estimate the increase in present global aggregates that would result if all were to rise to present rich world per capita levels. The reference is to a global population of 9 billion in 2050, which is probably lower than most estimates. (For instance, Bradshaw, Blumstein, and Ehrlich (2021) assume 10 billion, the UN

Department of Economic and Social Affairs estimated 9.8 billion in 2017 and in 2019 suggested that it could rise to 11 billion.)

2.1. **GDP per capita**.

The main evidence referred to below is to do with resource and environmental impact rates but GDP can be taken as a loose overall representation of the amount of consumption taking place. For instance it corelates closely with energy use, and Wiedmann et al. (2014) report a close correlation with materials use. If 9 billion people rose to the present Australian level of per capita income, around $50,000 p.a., the total world income would be around $450 trillion, approaching six times the present amount. Yet the World Wildlife Fund (2019) estimates that the present amount of resource consuming going on is 1.7 times a sustainable amount. (The figure is also given by Bradshaw, Blumstein, and Ehrlich, 2021, the UN Department of Economic and Social Affairs estimated 9.8 billion in 2017 and that it could reach 11 billion in 2019.) This indicates that by 2050 the amount would be over 10 times a sustainable level.

The 1.7 multiple has been disputed, primarily because approximately half the Footprint is due to the inclusion of ecological resources required to deal with carbon emissions. The significance of this point depends on expectations regarding how effectively the emission problem can be dealt with, e.g., by shifting to renewable energy sources. That issue is quite unsettled and there is a considerable literature doubting the possibility of 100% renewable energy supply. (For instance, Clack et al. 2017, Trainer 2017, Moriarty Honnery 2012, 2016,2017, Capellán-Pérez et al., 2020, de Castro and Capellán-Pérez 2020, Heard et al. 2017.) The uncertainty over the issue is to be borne in mind but the multiple can be taken as an indicator of a significant overshoot that it might not be possible to reduce significantly.

2.2. **Resource consumption**.

Although at times comparisons in this area cannot be precise due to differing definitions of “poor”, “underdeveloped”, “low income” etc. countries, the following references indicate significant differences. The UN's International Resources Panel reports that per capita material footprint in high-income countries is more than 13 times the level of low-income countries. (United Nations International Resources Panel, 2019 p. 5) “…overall, the wealthiest 20 per cent of the world's population consume 80 per cent of resources such as water and land. By contrast, the poorest 20 percent do not have enough to meet their basic needs - and account for just 1.3 per cent of global resource consumption.” Wiedmann et al. (2015, Fig 1) found that the Australian “Materials Footprint” is 9 times that of India. Wiedmann, Schandl and Moran (2014) estimate that the top five consumer countries consume 62% of iron ore and 47% of bauxite. The figures given by Soderstein et al. (2020) indicate that OECD vs non OECD per capita consumption ratios are, for biomass 13/1, fossil fuels 7.4/1, metals 7.1 and minerals 6.4/1, meaning that the ratios for rich vs poor countries would be higher.

Recent studies have shown that previous measures of Material Footprint can be significant underestimates, firstly because they usually reflect only net quantities used and thus do not take into account the significant quantities of materials that are processed in Third World exporting countries for each unit exported. (Wiedmann et al., (2015 discuss this point.) Secondly previous estimates have tended not to include the resource costs embodied in the capital-intensive infrastructures that must be built to produce and export materials. Soderstein et al. (2020) have estimated that including these can increase total quantities by up to 162%. Wiedmann and Lenzen (2018) arrived similar findings. Note that most of the above references have been to present per capita resource use, but these rates are expected to increase significantly. The UN estimates the global average will be 110% higher by 2060. (United Nations International Resources Panel, 2019, p.27). Taking this factor into account would increase the basic multiple. 2.3 Energy. The wealthiest 10% of the world's population consumes about 20 times as much energy as the poorest 10% of the world's population. (Wiggins, B., 2020.) US per capita consumption is 14 times the Indian and African averages. (Akanonu, 2019.) For the world's population to rise to the present US per capita primary energy consumption of around 330 GJ/y world production would have to be multiplied by almost 5.

2.4 **Carbon emissions**.

In 2015 Oxfam released a study (Colarossi, 2015) which found that the richest 10 percent of people produce half of the planet's individual-consumption-based fossil fuel emissions, while the poorest 50 percent, about 3.5 billion people, contribute only 10 percent. This is a per capita ratio of 25/1. Bueret (2019) provides similar summary figures, as does Tucker (2014) who says "…the top 5 emitters together were responsible for more than 52% … of GHG emissions. The 100 countries emitting the smallest absolute amounts of GHG together accounted for a miniscule 1.6 % of the global carbon footprint."

2.5 **Environmental impact**.

Wiedmann et al. (2020) report that the world's top 10% of income earners are responsible for between 25% and 43% of the global environmental impact. In contrast, the world's bottom 10% income earners cause only around 3–5% of environmental impact. 2.6 Footprint measures.

The best known "Footprint" measures are likely to be those published by the World Wildlife Fund (2019) and the Global Footprint Network (2021a). These indicate that the average Australian per capita use of productive land is approaching 7 ha, compared with the global average of 1.7 ha (and thus the total available is 7.8 billion people x 1.7 ha = 12 billion ha. Global Footprint Network, 2021b.) Therefore if the 9 billion people expected to be on earth by 2050 were to live as Australians do now, around 63 billion ha of productive land would be needed. But there are only about 12 billion ha of productive land on the planet. If none of this is set aside for nature then each Australian would be living in a way that would require over 5 times as much productive land as all people could average, and if one third was set aside the multiple would be 8. The UN's International Resources Panel estimates that for US resource consumption to be provided sustainably to all at present would require five planet Earths. (United Nations International Resources Panel, 2019.)

2.7 **To summarise regarding multiples**.

These numbers are imprecise and varied but they document quite large differences between current rich world per capita rates of resource consumption and ecological impact compared with poor world rates and world averages. The general impression is that if the probable 2050 world population of 9 billion was to rise to the present Australian per capita rate of consumption the amount of productive resources needed would be in the region of at least 6 times and possibly up to 10 times the amount that could be provided sustainably.

3. **<u>Add the significance of deteriorating trends.</u>**

To the foregoing picture must be added the fact that it is becoming increasingly difficult to access resources. Following are indications of the significance of this factor. It means that it would be a serious mistake to think about the prospects of raising all people to 2050 rich world "living standards" by reference to the effort needed to produce resources now. In general the difficulty is likely to be much greater, and the success much smaller, meaning that in effect the totals assumed above underestimate the equalising task.

3.1 **<u>Climate change</u>**.

Little needs to be said about the probability that climate change will greatly impede future access to resources.

3.2 **<u>Declining ore grades</u>**.

The CSIRO (2019) provides a plot which shows an approximate halving of Australian ore grades since 1950 for gold, lead, zinc, and nickel. Mudd et al. (2016) document the significant fall in global copper grades. Rotzer and Schmidt (2018), say, "It has been shown in numerous studies that the ore grades of mined deposits have been falling over time."

3.3 **<u>The falling petroleum discovery rate</u>**.

According to the oil-and-gas consultancy Rystad Energy oil discoveries in 2017 were the lowest since the 1940s, having fallen every year since 2014. "…explorers are finding less oil resources per field …An average offshore discovery held about 100 million barrels of oil equivalent in 2017, down from 150 million boe in 2012." Hienberg (2016) says "We are no longer making significant new discoveries of high quality oil, and the rate and size of fossil fuel discoveries in general are in exponential decline. This has been partly due to falling demand in the post GFC period but Hienberg and others show that from 2000 to 2009 there was an even worse return on investment in discovery. (See also Oyedele, 2017.) Mischeaux (2016) says, "Between 2000 and 2012, $2.6 Trillion USD was invested in oil infrastructure CAPEX, with no gain in oil production (this data includes shale oil production in USA)."

An important indicator of the of the increasing difficulty is the falling EROI for oil, meaning that more energy has to be invested in providing a given quantity. "…There was a time in the US, around the 1930s, when the EROI of oil was a monumental 100. This has steadily declined, with some fluctuation. By 1970, oil's EROI had dropped to 30. Over the last three decades alone, the EROI of US oil has continued to plummet by more than half, reaching around 10 or 11." (Hienberg, 2016.)

Reference will also be made below to Ahmed's case (2017) that increasing difficulties are likely to lead several oil producing states in the Middle East to fail in the near future, which would greatly impact on global resource production capacity. 3

3.4 **Forest loss.**

Although the rate of forest loss declined in the 2015-2018 period, Bologna and Acquino (2020) report that global deforestation due to human activities is on track to trigger the irreversible collapse of human civilization within the next two to four decades." They estimate that if the present rate continues, "…all the forests would disappear approximately in 100–200 years." "…we have very low probability, less than 10% in most optimistic estimate, to survive without facing a catastrophic collapse."

3.5 Water.

It is well known that there is a serious and increasing problem of global fresh water scarcity. The Global Peace Index (2020, p. 71) says that if present trends continue, "By 2050, 27% of countries will experience catastrophic water stress and 22% catastrophic food stress."

3.6 **Land and food**.

"A third of the planet's land is severely degraded and fertile soil is being lost at the rate of 24 billion tonnes a year," (UIA, 2019. See also Millman, 2015.) The UN Environment Programme (2018) says, "Every minute we lose 23 ha of land worldwide to drought and desertification." Loss rates can be expected to increase due to erosion, acidification, loss of soil carbon, climate change, pesticide pollution and non-return of nutrients. A review by the FAO (2017) concluded that "Although agricultural investments and technological innovations are boosting productivity, growth of yields has slowed to rates that are too low for comfort."

3.7 **Ecological resources and services**.

Many of the conditions and ecological services enabling current levels of natural resource production are deteriorating alarmingly. The "Planetary Boundaries" literature initiated by Rockstrom et al. (2009), quantifies several of these and although aspects of the study have been challenged (e.g., Brook et al, 2018, Montoya et al. 2018) and defended (Stockholm Resilience Centre, 2017), the notion has been widely recognised and adopted. The review by Bradshaw, Blumstein, and Ehrlich (2021) finds that the seriousness of these factors has been underestimated. They include the loss of biodiversity and sheer animal biomass, including now the possibility of insect loss and their pollination services, the capacity of ecosystems to break down wastes and toxicity, loss of fisheries due to ocean warming and acidification, the possible failure of the ocean current keeping Northern Europe warm, and the many probable effects of climate change including acidification and sea level rise. The interaction and feedback effects between these kinds of factors are largely unknown, such as the effect of warming on the loss of ice cover reducing the planet's albedo and methane release from the thawing of tundra, both further accelerating the warming that caused these effects.

3.8 **Deteriorating EROI and productivity.**

The significance of deteriorating EROI for oil production noted above is a specific instance of a more general effect impacting on many factors. It is a cause of the long term decline in productivity rates. The foregoing rising difficulties and costs can be seen as increasing fractions of gross output or value that are having to be paid to secure net output. This effect cascades through the economy, especially as the declining energy EROI affects the resource and dollar costs of all things energy is used to produce. In addition there is the effect that Tainter (1988) drew attention in his The Collapse of Complex Societies. As scale and complexity increase, increasing quantities of input resources must be applied to system maintenance as distinct from delivering benefits or further expansion. US infrastructures are crumbling because the of the inability to meet the cost of upkeep of now vast freeway etc systems. But even more important might be the increasing cost of deteriorating social infrastructure.

3.9 **Social and political instability**.

The possibility of securing resources for an expanding world population committed to rising GDP per capita also depends significantly on whether or not socio-political systems in regions supplying resources will remain as orderly as they are now. Many believe that in general they will not, as is indicated by the title of Ahmed's article "Theoretical Physicists Say 90% Chance of Societal Collapse Within Several Decades". (2017.) See also Bradshaw et al. 2021 for a summary statement. The Global Peace Index (2020) finds that conflict in the world has been increasing since the beginning of the century. Deteriorating quantities and grades of natural resources are likely to generate increasing competition to secure supplies and these are likely to lead to armed conflict. For instance possibly two billion people depend on the waters coming down from the Tibetan plateau but China is building dams to take much of it. Ahmed provides an alarming account of how deteriorating natural conditions are driving several Middle East oil states towards becoming failed states, which would have the potential to cut world oil supplies dramatically in the near future.

Another dimension is evident in the social turmoil associated with the rise and fall of the Trump presidency. A major causal factor has been the damage caused to the social fabric of American society by neoliberalism, such as the loss of livelihoods as NAFTA enabled the movement of jobs to Asia. Large numbers now experience highly unsatisfactory social conditions in the US. (Speth's evidence, 2012, shows the US at or near the bottom of the OECD countries on almost all social indicators.) This has generated intense discontent with the establishment and fuelled a loss of legitimacy and consent, jeopardising the capacity to deal with the many serious problems facing the country. Rising rates of global inequality are likely to contribute to a significant breakdown of social cohesion in coming years, among other things reducing the capacity of states to deal with problems of resource access.

To summarise, this section has provided support from several areas for the claim that while the task of enabling 9 billion to rise to present rich world levels of resource consumption assuming present difficulties and costs would seem to be well beyond possible, it is bound to become much more difficult in the near future.

4. **Now add the significance of the commitment to economic growth.**

To the foregoing picture of the situation must be added the implications of the fundamental commitment to continual and limitless economic growth. The typically taken for granted goal is 3% p.a. Given that the populations of rich countries are now only growing slowly, this means the goal can be taken as a per capita income growth rate of around 3% p.a. If this were to be achieved and continued to 2050 the present Australian average income of $55,000 p.a. would be about 2.5 times as high as it is now, i.e., $137,500 (and by 2073 it would be double its 2050 level.) If a world population of 9 billion had risen to that level world GDP would total c. $1,238 billion, which is around 15 times as large as it is at present.

Again, the WWF estimates that to meet the present global amount of consumption of biocapacity sustainably 1.7 planet earths would be required, which would seem to mean that the 2050 levels of GDP and per capita use of these resources would be about 23 times sustainable levels. (This assumes that the ratio of resource use to GDP remains the same, i.e., that there is not significant decoupling. (There is likely to be some "relative" decoupling, but no "absolute" decoupling; see below.)

The significance of the magnitude of the foregoing multiples has been given little recognition in the general limits to growth and sustainability literatures. As will be stressed below, if the reductions in rich world and global over-consumption necessary for sustainability were relatively low then adjustments might not be disruptive and reforms to existing systems might be viable. However if the multiples are of the magnitude indicated by the foregoing evidence this will not be the case. Radically different systems will be necessary, of the kind outlined below.

4.1. Why analyse in terms of 9 billion rising to rich world lifestyles and systems?

Even if the moral case for equal shares of the word's resources is ignored, raising "living standards" to rich word levels is the almost universally accepted supreme development goal so the consequences of its continued pursuit will have to be dealt with.

5. **Can't technology solve the problems**?

The faith that technical advance can enable economic growth without growth in resource use is contradicted by a large amount of evidence. Many studies show that despite constant effort to improve productivity and efficiency, productivity growth is low and falling and growth of GDP is accompanied by growth in resource use. (See the recent powerful refutations by Hickel and Kallis, (2019), Parrique et al., (2019) (reporting on over 300 papers) and Haberle et al. (2020) (reporting on over 850 studies.) This would seem to constitute a very substantial case against the faith of the "tech-fix" and "Green Growth" believers and the "Ecomodernists".

The competitive economy generates constant effort to achieve increased efficiency, recycling and technical breakthroughs but the decoupling evidence shows that these efforts are not enabling stabilisation of global resource use, let alone reductions on the scale argued above and in the general degrowth literature. (For a discussion of additional reasons why tech-fix faith is mistaken see Trainer, 2020, pp. 187-214.)

5. **Conclusions on the magnitude issue.**

The above case can be summarised as follows:

• Present rich world per capita rates of both biological and material resource consumption seem to be in general at least x 5 global averages, so if 9 billion were to rise to them total global consumption would be at least 5 x (9/7.8) = 5.8 times as high as they are now.

• But the WWF estimates that present global biological resource demand is 1.7 times a sustainable level, meaning that the 2050 rich world level would be around at least 10 times a sustainable level. It is plausible that the multiple for material resource demand would be similar.

• However, that calculation does not take into account a) the increasing per capita rate of resource consumption in rich countries, b) the dwindling of accessible resources, c) the increasing difficulty and thus resource costs of accessing resources, and thus deteriorating net yields.

These estimates are very imprecise but there can be little doubt that their scope is far beyond achievable. Higher but plausible assumptions could more or less double the multiple arrived at as an indicator of the magnitude of the Degrowth needed.

7. **Implications.**

The enormity of the significance of the above multiples for the Degrowth vision has received very little if any recognition within the Degrowth literature, even from some of its most enthusiastic advocates. Most have proceeded as if reforms to existing basic systems, such as tax changes, curbing advertising, work sharing, a basic minimum income would be sufficient. (See the list given by Kallis, 2015.) But if the required reductions are anything like those argued above this assumption is seriously mistaken; only extremely radical changes in economic, political, settlement forms and social and cultural systems could enable per capita consumption rates to be cut to levels enabling a sustainable and just world. Further, the magnitude issue sets formidable challenges regarding strategy, indeed it provides considerable support for the view that sufficient Degrowth is unachievable.

7.1 **Implications for goals**.

The central element in The simpler Way vision (https://thesimplerwayinfo/) is that the only social form capable of enabling the required degree of Degrowth must involve mostly small scale settlements which are highly self-sufficient and self-governing, in control of their needs-driven and not profit-driven local economy, basically cooperative/collectivist, and above all willingly committed to frugal material living standards and non-material sources of life satisfaction. (For the detail see TSW 2021.) This can involve much private ownership of (small) farms and firms, and increasing socially valuable R and D, high tech professions, industries, universities, medical facilities etc. But it cannot permit the market to have a major role in determining production, distribution or what is developed. Communities must take control of their fate via thoroughly participatory town assemblies, committees, working bees and commons. Needless to say national economies would be zero growth after having undergone Degrowth to a GDP that is miniscule (and ignored.)

It is important here to indicate the grounds for this claim, i.e., why it is that only communities of this kind can enable the per capita resource demand to be reduced dramatically while providing a high quality of life for all? The study of egg supply by Trainer, Malik and Lenzen (2019) showed that the conventional supermarket path involves resource and dollar costs approximately fifty times those associated with backyard or local cooperative paths. The difference is due to the proximity, smallness of scale and integration of communities enabling the elimination of many costly inputs and the use of “wastes”, and “administration” via spontaneous, dollar-costless and informal social interactions.

For instance behind the typical supermarket egg there is a vast and complex global input supply chain involving fishing fleets, agribusiness feed production, shipping and trucking transport, warehousing, fuel and power production, mining, steel works, chemicals, infrastructures, supermarkets, storage, packaging, marketing, finance, advertising and insurance industries, waste removal and dumping, computers, a commuting workforce, and highly trained technicians. It also involves damage to ecosystems, especially via emissions and agribusiness effects including non-return of nutrients to soils.

However eggs supplied via integrated village cooperatives can avoid almost all of these costs, while providing benefits such as enabling immediate use of all “wastes”. Recycling of household, garden and animal pen “wastes” along with free ranging can more or less meet poultry nutrient needs for the associated settlement amount of egg demand. In the process these inputs to compost heaps, methane digesters, algae and fish ponds and aquaculture systems can replace imports of several food items and eliminate the need for fertilizer inputs to village food production. No transport need be involved. The labour need not be paid in money and maintenance of systems can be largely informal via spontaneous discussion and action, for instance within poultry cooperatives. In addition cooperative care of poultry and similar systems adds to amenity and leisure resources and facilitates community bonding.

The Dancing Rabbit ecovillage in Missouri provides one of many illustrative examples that can be drawn from the Ecovillage and Transition Towns literatures. Per capita fuel, power, waste, transport, water and energy consumption rates are in the region of 5-10% of national averages, while reported quality of life measures are higher than national averages. (Lockyer, 2017.) Trainer’s study (2019) estimates that similar achievements are possible in a Sydney suburb. The challenge to advocates of Degrowth is to consider whether there is any path to a sustainable and just world other than via some kind of Simpler Way.

7.2 **Implications for means**.

Much more difficult than imaging the required alternative is imagining how it might be achieved. The Degrowth literature has shown virtually no recognition of the enormity of this problem, well labelled as “The Degrowth Conundrum”. If the task is to cut the amount of normal resource-intensive producing and consuming going on probably to less than one-tenth of the present amount, this means that almost all present industries must be shut down. Their workers must somehow be shifted out of normal offices and factories into lifestyles and systems which enable them to live well without doing any of the resource-intensive producing and consuming they are doing now.

How is this conceivable? How could it possibly be done within economies which are completely dependent on not just maintaining present levels of production and consumption but constantly increasing them? If their growth rates merely slow these societies are in trouble. How then could large numbers of workers possibly be taken out of factories, offices and mines … to do what? They can’t be transferred other kinds of jobs in the existing economy since the point is to dramatically eliminate that economy’s volume of jobs and production and GDP. What is to be done with entire towns and regional economies dependent on for instance mineral production? Could such changes be got through other than by extremely authoritarian governments? But how would such governments with such policies come to power in the first place; certainly not through election by publics which at present would regard the notion of Degrowth as absurd.

Much more problematic, and it would seem not considered at all in the Degrowth literature, is the question, what is to be done with the vast amount of capital that will no longer be needed, and the class which derives huge incomes by investing it, and the vast numbers of “financial advisers” who manage their accounts, and the many more middle class aspirationals who are able to own small amounts of shares and investment property? Degrowth of even the most miniscule degree means writing off factories and eliminating investment opportunities. What Degrowth strategy might deal with how the capitalist class and associates might react if confronted by proposals for eliminating most of them? Discussion of transition within the current Degrowth literature has not recognised let alone begun to deal with this “Degrowth conundrum”.

What passes for strategic discussion typically only calls for big policy changes that would have to be made at the state level such as implementing a basic minimum income. These calls are in fact goal statements, not transition strategies, and calling for existing states to implement them is obviously futile. The Simpler Way perspective on these questions is elaborated in Trainer, (2020) where detailed support is given for the view that this society is incapable of solving the problems threatening its existence, and we have begun a descent into a period of major and possibly irretrievable breakdown involving capitalism’s self-destruction. If the descent involves a Goldilocks depression then we might avoid collapse eliminating any possibility of salvage, and people at the grass roots level will might gradually come to realise that their only hope is to develop local systems focused on collectivism, simplicity and sufficiency. This situation could in time lead to citizens taking control of failing states, given that it would be increasingly evident that national resources must be redirected primarily to providing the inputs the emerging communities need. It hardly needs to be pointed out that the chances of such a transition are remote, but the argument is that there is little if any option here and now but to work to enable it.

With respect to both goals and means the foregoing argument presents an Eco-Anarchist as distinct from an Eco-Socialist perspective.

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