Wales Centre for Public Policy
Canolfan Polisi Cyhoeddus Cymru

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Growth or degrowth for Wales?

Summary

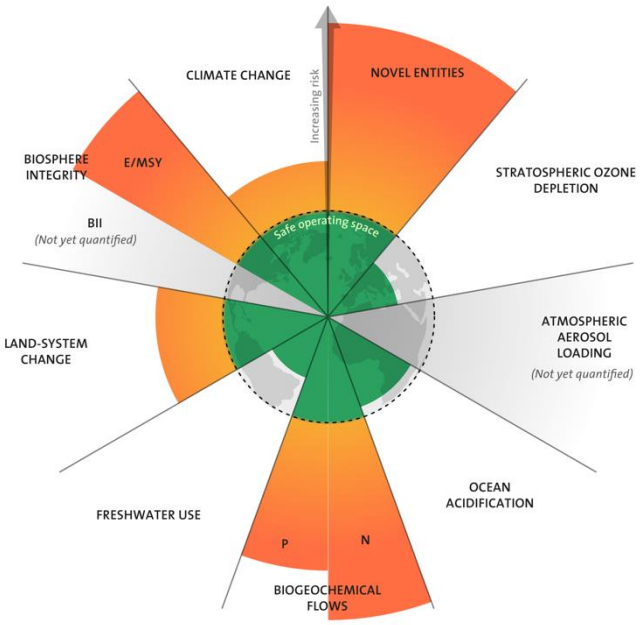
This briefing considers the question of whether a growth or a degrowth policy is in principle optimal for Wales' future sustainability and contribution to stabilising the climate. The arguments against growth tend to emphasise the biophysical limits of the Earth system, and how perpetual growth must necessarily transgress these limits as a mathematical certainty.

However, this belief is based on false assumptions. While the Earth does indeed have limits to human interference with its different biophysical systems - from climate to biodiversity to the nitrogen cycle - indefinite conventionally-defined growth is possible within these limits as a result of changes in technology, the end of population growth and changes in patterns of production and consumption trending towards closed-loop systems with only energy as an increasing input to drive growth.

This is fortunate, as a degrowth agenda is politically extremely unpopular as it implies reductions in income and job opportunities, and is likely impossible to implement anyway under the prevailing democratic political and market economic systems. The paper concludes that Wales can enjoy sustainable growth which promotes innovation and job creation - particularly if focused in deprived communities - while achieving the vision of the Future Generations Act, the Climate Act and other policy measures aiming for climate stabilisation, environmental recovery and respect for planetary limits.

Planetary boundaries

The Earth is a closed system with the exception of the inflow of energy in the form of solar radiation. The planet has key biophysical systems which need to operate if it is to sustain life. These include the carbon cycle, the water cycle, the nitrogen cycle and so on. A better understanding of the complexity of the Earth system led a number of scientists in 2009 to propose the concept of 'planetary boundaries', with quantified numerical limits to human 'transgression' in each area (Rockström et al., 2009). The implication was that if humans could stay within the 'safe zone' on the right side of the boundary, there would not by necessity be any limit to human development.



Source: Designed by Azote for Stockholm Resilience Centre, based on analysis in Persson et al. (2022) and Steffen et al. (2015)

The nine planetary boundaries were:

1. Climate: 350ppm limit (transgressed)
2. Biodiversity loss (transgressed)
3. Nitrogen/Phosphorus cycle (transgressed)
4. Freshwater use
5. Land systems change (transgressed)
6. Toxics/novel chemicals (transgressed)
7. Ocean acidification
8. Ozone layer (in recovery)
9. Atmospheric aerosols (not quantified)

Limits to growth?

A simplistic viewpoint might see these planetary boundaries as posing fundamental limits to growth, and indeed many have interpreted them that way. However this is not necessarily the case. To take climate as an example, the proposed planetary boundary is defined as CO2 concentration in the atmosphere and subsequent warming. It is not the use of energy per se, which can be provided indefinitely and at increasing rates from clean sources such as solar, wind and nuclear.

> **The old adage - that infinite growth is not possible on a finite planet - which sounds like a mathematical truism, is in fact a fallacy**

There is no fundamental limit to energy supply in any meaningful sense: there exists sufficient uranium and thorium to sustain fission power stations for millennia, much more so if fusion works. With space-based solar there is no practical limit to the power of the Sun that can also be captured away from the planet's surface (which is certainly limited). The key variable here in terms of human society is not the planetary boundary itself, but how humanity interacts with it primarily via the medium of technological change.

Another example might be land use. Most land is used for agriculture to produce food. This is the biggest driver of biodiversity loss, but again both technologies and consumption choices play a big role. Plant-based diets are very efficient in the use of land: if everyone went vegan, we could spare a lot of land for rewilding and ecosystem restoration (Ritchie, 2021). However, yields also play a big role: high-yielding crops and land-efficient agriculture (not 'organic', which is lower-yielding and therefore uses more land [Kirchmann, 2019]) also spares land which would otherwise be put under cultivation. Technology can also substitute meat with plant-based alternatives and even cellular cultivation.

The planetary boundaries also interact with each other: nitrogen pollution - a big issue in Wales - produces nitrous oxide, a potent greenhouse gas, while runoff (of both nitrogen and phosphorus) causes the loss of freshwater biodiversity via algal blooms. Ocean acidification is the chemical product of atmospheric carbon concentrations. The land use boundary is critical for biodiversity protection and the protection of rivers and lakes (the freshwater boundary) and so on.

In all these areas, human transgressions of planetary boundaries can be substantially mitigated or solved altogether with technological change - indeed doing so could be a major opportunity for economic growth in the years and decades ahead. The most obvious example is the stratospheric ozone layer, which was addressed via the Montreal Protocol phasing out CFCs and replacing them with substitute propellants and refrigerants not containing ozone-depleting chlorine and bromine.

Thus the old adage - that infinite growth is not possible on a finite planet - which sounds like a mathematical truism, is in fact a fallacy. All the drivers which are transgressing the planetary boundaries have, or will have, substitutes which allow for conventionally-defined economic growth to continue indefinitely, and indeed may themselves be drivers of additional growth. If this seems impossible, consider that the end product here would not be a theoretical steady-

state economy, but a system of closed-loop production and consumption achieving as close to 100% recycling as possible (given the laws of thermodynamics) with the only external input being increasing flows of clean energy as the driver of continued growth.

> **People flourish when they are in well-paid jobs that give them purpose and show that their skills are valued by society.**

Three examples specific to Wales

Perhaps the best way to illustrate this proposal is to move away from abstractions and consider some examples specific to Wales.

1. **Climate**. Wales has huge potential for clean electricity generation via onshore and offshore wind, and to a substantial extent solar photovoltaic generation. These could drive a new manufacturing industry and provide jobs given sufficient government support. Nuclear power can decarbonise steelmaking at Port Talbot via the new small modular reactor (SMR) technology, which can generate both electricity for electric-arc furnaces and hydrogen for reduction as an alternative to coking coal. Fleets of SMRs could deliver hydrogen to industry most of the time but switch to providing electricity to the grid when required, helping balance the intermittency of renewables and reducing the need for grid-scale storage. New nuclear can deliver high-paying jobs and promote the development of communities and skills in areas which are highly supportive, such as Wylfa in Anglesey and Trawsfynydd in Gwynedd. Nuclear and renewables together can support new industries based on manufacturing and bring forward the transition to Net Zero.
2. **Biodiversity**. Wales is highly ecologically impoverished, with no intact ecosystems left even in the national parks. Much of the Cambrian mountains and coastal areas are in the eco-zone of temperate Atlantic rainforest and would eventually revert to it if left to regenerate without sheep grazing (see photo). Wales has huge potential to pioneer ecological restoration, from peat heathlands in Snowdonia, central Wales and the Brecon Beacons to rainforests in other areas, particularly via natural regeneration. This would require a major cultural change however, and a shifting of agricultural subsidies away from sheep farming and toward rewilding-type land uses. These could by funded by a system of carbon sequestration payments potentially, as well as eco-tourism and other diversification opportunities. The growth opportunity here is inherent in the modal shift away from low-productivity livestock farming towards higher-value uses of land.
3. **Nitrogen**. All of Wales is now classed as nitrogen-vulnerable zone. This is due to inadequate sewage treatment and spills from anaerobic digestion plants as well as the ubiquitous and controversial intensive poultry units (IPUs) that have sprung up especially in the Wye Valley. Phosphorus levels in soils are so high in many areas due to chronic over-manuring that polluting year-round runoff is almost guaranteed, and algal blooms have destroyed freshwater biodiversity and reversed decades of progress on bringing back fish like salmon in the Wye, Usk and other rivers. Many plant-based chicken alternatives have been developed which do not have this problem, and do not compromise on animal welfare. Again, technology is key: genetically-engineered microbial proteins and cell cultures can large replace poultry farming, and generate jobs and growth at the same time. IPUs generate

little in the way of jobs and produce manure which cannot be disposed of sustainably.

Conclusion: Why degrowth will not work for Wales

Wales has experienced degrowth already, for example in the Valleys area with the death of the coal industry. The result has been fractured communities and structural poverty leading to loss of livelihoods and an epidemic of mental health problems. People flourish when they are in well-paid jobs that give them purpose and show that their skills are valued by society. Proposals for degrowth will be given short shrift in communities which have already experienced severe economic contractions resulting from de-industrialisation and the offshoring of manufacturing jobs, and with good reason. The

Fragment of temperate rainforest in cave country near Ystradfellte (photo: Mark Lynas)

Valleys area still substantially underperforms the rest of Wales economically, with conventional economic measures closely correlated with material living standards and wealth (Welsh Government, 2019). This area is a good example of a region that needs growth and job opportunities, not more 'degrowth'.

Having said that, sustainable growth must take in the long-term challenge of protecting and enhancing the land, water, and ecosystems of Wales to deliver recovery and opportunities for job-creating innovation via new industries and agriculture. Wales should aim for a return of the manufacturing economy - rather than offshoring these jobs to China and India - which pioneers innovations that can produce all the goods and services people need at the same time as a trend towards dematerialisation and a decoupling of economic growth from carbon and the overuse of other scarce ecological resources. The Wellbeing of Future Generations (Wales) Act 2015 is clear that "a prosperous Wales" is one of the seven key well-being goals:

"An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work."

As this paper has argued, the concept of prosperity within environmental limits does not preclude conventionally-defined economic growth. Indeed, as the Act recognises, growth and prosperity are essential well-being goals which are critical to the welfare of future generations.

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Find out more

For more on planetary boundaries see Lynas, M. (2012). ***The God Species: How Humans Really Can Save the Planet…*** London: 4th Estate.

About the Wales Centre for Public Policy

Here at the Centre, we collaborate with leading policy experts to provide ministers, the civil service and Welsh public services with high quality evidence and independent advice that helps them to improve policy decisions and outcomes.

Funded by the Economic and Social Research Council and Welsh Government, the Centre is based at Cardiff University and a member of the UK's What Works Network.

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