Reviewing studies of degrowth: Are claims matched by data, methods and policy analysis?

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ABSTRACT

In the last decade many publications have appeared on degrowth as a strategy to confront environmental and social problems. We undertake a systematic review of their content, data and methods. This involves the use of computational linguistics to identify main topics investigated. Based on a sample of 561 studies we conclude that: (1) content covers 11 main topics; (2) the large majority (almost 90%) of studies are opinions rather than analysis; (3) few studies use quantitative or qualitative data, and even fewer ones use formal modelling; (4) the first and second type tend to include small samples or focus on non-representative cases; (5) most studies offer ad hoc and subjective policy advice, lacking policy evaluation and integration with insights from the literature on environmental/climate policies; (6) of the few studies on public support, a majority concludes that degrowth strategies and policies are socially-politically infeasible; (7) various studies represent a "reverse causality" confusion, i.e. use the term degrowth not for a deliberate strategy but to denote economic decline (in GDP terms) resulting from exogenous factors or public policies; (8) few studies adopt a system-wide perspective – instead most focus on small, local cases without a clear implication for the economy as a whole. We illustrate each of these findings for concrete studies.

1. Introduction

In the last decade there has been a flood of publications on degrowth as a strategy to confront environmental and social problems. This paper reports a systematic literature review to assess their content, data and methods. To evaluate the quality of research and avoid unfair or ad hoc conclusions, it uses various objective indicators and techniques. Among others, we will make use of computational linguistics to identify main topics studied in the literature on degrowth. In addition, we examine which share of reviewed studies goes beyond conceptual discussion and subjective opinions by identifying use of concrete scientific method, notably qualitative or quantitative data analysis and formal theoretical or empirical modelling.

As a fair number of studies use the term "postgrowth" to denote degrowth type of sentiments, we decided to include this as a key term in our search for relevant studies. Even some leaders of the field have used it in their work (e.g., Hickel et al., 2021). While appeals for postgrowth generally emphasise the need to prioritise sustainability and social justice over economic growth, a strict degrowth position goes one step further by advocating for a deliberate reduction in the scale of economic activity to achieve these goals. We find, though, that especially in the last few years the division between degrowth and postgrowth has become a bit blurred. Indeed, many authors writing on degrowth opt for using the catch-term postgrowth, possibly to avoid resistance against the strong connotation of degrowth.

Degrowth thinking considers reducing the size of the market economy as the key strategy to solve environmental problems. As opposed, policy researchers tend to regard ambitious climate policy as fundamental to solving climate change, and likewise ambitious environmental policies as essential to overcome other environmental challenges. To achieve considerable reductions of CO_2 emissions, such policies might result not only in more efficient technologies, substitution between energy sources or a shift to less pollutive goods or services, but also in a lower level of production and consumption of goods and services with a

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relatively high environmental pressure over their life cycle. In view of this, we will examine if degrowth studies devote attention to received insights about environmental policies, focusing on climate policy. This will, among others, include assessing whether attention is given to policy support and political feasibility of degrowth policies. Indeed, since degrowth proposals arguably respond to insufficient support for ambitious climate and environmental policies, an obvious question is whether these proposals themselves can count on (considerably) more political support. Hence, we will examine if studies refer explicitly to climate policy or its particular instruments, whether this is connected to policy support and feasibility, and if insights from the broader literature on environmental and climate policy are integrated.

Five earlier studies have offered reviews of publications on degrowth. These are rather uncritical, and do not tackle the questions and issues discussed above regarding methods and policy. Cosme et al. (2017) offer a review of 128 studies from 2007 until 2014, aimed at identifying policy proposals by the degrowth movement. They classify proposals in terms of "ecological economics policy objectives" (sustainable scale, fair distribution, and efficient allocation), type of approach (top-down versus bottom-up), and geographical focus (local, national, or international). Of the sampled studies, 54 (42%) provide policy proposals, aligning with three general goals: (1) reducing the environmental impact of human activities; (2) redistributing income and wealth; and (3) promoting a transition from a materialistic to a convivial and participatory society. In addition, the proposals are found to reflect a national, top-down rather than a local bottom-up approach, which the authors find remarkable as the latter type is strongly advocated by degrowth proponents. A second paper by Kallis et al. (2018) states as the aim to "review studies of economic stability in the absence of growth and of societies that have managed well without growth.". This is a non-systematic review that covers a diversity of issues ranging from resource limits through technologies compatible with degrowth views to social movements. It refers to 150 studies in its list of references. A third paper by Vandeventer and Zografose (2019) mixes a review (of 179 studies from 2008 until 2016) with other issues (notably how to integrate degrowth as anti-capitalism with the multilevel perspective on sustainability transitions), and it focuses on bibliometric analysis studying author citation networks. A fourth study by Fitzpatrick et al. (2022) is focused on policies. It reviews 1166 texts (articles, books, book chapters, and student theses) from 2005 until 2020, of which 446 are identified as including degrowth-policy proposals, divided over 13 themes: food, culture and education, energy and environment, governance and geopolitics, indicators, inequality, finance, production and consumption, science and technology, tourism, trade, urban planning, and work. Finally, Kongshøj (2023) presents a non-systematic literature review referring to 156 studies, resulting in a discussion of challenges for feasibility and desirability of degrowth policies. For a more detailed discussion of some of these reviews see Section 5.2 on environmental/climate policy.

To motivate the relevance of our review, it should be noted that these previous reviews were written by degrowth proponents and looked for positive insights. Ours is different as it adopts a more objective approach focused on assessing data, methods of analysis, and connections with climate/environmental policy studies – which we think is important for judging a new line of research characterized by strong claims about academic and policy relevance.

The remainder of this paper is organized as follows. Section 2 explains the search procedure to create the sample of degrowth and postgrowth studies. Section 3 provides basic descriptive information about the sampled studies. Section 4 reports the results of a computational-linguistic analysis of topics in the sample. Section 5 offers an in-depth assessment of the studies, divided into method use, policy analysis, and other issues. Section 6 concludes.

2. Search and selection of studies

The data for this study was obtained from the peer-reviewed literature, using the Scopus database. On the 20th of February 2023 we searched for publications that included the words 'degrowth', 'de-growth', 'postgrowth' or 'post-growth' in the title. This search generated 1230 matches. These publications were screened and assessed for eligibility according to PRISMA guidelines. Fig. 1 summarizes the sampling process.

The first step – the screening process – was based on basic information of the studies, such as title, abstract and keywords. We excluded publications written in a language other than English ($n = 39$), books ($n = 14$), publications for which a full paper was not accessible ($n = 13$), duplicates ($n = 8$) and corrections on previous articles ($n = 5$). Books were excluded as they tend to provide summaries of earlier published articles and have no consistent abstracts. For a few publications that were accessible but lacked an abstract we used either the full text, provided it was less than two pages, or the introduction section. This resulted in a total of 79 publications being excluded in this step. Next, we assessed the remaining 1151 publications for eligibility based on the study focus.[1] This involved reading the abstract and, if this was insufficiently clear about the study focus, reading the article text as well. We excluded studies that used the terms degrowth or postgrowth in a distinct context or discipline, such as physics, chemistry, biology, engineering or other sciences where the term 'postgrowth' has been used in a way that is unrelated to economic/GDP growth. Examples of titles of excluded papers are "post-growth thermal annealing", "post-growth tailoring of quantum-dot saturable absorber mirrors", "urban migrants as heterotopic selves in post-growth Japan" and "influence of family TMT involvement on firm growth and degrowth rates". This criterion led to 590 studies being further excluded, resulting in a final sample of 561 studies. Of these, 473 (84%) use "degrowth" and 88 (16%) only "post-growth" in their title. In addition, 376 are classified by Scopus as articles, 73 as book chapters and 28 as reviews, while the remaining 84 cover letters, notes, editorials, conference papers and short surveys.

3. Descriptive information about the sampled studies

All the 561 studies in the sample were screened for the presence of formal (mathematical) models and data analysis. As models we understand an original (set of) equation(s) – for instance, we did not count instances like merely applying for illustrative purposes the well-known IPAT equation without any original component, as in Kurz (2019) and Nørgård and Xue (2016). We further distinguish between theoretical (whether analytical or numerical) and empirical (or applied) modelling studies. The distinction is that the former do not employ empirical data for their parametrization/calibration/validation, while the latter do. Overall, 9 studies (1.6% of the sample) used a theoretical model, and another 8 (1.4%) employed an empirical model. As for data analysis, several studies in the sample presented qualitative results mostly derived from interviews. We distinguish such qualitative data analysis from quantitative data analysis in which empirical data is statistically processed into indicators or graphical output. We did not include here studies that provided a verbal argument adorned with some tables or graphs (often from other sources) or very simple plots (like GDP or population over time) as they do not represent original quantitative analysis (for details and illustrations, see Section 5.1). In total, 31 studies (5.5%) in the sample performed quantitative data analysis, and another 23 studies (4.1%) qualitative data analysis.[2] The amount of data and the

[1] As opposed to Fitzpatrick et al. (2022), who collected a sample of 1166 text published prior 2021 covering grey literature and non-English texts, we analysed only studies indexed in Scopus and written in English.

[2] Literature reviews and discussions of literature are not counted as data analysis.

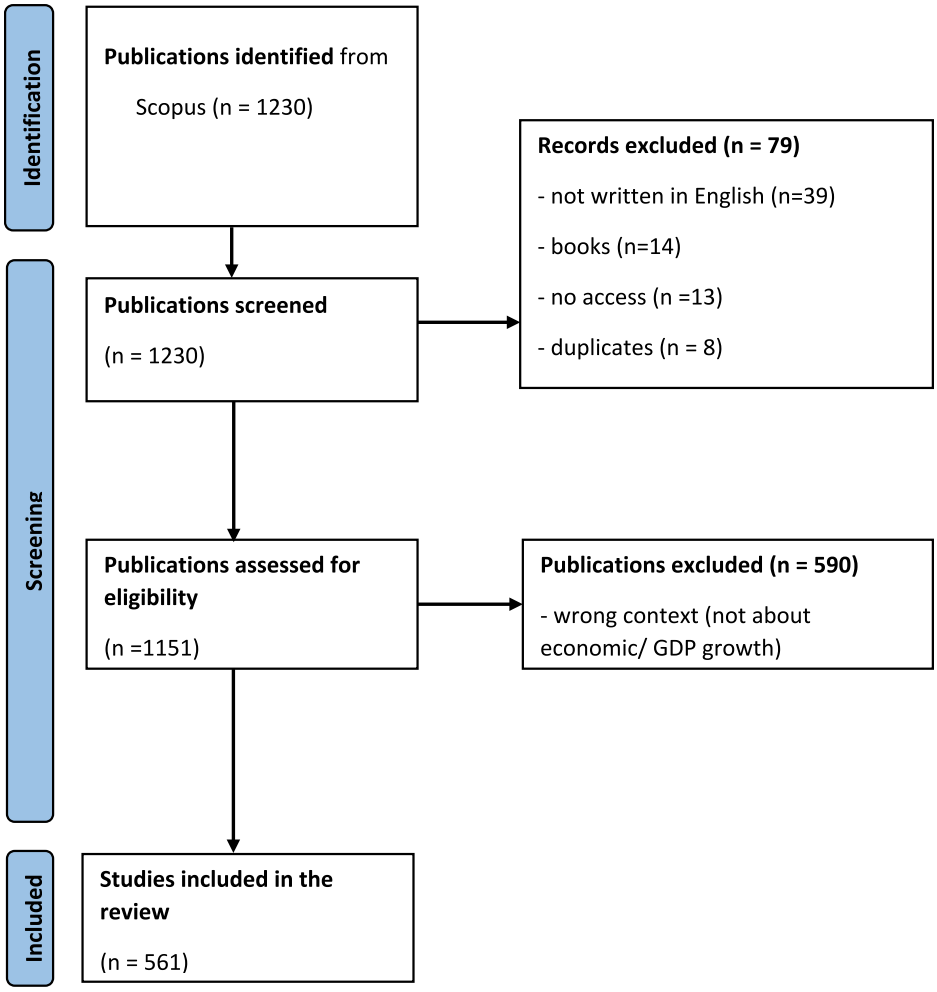

Fig. 1. An overview of the systematic review process.

complexity of the analysis differed among publications. For example, Kalimeris et al. (2014) undertook a meta-analysis of 158 studies published on the energy-GDP causal relationship while many other studies involve just a dozen or so interviews (Ruiz-Alejos and Prats, 2021; Buhr et al., 2018; Nierling, 2012). It is worth noting that all studies have been attributed to only one method category.

The top plot in Fig. 2 shows the distribution of studies over time (publication year), showing a rising trend. Moreover, as indicated by the red line, ten years ago virtually all studies used the term "degrowth", while in recent years some 25% of studies use the term "postgrowth", in most cases meaning degrowth.[3] The lower plot in Fig. 2 shows that the fraction of studies undertaking modelling or data analysis fluctuates in the range of 0–15% over time and shows no clear trend.

Table 1 lists ten journals that appear most often in the sample. The two by far most popular outlets are *Ecological Economics (EE)* and *Journal of Cleaner Production (JCP)*. One reason may be that both published special issues on degrowth: one in *EE* and three in *JCP*. In total, the sample of studies we review contains 14 special issues, covering 100 out of 376 journal articles (26%). The most cited journal in the sample is *Journal of Sustainable Tourism* followed by *Sustainability Science*, *EE* and *JCP*.[4]

The only journals that have published theoretical model studies of degrowth are *EE, JCP* and *Futures*. Empirical models have appeared relatively often in *Sustainability (Switzerland)* and *EE*. Quantitative data analyses are mostly found in *JCP, Futures* and *Journal of Sustainable Tourism* and to a lesser extent in *Environmental Values* and *EE*. Studies using qualitative analysis appear in virtually all outlets, except *Futures*, the journal *Capitalism, Nature, Socialism* and *Journal of Sustainable Tourism*.

According to Table 1, articles with models and data analysis seem to be cited slightly more often. To confirm this, we measured statistical correlations between citations per year and use of method. In addition, we correlated the number of words in the title with the year of publication to see if studies with shorter titles or more recent studies are cited (annually) more often, e.g. due to a growing number of academic journals and rising impact factors. We find no significant association between modelling or data analysis and the number of citations (see Fig. A1 in the Appendix). More recent papers have longer average titles, and these often co-occur with empirical modelling or data analysis. In contrast to what has been found for other areas of research (Letchford et al., 2015; Savin and van den Bergh, 2021; Savin, 2023), degrowth studies with shorter titles do not receive more citations. Finally, we observe that studies published more recently received on average fewer citations per year.

A total of 18 articles (17 from *Sustainability* (Switzerland) and one from *Biomedicine*) in the sample of studies are published by the Multidisciplinary Digital Publishing Institute (MDPI), which is widely considered to be a predatory publisher (Ángeles Oviedo-García, 2021;

[3] For example, in 2021 and 2022 only 68 out of 89 and 74 out of 95 studies, respectively, used the word degrowth in their title.

[4] Since studies published earlier have more time to receive citations, we measure annual citations.

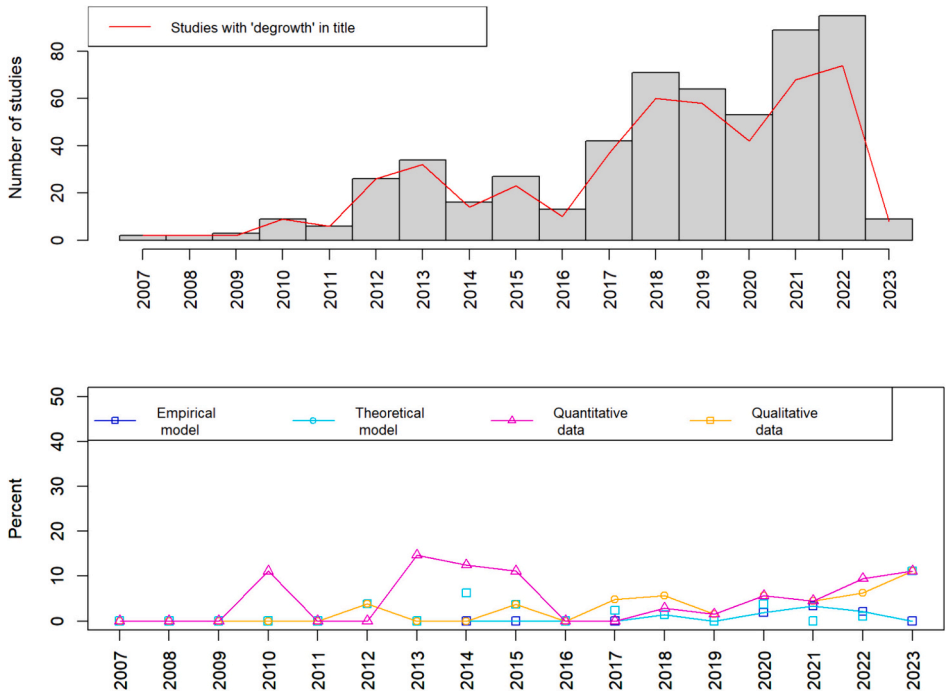

Fig. 2. Time distribution of publications in the sample.
Notes: The top panel contains a histogram depicting the frequency of studies by year (left Y-axis); the red line here indicates the number of studies that used "degrowth", and the remainder "postgrowth", in their title. The bottom panel shows the time pattern of the share of studies using one of the four methods.

Table 1
Ten journals with highest number of publications in our sample.

Journal	Number of studies published	Number of special issues	Average number of citations per year	% studies with empirical models/theoretical models/quantitative data/qualitative data
Ecological Economics	63	1	7.27	3.2 /7.9 /3.2 /3.2
Journal of Cleaner Production	56	3	7.18	0/ 1.8 /17.9 /3.5
Futures	19	1	4.32	0 /5.3 /10.5 /0
Journal of Political Ecology	18	0	2.37	0 /0 /0 /11.1
Sustainability (Switzerland)	17	0	1.93	11.8 /0 /0 /5.9
Sustainability Science	16	2	7.56	0 /0 /0 /6.3
Environmental Values	16	1	4.81	0 /0 /6.3 /6.3
Capitalism, Nature, Socialism	14	0	2.23	0 /0 /0 /0
Local Environment	10	1	4.18	0 /0 /0 /30
Journal of Sustainable Tourism	8	1	10.16	0 /0 /12.5 /0

Siler, 2020). In addition, the *Journal of Cleaner Production* (56 degrowth studies) was considered by Web of Science/Clarivate as intermediate between regular and questionable in the period that many degrowth studies appeared in it.[5]

Finally, authors' affiliations cover 60 countries (Fig. 3), with the UK, Spain, and Germany being the top three, leading by a big margin. If we limit the sample to only studies with "degrowth" in their title, the order changes slightly to Spain, the UK and – at some distance – Germany (see Fig. A2 in the Appendix for a visualisation). This is in line with the finding by King et al. (2023) that degrowth/postgrowth views are more popular among scientist from OECD countries with a high per capita GDP, particularly in Europe, while outside the OECD support is limited.

[5] https://clarivate.com/webofsciencegroup/essays/jcr-editorial-expression-of-concern/

4. Computational linguistic assessment of degrowth topics

Here we reveal hidden structure in the textual data of titles, abstracts and keywords of publications in the sample of degrowth studies. To this end, we use the approach of topic modelling, which clusters words into topics based on how often any pair of words appears in the same texts (Blei, 2012; Savin et al., 2022a). Since our texts are relatively short (median length is 192 words), we apply structural topic modelling (STM, Roberts et al., 2019) as it was designed specifically for short texts and allows processing of additional information about publications. In our case, this focuses on year of publication, number of citations per year, and method (theoretical/empirical model and qualitative/quantitative data analysis). Using additional data as covariates in estimating a topic model has proven to produce topics with higher predictive power and interpretability (Roberts et al., 2014). To apply STM, we use the associated R module by Roberts et al. (2019). See the Appendix for details on data preparation and selection of the optimal number of topics.

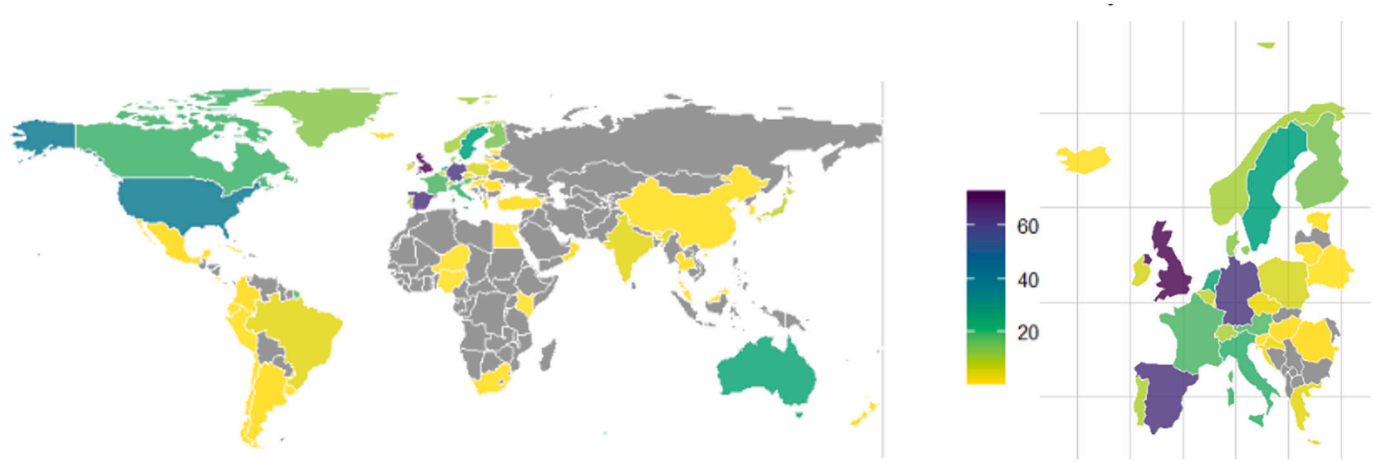

Fig. 3. Frequency of author affiliations – world (left panel) and Europe amplified (right panel).
Note: If authors are affiliated to multiple countries, the paper is equally split between these.

The resulting topics are presented in Table 2 and visualised in Fig. A4 in the Appendix as word clouds. The table suggests concise topic labels capturing the message from the titles, abstracts and keywords of the top twenty documents with the highest prevalence for each topic. Also mentioned are the most frequent and exclusive words for each topic as well as the title of an illustrative paper with the highest prevalence of the topic. Topic shares in the sample range from over 15% for Environmental justice to less than 5% for Scenarios on emissions neutrality.

Subsequently, we undertake regression analysis, to examine associations of topic prevalence with the year of publication. The results in Fig. A5 in the Appendix show that Topics T3 on Urban/local practices, T6 on Green transition and T11 on Scenarios for emission neutrality gained popularity over time, while Topics T2 on Sustainable wellbeing, T5 on Circular economy, T7 on Conceptual framework, and T8 on Limits and scarcity have become less popular over time. Next, Fig. 4 on citations per topic indicates that studies focusing on Topics 2 and 11 (Sustainable wellbeing and Scenarios for carbon neutrality) are cited considerably more than the average study in the sample. Topics 3 and 10 (Local/urban practices and Historical lessons) are the least cited.

Fig. 5 presents the results of statistical association of topic prevalence of studies in the sample with the use of theoretical/empirical modelling or quantitative/qualitative data analysis. We find that studies focusing on Topics 2 and 5 (Sustainable wellbeing and Circular economy) are significantly more likely to use theoretical and empirical modelling, while T11 on Scenarios for carbon neutrality contains especially empirically calibrated models. In addition, T9 on historical lessons includes both types of modelling. Studies focusing on Topics 2 and 3 (Sustainable wellbeing and Urban/local practices) are more likely to contain qualitative data analysis, while quantitative data analysis is more common for studies in T2 (Sustainable wellbeing) and T9 (Sustainable tourism). Topics T1 on Environmental justice, T4 on civil society, T7 on Conceptual framework and T8 on Limits and scarcity are least likely to use any type of modelling or data analysis.

5. In-depth assessment

5.1. Model and data-analysis studies

Here we discuss use of the four methods in the sample and briefly comment on specific studies to illustrate their approach, relevance and quality. More detail is provided in Tables A1–4 in the Appendix, one for each method: theoretical modelling (9 studies), empirical modelling (8 studies), quantitative analysis (31 studies) and qualitative analysis (23 studies).

5.1.1. Theoretical modelling

Only nine degrowth studies use theoretical modelling (Table A1). According to Andreoni and Galmarini (2014) this may be explained in two ways: ideological rejection by degrowth supporters of formal framings, and existing studies using growth modelling excluding attention for degrowth strategies. The nine theoretical studies deal with a variety of research questions within T2 on Sustainable wellbeing and T5 on Circular economy: worktime reduction, slowdown of obsolescence of goods, universal basic income (UBI), identifying (de)growth path under status seeking and voluntary simplicity and sharing. Overall, we judge few of these theoretical modelling studies as scientifically and policy relevant. One reason is that 3 of the 9 papers have the same author (Heikkinen) who writes very mathematical papers with results that are not easy to interpret in terms of meaning or critical dependence on assumptions made; e.g., one draws the conclusion that "Green growth can take place during degrowth" – a *contradictio in terminis* (Heikkinen, 2020). Other studies are also very abstract and difficult to judge: one by Germain (2017) uses the confusing term "voluntary degrowth policies" which seems an unclear twist of the notion "voluntary action" (in the absence of policies) and confusingly proposes "a tax on the natural resource" to be a degrowth policy. Another is by Andreoni and Galmarini (2014), whose many concepts (reciprocity work, wellbeing equation, health and social capital) and equations overwhelm the reader as they are not all clearly defined or motivated. Moreover, these model studies do not refer to each other nor do they try to build bridges with the enormous literature on modelling growth and environment.

On a positive note, some of these studies provide a rare macroeconomic and systemic perspective on the overall impacts of degrowth strategies, which is missing in much of the rest of the literature which has a strong focus on local issues and therefore does not contribute to the big picture. Two of such studies are: Oberholzer (2023) who concludes that worktime reduction means a threat to macroeconomic stability; and Malmaeus et al. (2020) who finds that UBI is less compatible with a labour-intensive local self-sufficiency economy than with a capital-intensive, high-tech economy. Having good insight into the systemic and macroeconomic consequences is indeed critical for judging radical strategies as proposed by the degrowth community. Against this background, the theoretical model study by Bilancini and D'Alessandro (2012) is one of the more valuable ones as it accounts for multiple externalities and compares three different policy regimes. For further discussion of a systemic perspective, see Sorman and Giampietro (2013) who, among others, argue that degrowth studies ignore the population factor and indirect effects of voluntary restraint.

Table 2
Main degrowth topics based on titles, abstracts and keywords of sampled studies.

	Topic label	Most discriminating terms and illustrative titles	Proportion
T1	Environmental justice	justice, movement, freedom, economics, alliance, counter, feminist, activist, critique, democracy, autonomy, ownership, modern, theory, crisis, theoretical, socioecological, ecofeminist, address, core "Not So Natural an Alliance? Degrowth and Environmental Justice Movements in the Global South"	15.1%
T2	Sustainable wellbeing	goal, impact, consumption, indicator, sustainable, happiness, energy, environmental, analysis, investigate, proposal, welfare, paradigm, concept, multi, discuss, policy, sustainability, influence, efficiency "How to increase wellbeing in a context of degrowth"	14.9%
T3	Local/urban practices	urban, housing, planning, city, plan, chapter, spatial, mobility, practice, narrative, transformation, organise, dimension, politics, squat, local, institutional, planner, rural, food "Barcelona's housing policy under austerity urbanism: a contribution to the debate on degrowth and urban planning"	13.8%
T4	Democracy and civil society	post, blue, agenda, green, conflict, growth, regime, development, law, crisis, emerge, deal, liberal_democracy, fishery, paradigm, compromise, european, contribution, economic, hegemonic "Accountability, Democracy, and Post-growth: Civil Society Rethinking Political Economy and Finance"	12.9%
T5	Circular economy	circular, company, health, sector, product, business, circularity, equilibrium, service, tax, cost, financial, firm, government, shrink, reduction, wellbeing, employment, must, postgrowth "Are the circular economy and economic growth compatible? A case for post-growth circularity"	9.3%
T6	Green transition	digital, technology, innovation, convivial, currency, conviviality, tool, design, technological, water, criterion, ocean, fashion, intentional, community, collaborative, share, network, local, sea "Digital degrowth: towards radically sustainable education technology"	7.8%
T7	Conceptual framework	robbins, book, limit, economist, french, want, georgescu_roegen, today, recession, threshold, slogan, external, wealth, fix, socialism, reject, inevitable, degrowthers, earth, birth "Degrowth: A Defence"	6.3%
T8	Limits and scarcity	metabolism, scarcity, biophysical, metabolic, matter, property, liberal, quantity, capitalism, human, reproduce, subordinate, poor, relation, upon, alienation, class, accumulation, surplus, material "Beyond limits and scarcity: Feminist and decolonial contributions to degrowth"	5.5%
T9	Sustainable tourism	tourism, covid, overtourism, tourist, pandemic, destination, travel, advocacy, spain, scheme, long_term, decline, industry, hop, despite, covid_pandemic, evidence, higgins_desbiolles, interesting, mass "Revenge and catch-up travel or degrowth? Debating tourism Post COVID-19"	4.9%
T10	Historical lessons	archaeology, zorzin, professional, education, university, money, archaeological, village, archaeologist, meaningful, student, obsolescence, home, metal, skill, civilization, profit, activity, decline, encourage "Degrowth and archaeological learning beyond the neoliberal university"	4.8%
T11	Scenarios for emissions neutrality	climate, percent, emission, scenario, hickel, mitigation, zero, per, canada, demand, co_emission, land, global_south, average, south, gdp, ipcc, global, food, north "Degrowth scenarios for emissions neutrality"	4.7%

Note: The terms in the third column are the most frequent as well as exclusive to each topic. Illustrative titles are chosen from the five documents with the highest topic prevalence.

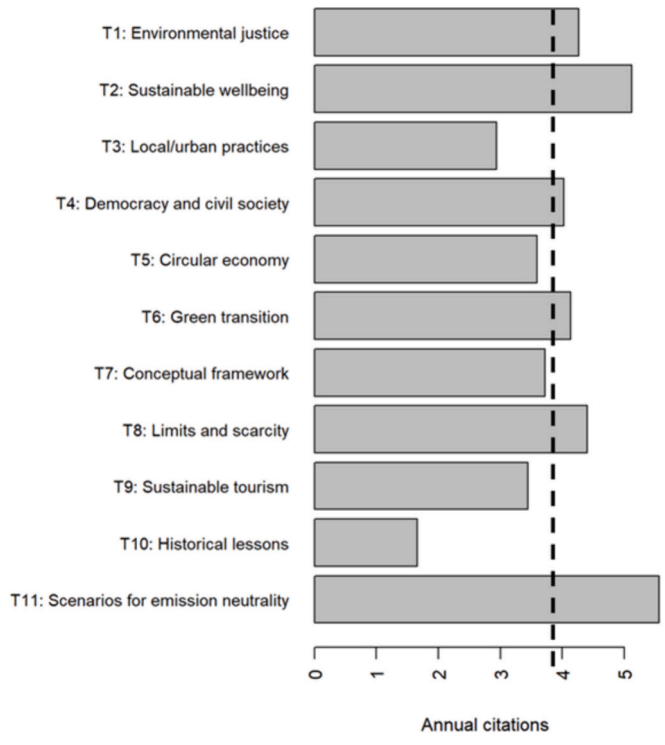

Fig. 4. Annual citations per publication for each topic.
Note: Annual citations per publication belonging to a topic reflect how many citations a study consisting of the respective topic would receive. The dashed line indicates the average number of annual citations of a publication in the sample (3.9).

5.1.2. *Empirical modelling*

Regarding empirical modelling studies, the eight in Table A2 are quite diverse, relating to the topics T2 on Sustainable wellbeing, T5 on Circular economy, and T11 on Scenarios for emission neutrality. More specifically, they address issues like energy pathways for Ecuador, food supply, a circular bioeconomy, degrowth policies in the European Union, the relationship between embodied energy intensity and labour productivity, the impact of degrowth strategies on international carbon leakage, and the socioeconomic and climate impacts of low growth of the Canadian economy. Some findings are: a shift towards five labour-intensive service sectors would result in small reductions in overall energy use because of indirect energy use (Hardt et al., 2020); reducing and redistributing income alone leads to limited greenhouse gas (GHG) emission mitigation from agriculture and land-use change while a needs-based food system combined with efficient resource allocation through complementary carbon pricing will be more effective (Bodirsky et al., 2022); substantial reductions in GHG emissions by Canada cannot be achieved by improving GHG intensity alone but requires a lower scale of the economy which will result in a reduction of GDP by about 50% (Victor, 2012); and degrowth reduces leakage by keeping the sectoral composition of the country stable and reducing uncommitted countries' incentives to shift towards more energy-intensive production techniques (Larch et al., 2018). While the latter study seems original and relevant, its approach and assumptions are hard to understand, also as their own "structural gravity model" deviates from traditional equilibrium and trade models commonly used for tackling trade and relocation impacts (of non-harmonized policy) that give rise to carbon leakage (King and van den Bergh, 2021).

Two other studies, by D'Alessandro et al. (2020) and Nieto et al. (2020), are worth mentioning. These do not form part of the sample as they do not use the terms de(−)growth or post(−)growth in their titles.

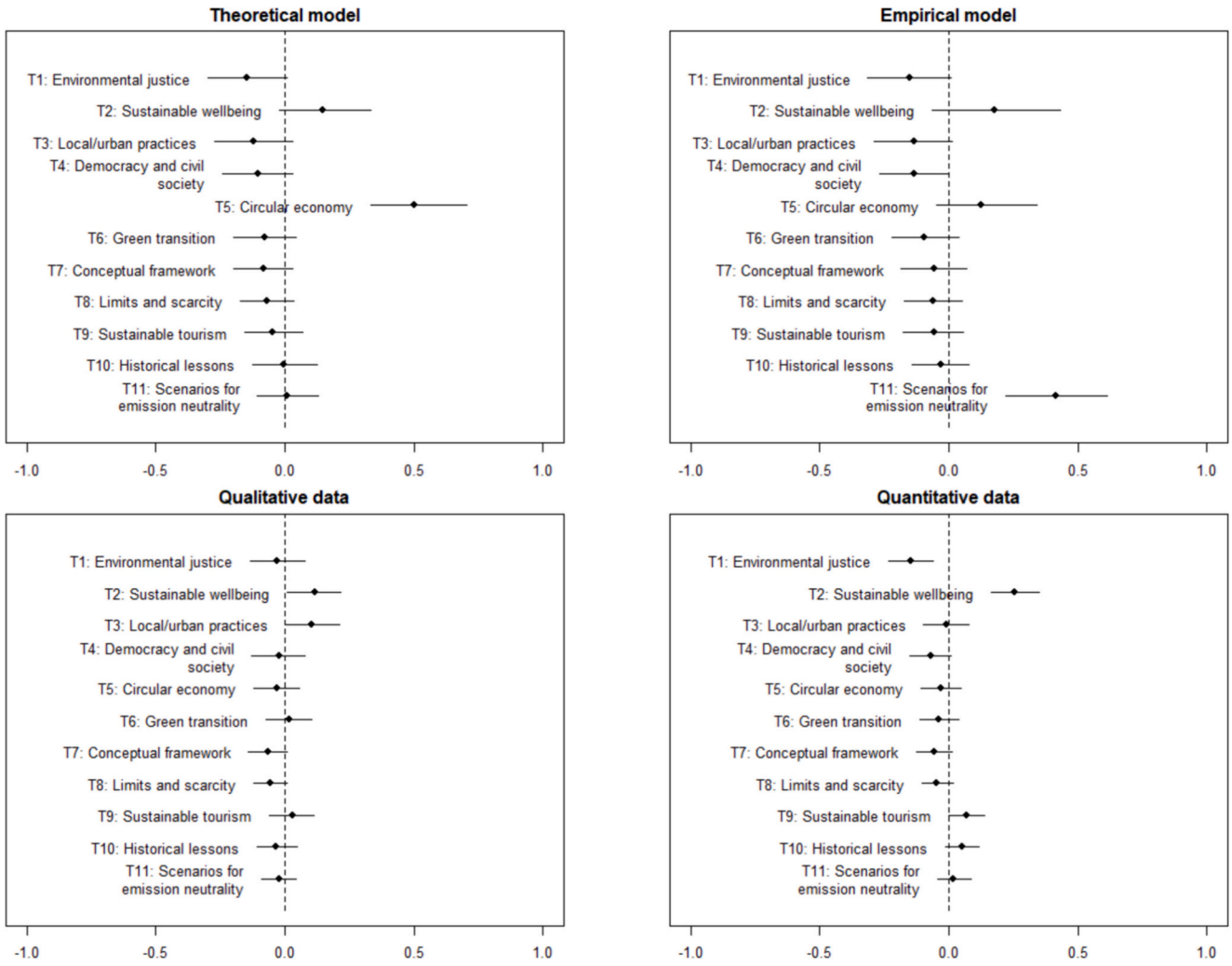

Fig. 5. Relation of topics with modelling and quantitative/qualitative data analysis.
Note: The plots show mean differences in topic proportions between studies with and without modelling or corresponding data analysis (a positive value on the X-axis indicates a larger prevalence).

Both, however, use empirical modelling to examine emission neutrality, which falls within topic T11, while giving attention to degrowth or negative growth scenarios. Among all topics, T11 attracted most attention in studies using empirical models (Fig. 5), while it is also the most cited topic in the sample (Fig. 4). D'Alessandro et al. (2020) show in a macrosimulation model that a degrowth scenario can achieve lower inequality at the cost of a higher public deficit, which questions the political feasibility of such a scenario. Using the global (one-region) integrated assessment model MEDEAS, Nieto et al. (2020) demonstrate that climate goals can be reached by means of negative GDP growth but address neither actual policies that would achieve this nor the political feasibility of such a scenario.

We find that virtually all the theoretical and empirical modelling studies develop models that are not well embedded in the literature, notably contain too many ad hoc elements, and therefore are disconnected from previous model studies. It is also important to stress that many of the modelling studies are not really about degrowth as a strategy but about economic decline as an exogenous scenario (Nieto et al., 2020) or due to external factors or general (policy) scenarios (e.g., Keyßer and Lenzen, 2021; Espinosa et al., 2022) – this one might call a "reverse causality error" (see for more discussion Section 5.3.3).

5.1.3. *Quantitative and qualitative data analysis*

The quantitative/qualitative analyses are also very diverse, in terms of both applications and sample size (Tables A3 and A4 in the Appendix). Many studies can be questioned regarding representativeness of locality, region or country (see below) – in various instances studies focus on a far-fetched and non-representative case (examples are given further below). The few studies that use large data sets did not generate or collect these themselves but rely on data of a general nature, such as the European Value Study (EVS).

Data analysis is often superficial and incomplete. For example, Dartnell and Kish (2021) on COVID-19 merely plot the time patterns for two variables and then draw far-reaching conclusions. This is characteristic of a lot of "degrowth studies". To illustrate further, D'Alisa and Cattaneo (2013) claim "the importance of combining time use studies with energy analysis". However, they then report time use and energy use in separate sections without ever combining the results (e.g., through integrated indicators, correlation or regression) – resulting in an incomplete analysis from which it is hard to draw robust conclusions.

5.1.4. *Small and non-representative samples in surveys and interviews*

Here are some illustrations of studies with relatively small or non-

representative samples (other cases can be found in Tables A3 and A4):

- Colombo et al. (2023) undertake interviews with 41 individuals of three Italian Social Agricultural Cooperatives (SACs). But one wonders why only three cooperatives were studied given that the article notes that Italy had 430 of such SACs in 2017.
- Schmid (2018) studies "alternative economies in Stuttgart", without motivating the choice of city. Potential post-growth organisations (PGOs) are identified through "snowballing", which may introduce bias through network connections. Interviews were conducted with founders or local representatives of 14 organisations. No information is offered about why the specific organisations were selected.
- Wiefek and Heinitz (2018) undertake interviews with 11 companies that are part of the "Economy for the Common Good". Selection of the companies was done through so-called" generic purposive sampling", meaning subjective sampling where the researcher relies on their own judgment when creating the sample. The company sizes range from 1 to 500 employees. It is not clear that the diversity in the sample is representative of the wider economy.
- Rooney and Vallianatos (2022) present a case study applying a "holistic model of degrowth" in a small-scale context, embedded within larger capitalist economies, to examine degrowth opportunities and constraints. Ten interviews were undertaken with leaders of organisations in Edmonton, Canada and the greater region whose initiatives or programmes address local food issues. The small number of interviews is motivated by researcher time constraints and interviewee availability during the busy summer months.
- Ruiz-Alejos and Prats (2021) study the Swedish municipality of Södertälje, motivated as "The authors had previously been working with this municipality, which eased the analysis." They held six interviews with municipal urban planners.
- Buhr et al. (2018) study local growth discourses in the small town of Alingsås, also in Sweden, through 10 interviews with 11 respondents (as two respondents were present in one of the interviews). First the authors selected five "civil servants working for Alingsås municipality". These then suggested individuals influential in discussing degrowth locally, resulting in 3 workers for municipal companies and 2 of civil society. This reflects a procedure that, through personal networks, can easily lead to biased outcomes. Moreover, the choice of town is not motivated in the paper.
- Hankammer et al. (2021) study degrowth principles in four organisations certified as B Corps (a private certification of for-profit companies as to their social and environmental performance). The method of selection of companies is unclear as are distinct approaches to interviews between the companies (e.g., 3 CEOs for three companies versus a manager group for a fourth company). It is also unclear why mainly CEOs are interviewed.
- To understand "limited uptake of degrowth discourse in the English-speaking world", O'Manique et al. (2021) interview 14 Canadian environmental activists. The selected interviewees seem all in favour of degrowth, which seems a narrow basis for a study. Given the research question, it is strange that the scope was not broader, including e.g. politicians, policy makers, journalists or political scientists.
- A study on "complementarity between the EJ [environmental justice] movement and degrowth" by Domazet and Ančić (2019) undertakes interviews with activists ("prominent Croatian EJ movement leaders") – limited to eight consultations.
- To study how "degrowth values in tourism influence the host-guest exchange", Muler and Galí (2021) undertake interviews with 12 residents (8 females and 4 males). This is a rather uncritical study with a sample that is far too small and unbalanced to draw firm conclusions. One also wonders why no interviews were undertaken with other stakeholders, including tourists themselves.
- Çakar and Uzut (2020) also study sustainable degrowth in tourism. They undertook 15 face-to-face interviews with key tourism stakeholders in Istanbul, Turkey. This is a small number given that the city had about 15 million visitors in 2019.
- Eversberg and Schmelzer (2018) conducted a survey at the 2014 International Degrowth Conference in Leipzig (with a German bias – 84% of respondents where German). A few years later Windegger and Spash (2022) did the same at the 2018 Degrowth Conference in Malmö, Sweden. It is unusual to see such "conference surveys" in science. While they are easy to implement as all participants are motivated and reachable on one location, a better approach seems to ask everyone who published on degrowth to participate, not just the arbitrary people present at one conference. Or better, for comparison and diversity, including participants who do not support degrowth – to see if their opinions are significantly different.
- Nierling (2012) undertakes ten interviews with people performing unpaid work. All interviewees were associated with a non-profit organisation in a large German town offering people an infrastructure and setting to work without pay, creating products for their own use through handicrafts. It is unclear how representative this is of modern society, and why individuals from only one organisation were interviewed. No information is given about the type of interviewees or the specific centre.
- A rare study of degrowth in a low-income region is Pansera and Owen (2018). They undertake a case study of low-tech innovation in the Indian state of Kerala. This involves 9 interviews with "PSM activists" (of the People's Science Movements) who oppose a "top-down technological modernization and growth agenda".
- Another study by Hayden (2015) zooms in on Bhutan, a rare case of a state with a development objective, Gross National Happiness (GNH), that emerged out of a critical perspective on economic (GDP) growth. Interviews were conducted with nine individuals – Bhutanese officials (in government and civil society) and foreign advisors – selected for their knowledge of, and their role in, the development and promotion of GNH and the related New Development Paradigm.
- A study by Robra et al. (2020) operationalises eco-sufficiency as an indicator for degrowth, focusing on commons-based peer production. This was done through seven interviews with board members, founders and directors of WindEmpowerment, a renewable energy commons-based peer production organisation. The finding is that manifestation of sufficiency is marginal. The relevance of the study is unclear – why would you ask providers of renewable wind turbines to focus on sufficiency, and why study only one organisation? Further examples of small and not clearly representative samples are given in the subsection in Section 5.3.4 on "Degrowth businesses".

The above list of illustrations includes both older and recent studies, suggesting there is no clear trend. Instead, the problem small and non-representative samples is quite evenly spread over time.

5.1.5. *Non-representative case studies*

Case studies are popular in degrowth studies. However, the cases often lack a good motivation or are not representative of a relevant regional or national population. Indeed, many degrowth cases involve peculiar areas, such as locations that are remote, small in economic or population terms, with low population density, or without industrial activity. Some examples:

- Lockyer (2017) presents ethnographic research to describe how one intentional community – Dancing Rabbit Ecovillage in northeast Missouri. According to Wikipedia (https://en.wikipedia.org/wiki/Dancing_Rabbit_Ecovillage) it was "formed in 1997 … current, on site population is around 30 people with the intention of growing to a small, locally self-reliant town of 500 to 1000 residents." How

representative is such a small village – a hamlet really? This also gives the impression it is more about population degrowth than anything else.

- Motivated by the idea "cultural geography of small islands provides fertile context for degrowth", Kallis et al. (2022) study Ikaria and Gavdos, two remote islands in the Greek archipelago. They suggest that cases of "real-existing degrowth develop" in relation to 'islandness' – a physical and cultural condition specific to small islands." Of course, the question is how representative such islands are for most of the modern world. It is also unclear why these particular islands were chosen, because their populations sizes are very different (Ikaria around 8000 and Gavdos around 200), which hampers comparability.
- Tsagkari et al. (2021) also study two small islands, but in distinct countries: namely, El Hierro in the Atlantic Ocean (part of the Canary Islands), with a population size of 10,162, and Tilos in the Aegean Sea with a much smaller population of 780 people. The motivation is that they may be on a "degrowth path". It is concluded, however, that "despite the degrowth potential of these local energy projects, their prospects are limited to revitalizing local economies and empowering local communities, but not necessarily reducing energy use or creating an alternative to the growth orientation of the islands." The study lacks a systematic comparison of the two islands.
- Duo cases seem popular in degrowth studies. Indeed, Xue (2015) studies decoupling between economic and housing stock growth from negative environmental impacts for two cities: Hangzhou (China) and Copenhagen (Denmark). The logic of comparing a city (Copenhagen) with 600 thousand inhabitants with a city of more than 10 million people, moreover in another continent, culture and economic system, remains unclear. If there are so many differences, a comparison will be unable to provide unambiguous insights. Moreover, while the paper speaks of decoupling and degrowth strategies, it does not clarify there are deliberate strategies of this kind regarding housing development in either city. This casts further doubt on the selection of these cities.
- Cattaneo and Gavaldà (2010) study "rural-urban (rurban) squatting" in the Barcelona hills of Collserola. This involves an empirical study of energy and time consumption. The analysis is poor – as reflected by one aggregate table for two locations, without any further details. The result is interpreted as suggesting that it is possible to live well with little energy. This seems a bit naïve as a view on solving society's environmental problems given that squatting is a kind of "parasitic" activity that requires buildings to be available and thus constructed in the first place. Indeed, a systems perspective is missing – one cannot imagine all society to be squatting.
- Borowy (2013) links degrowth to Cuba, which after the collapse of the Communist Bloc in the 1990s experienced a severe economic crisis. The author argues that its drastic reduction in fuels, negative economic growth, and adaptation to shrinking resources through local, labour-intensive production is an "experiment in degrowth". However, there was no degrowth strategy invoked, so it is unclear how this can be representative of planned degrowth.
- An article by DeVore (2017) is about "Trees and springs as social property". The study draws from "years of ethnographic research with rural squatters in the cacao lands of Bahia, Brazil", bringing together "alternative ways of conceptualizing property that can help overcome this lingering dichotomy and fruitfully inform new political projects". In particular, it examines local practices of property-making through two cases focused on the private ownership and stewardship of natural springs, and the processes whereby squatters convert forest into agroforest. No information is provided about data collection. In addition, the relevance and representativeness of studying private versus collective property through squatting remains unclear.

Also the above list of illustrations includes both older and recent studies, suggesting there is again no clear trend. That is, the problem of non-representative studies is quite evenly spread over time.

It is worth stressing that we do not judge qualitive analysis as being worse than quantitative analysis. The two can tackle different aspects and details, which means they are capable of provide complementary insights. We find, however, that degrowth studies when quantitative or qualitative in nature very often use small and non-representative samples and when qualitative often employ non-representative case studies. In other words, both qualitative and quantitative studies tend to not satisfy accepted standards for good research. In addition, many studies provide superficial and mostly descriptive analyses. Furthermore, a lot of these studies do not really address degrowth but suggest some connection between degrowth and the studied topic, sometimes only in the opening or closure of the study (e.g., Canavan, 2014; Carson et al., 2022; Oberholzer, 2023). In addition, most quantitative and qualitative analyses lack information in their abstract about sample size is or how they obtain their data – reflecting bad reporting practice. It is also quite common not to mention in the abstract the specific (novel and non-trivial) insights obtained. Such studies, moreover, quite often draw conclusions that overgeneralize the data limits and small sample size, while we found that shortcomings of the studies are seldomly discussed.

Finally, several studies with questionable characteristics are published in journals that are ranked as low (i.e. not in the first or even the second quartile) in leading databases like Web of Science and Scopus. However, a significant proportion is published in the *Journal of Cleaner Production*, *Ecological Economics*, and *Futures* – three well known Elsevier journals. Among these, mainly *Ecological Economics* includes the more worthwhile studies according to our assessment (for details, see Tables A1-A4 in the Appendix).

5.2. Assessing attention in degrowth studies for the literature on environmental/climate policy

5.2.1. Policy effectiveness

From the reviewed studies we infer that writings on degrowth generally do not integrate, or build explicitly upon, the extensive literature on environmental and climate policy. Here, specific policies and instruments have received already much scientific scrutiny. Table 3 shows the frequency of key terms related to climate policy in the titles, abstracts and keywords of papers in the sample. It indicates that degrowth studies pay very little attention to environmental/climate policy and associated notions. In line with this finding, well-known authors like Naomi Klein and Jason Hickel who wrote books promoting a degrowth strategy did not publish before about climate or environmental policy and likewise do not interact much with received insights from policy literatures (Klein, 2014; Hickel, 2021). The fact that degrowth studies lack interaction with the literature on policy instruments and their performance on key criteria may explain why many climate researchers and policy experts do not support a degrowth position (King et al., 2023).

We also assessed whether degrowth studies that pay attention to policy make use of formal models or quantitative or qualitative data analysis (Section 5.1). We found few such studies. The theoretical and empirical modelling studies tend to study policies at a very abstract level; e.g., Bilancini and D'Alessandro (2012) compare three regimes: a decentralized economy, a planned economy where a myopic planner fails to recognize leisure and consumption externalities but acknowledges production externalities, and a planned economy with a fully informed planner. Other model studies examine general strategies rather than concrete policies; e.g., Germain (2017) studies voluntary action without indicating how to achieve it; Đula et al. (2021) say "four policies were examined: basic and maximum income, work sharing, job guarantee and dematerialization" – but some of these are more targets than

Table 3
Frequency of key terms related to environmental/climate policy in titles, abstracts and keywords of the 568 reviewed degrowth studies.

Term	Frequency in sample	Share
Standard	22	3.83%
Regulation	17	2.96%
Tax	16	2.79%
Subsidy	10	1.74%
(Eco)label	9	1.57%
Pricing	5	0.87%
Regulate	4	0.70%
Political feasibility	4	0.70%
Climate policy	2	0.35%
Information provision	0	0.00%
Policy support	0	0.00%
Social feasibility	0	0.00%

Notes: The term "standard" can mean other things than a (climate/environmental) policy instrument (e.g., as in "economic standard" or "standard approach"). Similarly, the term "tax" has a broader use than in environmental/climate/carbon taxation – think of income and wealth taxes. The same holds for "subsidy". Hence, associated numbers in the table, while already low, possibly overestimate relevant instances.

policies; and while the title of Larch et al. (2018) suggest a study of climate policy, actually no concrete policy is examined. A minority of the quantitative and qualitative studies mention the term "policy" in their title or abstract, but none really analyses policy impacts; e.g., Buhr et al. (2018) study local policy and planning in a Swedish town, concluding that degrowth-related ideas have not had any significant overall impact on these, but without giving details on concrete degrowth policies. These examples indicate that the (low) frequencies in Table 3 may depict even a too favourable picture, that is, if one accounts for how the notion of policy is interpreted and elaborated.

5.2.2. *Attention for policy support in degrowth studies*

In addition, we assess if degrowth studies give attention to policy support and political feasibility of degrowth policies. In this context, it is good to note that degrowth proposals may be seen as reflecting a misunderstanding of the fundamental reason for our society insufficiently solving environmental problems – namely a lack of political support for key policies. However, the "degrowth thesis" is instead that current policies do not work, and we therefore need to explicitly degrow our economy by implementing more radical policies (e.g., bans) or even move away from capitalism. However, this is not a straightforward response if such alternatives count on little and likely even less political support than more moderate, conventional policies. To examine this, we scrutinised the reviewed studies for addressing – e.g., through questionnaire surveys – policy support.

Table 3 shows there is extremely little attention for policy support in the reviewed degrowth studies, as indicated by the share of "political feasibility" being 0.7% and terms like "policy support" and "social feasibility" being absent in the reviewed studies. As opposed, the literature on climate policy pays considerable attention to policy support (e.g., Drews and van den Bergh, 2016a, 2016b; Kyselá et al., 2019; Ewald et al., 2022; Kallbekken, 2023). The findings of Table 3 are in line with two earlier reviews of degrowth policies by Cosme et al. (2017) and Fitzpatrick et al. (2022): these did not find or discuss any attention for the theme of policy support and political feasibility. Various studies in the sample express concern but do not offer research on policy support. For example, Keyßer and Lenzen (2021) state that "Compared with technology-driven pathways, it is clear that a degrowth transition faces tremendous political barriers" while adding later that not exploring degrowth scenarios may lead to "a self-fulfilling prophecy" as "judging such scenarios as infeasible from the start, they remain marginalised in public discourse". According to Büchs and Koch (2019) "there are structural barriers to the political feasibility of degrowth". On the other hand, some surprisingly indicate a lack of understanding for limited support for degrowth: "societal support for a degrowth transition remains for the time being moderate, and it is not well understood as yet why this is the case." (Koch, 2020).

There are a few studies in the sample, mainly by psychologists, that address topics indirectly related to policy support using quantitative empirical analysis. One, by Avery and Butera (2022) reports two psychological experiments examining how participants emotionally react to a counter-normative pro-environmental minority message of advocating radical degrowth. They find that degrowth strategies are perceived as a threat. A second study by Tomaselli et al. (2021) used an online survey with 1250 Canadian respondents to examine the effect of four message frames about transitioning to a non-growth paradigm: "environmental gain of degrowth, environmental loss of no degrowth, wellbeing gain of degrowth, and wellbeing loss of not degrowth." The environmental loss frame generated more negative emotions. The study also examined reactions to different terms, where "green economy" and "economic growth" were perceived as favourably ("moving forward") while "sustainable degrowth" received by far the most unfavourable ("moving backward") responses, and "steady state economy" and "postgrowth" came out as "neutral" (neither favourable nor unfavourable). A third study by Krpan and Basso (2021) undertook four online studies (N = 2408) in the US and the UK to see if support is affected by labelling, finding support to increase when positive consequences are stressed. What makes this study less convincing is that it is unclear that the terms suggested to be linked to degrowth ("promotion", "prevention" and "rebirth") are actually used in the literature on degrowth. A fourth study by Drews and Reese (2018) examined whether the term "degrowth" works well in communication with the wider public. A first test (conducted online, 93 respondents) finds that degrowth elicits more negative affective and emotional reactions compared to post-growth and "prosperity without growth". The second (200 participants) finds that the effects of labelling on attitudes and voting intentions are relatively small. The authors advise against a careless use of the word "degrowth" in public communication.

Other opinion studies with a broader scope have also examined views on degrowth. However, some of these tend to use overly general questions on growth versus environment, resulting in a weak basis for drawing conclusion about support for degrowth (Ančić and Domazet, 2015; Paulson and Büchs, 2022 – for more details see items on these in Table A3). Others ask more specific questions to capture the different positions and find greater support for green growth and agrowth than for degrowth positions, among citizens (Drews and van den Bergh, 2016a, 2016b; Drews et al., 2019; Tomaselli et al., 2019) as well as among experts at the science-policy interface (Lehmann et al., 2022; King et al., 2023). Interestingly, some degrowth researchers in the sample indicate support for agrowth position (Missemer, 2017; Gerber and Raina, 2018; Malerba and Oswald, 2022). Other studies focusing on feasibility tend to have a more limited stakeholder scope which makes them less relevant. For example, to understand the "limited uptake of degrowth discourse in the English-speaking world", O'Manique et al. (2021) interview 14 Canadian environmental activists, with the conclusion that "class interests – particularly those of fossil fuel companies – are a substantial barrier to realizing degrowth goals". Despite such a meagre basis, the language in the paper breathes a righteousness, as if there are no doubts at all about a degrowth strategy being the most realistic solution.

5.2.3. *Comparison with earlier reviews of degrowth policy*

The earlier review by Cosme et al. (2017) focuses on "sustainable scale, fair distribution, and efficient allocation" but did not address effectiveness of emissions reduction and policy support/feasibility. They make the interesting point that "despite the grassroots origins of

degrowth—the majority of degrowth proposals published in peer-reviewed journals follow a top-down approach and have a national geographical focus, both in terms of environmental and social protection." Regarding environment and notably climate change, we feel this makes sense as local solutions tend to lack stringency due to the public-good nature of the problems, which invites for free riding, leakage and rebound. They also note that "the degrowth academic literature is, if anything, more focused on social equity than on environmental sustainability". Indeed, we would say there is a disbalance in the sense that environmental effectiveness is often sacrificed for social justice. Furthermore, the so-called policy proposals in the literature as documented by Cosme et al. do not all concern actual or concrete policies but general ideas such as "promote changes in consumption patterns", "decrease the number of appliances and volume of goods used or consumed per household", "promote restoration of ecosystem", "promote use of local water sources", "reduce waste generation", "certify organic farming", "reduce production (large-scale, resource intensive)", "introduce simpler technologies", "make more green investments", "promote eco-efficiency", "reduce energy and material consumption", "invest in more renewable energy", and "limit trade distance and volume". None of these are actual policies, meaning that the notion of "policy" is vague and interpreted with a lot of flexibility. Cosme et al. also identify the problem that there is "substantial overlap between some proposals, in part because of their range in specificity". To avoid this problem, the mainstream literature on environmental and climate policy has typically focused its attention on more concrete and well-demarcated policy instruments which then allows to make well-informed statements on potential overlap versus complementarity or synergy. The above makes clear that the degrowth literature does not well interact with the mainstream policy literature, raising the question what the degrowth approach really adds – also as some degrowth studies propose mainstream instruments like taxes, cap-and-trade, standards and subsidies. In addition, our review did not come across any degrowth study offering an assessment of potential interactions among policies or instruments. As opposed, the mainstream literature has given extensive attention to this (see, e.g., Bouma et al., 2018; and van den Bergh et al., 2021). In view of the foregoing, more rigorous and comparative studies of "degrowth policies" are needed to warrant the degrowth approach.

The review by Fitzpatrick et al. (2022) is in effect a follow-up of Cosme et al. (with Inês Cosme participating in both reviews). Although fairly broad in scope, it also lacks attention for effectiveness and feasibility of policies. An interesting conclusion of this review is "Degrowth is increasingly popular and associated with more and more policies", and they count 530 different proposals. Instead, the mainstream policy literature suggests that one needs few but effective policies, for three main reasons: simpler policy-packages are easier to judge and update if effectiveness is low (as one will know which instrument to make more stringent); instruments interact and may show negative synergies or overlap – which is difficult to know and avoid with a multitude of instruments; and because of free riding due to the public-good nature of climate change, we need to harmonize policies as much as possible to have a chance of achieving high policy stringency – which will be more difficult the more instruments we have. Fitzpatrick's evaluation implicitly supports some of these concerns – witness their harsh conclusion "Most proposals lack precision, depth, and overlook interactions between policies."

The non-systematic review by Kongshøj (2023) discusses challenges for feasibility and desirability of degrowth policies admitting that little is known about degrowth aims and its specific policy proposals. Its conclusions are similar to those of Strzałkowski (2024), namely that "degrowth plays a marginal role in policies". Both studies lack concrete suggestions on how to change this.

Based on frequency of mentions in studies, Fitzpatrick et al. identify ten core degrowth policies, in descending order: (1) universal basic incomes, (2) work-time reductions, (3) job guarantees with a living wage, (4) maximum income caps, (5) declining caps on resource use and emissions, (6) not-for-profit cooperatives, (7) holding deliberative forums, (8) reclaiming the commons, (9) establishing ecovillages, and (10) housing cooperatives. Most of these are not really environmental/climate policies while those that may be considered as such are not new (e.g., 5 is already implemented by the EU through its ETS), or represent ineffective ways to solve environmental problems (2, 4, 10) (King and van den Bergh, 2017) or may even have the opposite effect (1,3) (Sorrell et al., 2020).

Some studies use degrowth terminology but then propose to solve environmental problems through traditional strategies or policies: innovation (Priavolou et al., 2022), planting trees (Creutzburg, 2022), a tax on the natural resource (Germain, 2017), or a waste tax (Weber et al., 2019). In addition, many degrowth studies suggest that the mainstream focuses on technology as the solution and rejects limits. Kallis (2021) speaks in this regard "a modernist 'fix' mentality that searches salvation in technology". This creates, however, a caricature of mainstream policy, which denies that such policy is really aimed at triggering a combination of changes: technological, behavioural, structural (sector shares and composition of consumption) and scale of activity. The "degrowth interpretation" that mainstream policy excludes scale effects is erroneous. It overlooks that ambitious settings of traditional policies, like cap-and-trade (emissions trading), put a very hard limit on the system that can translate into negative scale effects. Monios and Wilmsmeier (2022) conclude in a study of container shipping that "It follows that a combination of degrowth and efficiency improvements is therefore necessary." Using the term degrowth for such scale effects is not uncommon in the sample but confusing as it incorrectly suggests that traditional environmental and climate policies are unable to cause scale effects. Finally, this discussion raises the question: what is easier, getting support for ambitious environmental and climate policy that might limit growth – without stressing this in the promotion of such policies as outcomes are uncertain – or getting support for degrowth strategies which explicitly suggest we need to decline income and consumption. Our review indicates that the current degrowth literature has not even addressed this question, let alone has proven that the second is easier.

5.3. Other issues

Here we discuss several other issues that emerge from the review of degrowth studies.

5.3.1. Multiple meanings of degrowth

The sample reflects an enormous diversity of definitions and interpretations of degrowth. A random selection is:

- "slowdown of obsolescence of goods" (Monserand, 2022);
- "a lower economic growth rate as well as reductions in the usage of materials and fossil energy; however, when the economy cannot fit within the biophysical boundary despite such reductions, degrowth can also mean a deliberate transition towards lesser and cleaner production of a smaller number of goods" (Heikkinen, 2020);
- "average GDP/capita is reduced towards a level which respects global environmental limits" (Victor, 2012);
- "socially sustainable and equitable reduction (and eventually stabilisation) of society's throughput" (Đula et al., 2021);
- "the parallel way of economic growth putting the primary accents on human wellbeing not on economic growth and better quality of life

with stronger social, local and natural relations" (Harasym and Podeszwa, 2015);
- "collectively consented choice of life, not an externally-imposed imperative" and "degrowth should not be the primer social objective but the outcome of a general transition towards a more democratic and autonomous social and political organization." (Cattaneo and Gavaldà, 2010).
- In addition, one can find varying interpretation of degrowth in applications to sectors. For example, regarding so-called "housing degrowth", Tunstall (2022) defines it as reduction of the total resources going into housing production and use without an increase in inequality or a loss of wellbeing, Xue (2015) as reduced size of urbanized area divided by GDP, Mete (2022) as reduced housing space per capita, and Cucca and Friesenecker (2022) as inclusiveness in housing (2022); regarding "waste degrowth", one interpretation is as reduction of physical waste generated by households (Weber et al., 2019), whereas one could also define it as reducing waste per capita or waste per unit of GDP.
- Degrowth as a focus on low-tech technologies (Pansera and Owen, 2018; Malmaeus et al., 2020: De Castro Mazarro et al., 2023).

If there is such a great variety of meanings (and the above is just a selection), this likely will hamper clear debate and consistent, cumulative research. Note in this regard also the five distinct meanings of degrowth as identified by van den Bergh (2011): (1) GDP degrowth, (2) consumption degrowth, (3) worktime degrowth, (4) radical degrowth and (5) physical degrowth. One can find multiple instances of each in the sample of degrowth studies. Finally, several studies combine degrowth with unexpected or even far-fetched themes, such as archaeology (Flexner, 2020; Zorzin, 2021; Watson, 2021; Wurst, 2021), crime prevention (Ruggiero, 2022), gluten-free beer (Harasym and Podeszwa, 2015) and Irish unification (Fearon and Barry, 2022).

5.3.2. *Inappropriate and colonizing uses of "degrowth"*

Many studies refer to degrowth in the title without offering an analysis of it (e.g., Dartnell and Kish, 2021; Fontanari et al., 2021; Akizu-Gardoki et al., 2020; Haller, 2020; Weber et al., 2019; Kalimeris et al., 2014; Infante and Gonález De Molina, 2013; Çakar and Uzut, 2020; Pansera and Owen, 2018). In these cases, degrowth could be removed from the paper without any consequences for the text, analysis or conclusions. Degrowth seems just a term used to attract attention of a wider readership. In this regard, Wurst (2021) notes that "The literature on degrowth is easy to command, and fosters a practice that I've started calling the 'Google Scholar syndrome', where a quick search gives the appearance of being thorough, while hiding the enormous bodies of literature attempting the same thing using different terms." The latter suggests that there is nothing new under the degrowth sun. In fact, several studies deal with topics that can be debated to be in the realm of "degrowth" – they merely relabel existing areas of research, such as on worktime reduction, circular economy (recycling and repair), refurbishing houses, or bioeconomy. These topics or areas were already studied before "degrowth" appeared on the scene. Such relabelling and claiming existing research topics and areas as "degrowth research" is ironic given the plea for "decolonising" in the degrowth community (Hickel, 2021). Incidentally, the literature on sustainability transitions shows similar types of local case studies with energy communities, NGOs, urban stakeholders, etc., and is equally dominated by qualitative research methods using small samples of interviews with selected stakeholders. Many of these studies could equally be labelled as energy studies, urban studies, environmental studies, or as degrowth studies. What's in a name?

5.3.3. *The trap of "reverse causality"*

Many papers confuse a strategy or planned degrowth with low, zero or negative growth as an unplanned outcome. This can be seen as erroneously reversing the causality (Savin and van den Bergh, 2022). While many defend that degrowth is not about declining GDP, many of these "reverse causality" studies exactly derive positive conclusions about the possibility of degrowth from data showing a stable or declining GDP. This is not entirely illogical given the literal meaning of degrowth is the opposite of economic or GDP growth. Below we illustrate a few of these "reverse causality" studies:

- A study by Espinoza et al. (2022) develops a system dynamics model to analyse energy supply and demand pathways under scenarios of oil availability up to 2050 for Ecuador. The model predicts that after 2038 shortages in petroleum products supply would cause contraction in economic activity measured by GDP. This study uses "degrowth" to denote economic decline as an outcome instead of a deliberate strategy.
- According to Keyßer and Lenzen (2021) the integrated assessment modelling community and the IPCC have neglected to consider "degrowth scenarios, where economic output declines due to stringent climate mitigation". Again, this is a "reverse causality" interpretation.
- It is not uncommon in debates or papers on degrowth to come across references to Japan's low growth from 1990 to 2010 as an indication of degrowth opportunities (e.g., Komatsu et al., 2022). Again, a case of "reverse causality" – no degrowth strategy was ever involved. The analysis of this particular study suffers from various other shortcomings (see Table A3 in the Appendix). Incidentally, if it is true that the main cause of Japanese stable GDP has been low birth rates (Hong and Schneider, 2020), then it seems the implication for degrowth research is to shift attention to demographics.
- According to Douthwaite (2012) "Degrowth is going to happen whether governments want it or not because, as fossil fuels run out, incomes will shrink along with the energy supply." A clear case of "reverse-causality" confusion.
- Borowy (2013) links degrowth to Cuba, arguing that its drastic reduction in fuels, its negative economic growth and its adaptation to shrinking resources and local, labour-intensive production represent an "experiment in degrowth". However, this is just another example of "reverse causality", confusing ex-post decline with planned degrowth. Incidentally, this kind of exercise can easily invoke the fear of many degrowth proponents that degrowth will be associated with (failed) communism or economic crises (Drews and Reese, 2018).
- A paper by Akizu-Gardoki et al. (2020) studies energy footprints using a dataset including 176 nations. It finds logarithmic growth of wellbeing and saturation for certain countries which they claim is "supporting degrowth" – but this is again a "reverse causality" error. The study could have done without the use of the notion of degrowth, instead focusing on the hypothesis of the diminishing marginal contribution of energy to wellbeing. Moreover, the negative correlation is confusing and should have been clarified using regression analysis uncovering factors of wellbeing. For example, Arabic oil states are found as having among the highest energy footprints but not the highest wellbeing – possible reasons are a lack of freedom/democracy and limited rights for women.

A study by Tokic (2012) mentions next to Japan the huge economic crisis from 2008 to 2012 in Greece as another so-called example of "unplanned degrowth". Given the huge impacts in terms of

unemployment, loss of wealth, income losses, etc. It is hard to see how this can qualify as a good model for the future. In fact, Tokic concludes: "We argue that any early indications of degrowth would cause the stock market to crash, which would trigger further deleveraging (contagion) and a deflation. As a result, the economy would implode, which would eventually allow for a new rapid growth cycle, given the likely extraordinary fiscal and monetary policy response during the implosion. Thus, in our view, degrowth as an explicit strategy option is economically unsustainable and unfeasible."

A paper by Jackson (2019) gives an interesting twist to the reverse causality by discussing secular limits to growth, i.e. declining rates of economic growth due to diminishing increases in labour productivity. While mainstream economics has identified this as a driver of increased inequality and the rise of political populism, Jackson proposes that rising inequality in advanced economies is the outcome of pursuing growth at all costs. This has hampered technological innovation and contributed to financial instability. Admittedly, some of these statements are ambiguous, but they provide useful hypotheses to test. The key suggestion is that policymakers must accept that low growth rates are "the new normal". Again, we emphasise that low growth as an outcome is not the same as planned degrowth.

5.3.4. *"Degrowth business"*

Several studies talk about "degrowth business" which by a newcomer might easily be interpreted as an oxymoron. A selection of studies is:

- A study by Hankammer et al. (2021) examines guiding principles for organisations approaching degrowth, using a two-step approach. Based on a systematic literature review, it derives principles for a conceptual framework. Then the framework is applied to four organisations certified as B Corps (a private certification of for-profit companies of their social and environmental performance) based on company data and interviews. The findings indicate that B Corps implement some degrowth-approaching principles in their organisation, but that tensions regarding growth-orientation remain.
- Schmid (2018) argues that "innovative forms of organising are a crucial pillar of post-growth transitions", using the term "post-growth organisations" (PGOs). The first half of the paper is a long discussion containing many abstract and cryptic terminology. To illustrate: "practice theories' flat ontology is integrated with a structured notion of diversity as inspired by perspectives on systems, institutional orders and worlds. Nicolini proposes the metaphor of zooming to capture the analytical movement across non-hierarchical scale". The second part of the paper studies "alternative economies" in Stuttgart. Founders or local representatives of 14 organisations were interviewed. From the brief descriptions one can derive that various offer repair services of some kind or "promote" food waste avoidance, circular economy or open-source hardware and software. It is suggested that "several of the organisations' practices break with growth-based institutions. Open-sourcing, communing, providing low-threshold access, cross-subsidising, and various non-commodified practices transcend capitalist markets." However, these are hardly activities that will fundamentally change the economy.
- Wiefek and Heinitz (2018) study companies which have joined the Economy for the Common Good, a social movement which identifies the common good as the purpose of economic activity. They argue that companies' values change in line with Latouche's transformation towards degrowth through eight 'R's: re-evaluate, reconceptualize, restructure, redistribute, relocalize, reduce, re-use and recycle. Based on 11 interviews, they find that the companies' management is guided by values like fairness, cooperation, diversity, independence, democracy, transparency, and ecological sustainability. This is exemplified by democratic ownership and decision-making structures, cooperative trade relations, a preference for local suppliers and the redistribution of surpluses. Furthermore, for these companies, profits are of reduced significance as an indicator of success. It is stated, as if a shortcoming, that "some companies in our sample do still consider further company growth to be necessary". However, if these companies are to replace traditional companies in a transition phase, why would company growth be a problem? The authors mention the idea of "Non-growing companies are a prerequisite for a reduction in macroeconomic growth". This may confuse the company with the system perspective and overlooks changes needed during a transition. It also raises questions about maximum company size. Nevertheless, the authors conclude optimistically "that the [companies] from our sample … bear the potential to support a societal transition towards degrowth."
- Some attention for "degrowth business" focuses on tourism. Panzer-Krause (2021) examines the sustainability of German tour operators through audit reports. The study is actually more about corporate social responsibility (CSR) certification 'TourCert' than about degrowth. The findings reveal that CSR certification does not foster a restructuring of the tourism market "within the capitalist system", but "can only marginally advocate and diffuse certain elements of degrowth-oriented tourism".
- One can also find very normative approaches without any analysis, such as "Wake up, managers, times have changed! A plea for degrowth pedagogy in business schools" (Bobulescu, 2021).

A lot of this work give the impression that the solution to environmental and climate problems must come from voluntary action by businesses. However, the cases and findings do not provide much reason for optimism. Perhaps one should accept the aphorism "the only business of business is business" (Milton Friedman) and implement strong regulation to alter the course of firms.

5.3.5. *Degrowth and COVID-19*

The database also includes several papers trying to establish a connection between degrowth and COVID-19 (Ambrosino et al., 2022; Monios and Wilmsmeier, 2022; Panzer-Krause, 2022). The first paper uses both degrowth and COVID inappropriately. The second paper mentions the term "degrowth" only in its (long) title ("Implementing Translational Research to Understand the Future of COVID-19 and Its Long-Term Consequences: A Degrowth Perspective or the Transformation of a Global Emergency"). The third paper "investigates whether COVID-19 provokes 'revenge tourism' after periods of lockdown or whether the pandemic can be used as a chance for a degrowth-oriented restart that forms the foundation for a more sustainable tourism sector". Not surprisingly, it finds that "neither 'revenge travel' nor a degrowth-oriented restart of tourism can be identified." Next, a study by Dartnell and Kish (2021) examines if the COVID-19 pandemic has triggered "degrowth type of behaviour". Based on public data on the internet regarding search traffic and financial returns of firms it argues there has been an increase in interest in home-making and small-scale production at the beginning of the pandemic, and a "sustained shift in consumer preference for peer-to-peer e-commerce platforms relative to more-established online vendors". In addition, these authors suggest a shift to "do-it-yourself" practices through two non-representative cases, namely "home-made facemasks supplied through Etsy", and "decentralised efforts of the 3D printer community". The study could have adopted a more critical approach: it is unclear how they can claim sustained shifts in preferences and behaviours in a study lacking long term effects. This fits a general tendency in degrowth studies of conveying hopeful opinions and wishful thinking. However, studies about the link between COVID-19 experiences and support for climate/environmental policy using questionnaire surveys among many citizens do not support such optimism but provide more mixed and nuanced insights (Ecker et al., 2020; Lewandowsky et al., 2021; Drews et al., 2022; Savin et al., 2022b).

5.3.6. Inferences and language in degrowth studies

A lot of degrowth studies are not modest. They draw generalising conclusions that go beyond the limits of the case or sample studied. In line with this, one can find ambitious language in many degrowth studies. Ironic in this regard is the common use of the terms "degrowth scholars" and "degrowth scholarship" (rather than "research(ers) on degrowth"). In addition, degrowth papers have a high frequency of "zombie nouns", a term coined by author Helen Sword and propagated by Harvard language psychologist Steven Pinker. It involves adding suffixes like 'ity', 'tion' or 'ism' to an adjective or verb. Only in titles we already identified the following ones: "(de-)resourcification", "decoloniality", "defashion", "islandness", "decommodification", "productivism". Other invented terms are spatialising and necropolitics. According to Pinker (2015), they are intended to impress but tend to characterize bad writing and sloppy thinking. A final example: "prefigurative strategy", which is cryptic but sounds interesting to naive readers. It is further not difficult to find eccentric and cryptic titles among the papers. An illustrative selection is shown in Table 4.

6. Conclusions

Our review of 561 degrowth studies delivers the following general insights: (1) content covers 11 main topics, with the four dominant ones being Environmental justice, Sustainable wellbeing, Local/urban practices and Democracy and civil society; (2) the large majority (almost 90%) of studies report opinions rather than analysis; (3) few studies use quantitative or qualitative data, most of these use qualitative rather than quantitative approaches, and very few studies use formal modelling; (4) the first and second type tend to include small samples or focus on non-representative cases, with analysis being generally superficial and lacking state-of-the-art statistical methods; (5) most studies offer ad hoc and subjective policy advice, lacking thorough policy evaluation and integration with key insights of the broad literature on environmental/climate policies; (6) there are few studies on public support, a majority of which conclude that degrowth strategies and policies are socially-politically infeasible – the ones that are more optimistic use overly general questions that do no capture degrowth well; (7) various studies represent a "reverse causality" confusion, i.e. they use the term degrowth not for a deliberate strategy but to denote economic decline (in GDP terms) as a result of external factors or public policies; (8) few studies adopt a system-wide perspective – instead most focus on very small and local cases without a clear implication for or translation to the economy as a whole; (9) many studies with the term degrowth in their title/abstract, including the ones using concrete methods, are not really analyzing degrowth scenarios or policies. We illustrated each of these conclusions with concrete examples. Based on the previous list, one is inclined to infer that degrowth cannot (yet) be considered as a significant field of academic research. There is also no indication that things are improving with time. We find that both many older and recent studies suffer from small and non-representative samples. This easily gives rise to biased results and insights for the field as a whole.

The weakness of degrowth studies in terms of data analysis – whether quantitative or qualitative - is understandable to some extent. The idea of degrowth is so far from reality that good empirical studies are hardly possible. Undertaking experiments with degrowth is also impossible as one cannot isolate one part of society from the rest and subject it to a completely different economic regime. And as argued in the evaluation of specific case studies, past experiences as in communist countries (e.g., Cuba), low-growth countries (e.g., Japan) or with COVID-19 do not serve as a good model. Arguably the best one can do is stated-preference research and behavioural experiments. The first type tends to use overly general questions on growth versus environment and optimistically conclude support for degrowth (Ančić and Domazet, 2015; Paulson and Büchs, 2022). However, this is not confirmed by opinion studies that use more specific questions for the distinct positions (King et al., 2023). In fact, the latter study finds – in line with earlier studies of a similar kind – more support for agrowth than degrowth, in general as well as for most sub-groups. The few psychological studies about support for degrowth find that degrowth is mostly perceived as a threat (Avery and Butera, 2022; Tomaselli et al., 2021; Krpan and Basso, 2021; Drews and Reese, 2018).

It is important to have a good insight in the systemic and macro-economic consequences of radical degrowth strategies before talking about their implementation. Too many studies seem to be willing to undertake a large socio-economic experiment with big risks without having insight into the bigger picture. Only some of the 17 studies using theoretical or empirical modelling offer this picture – and several of them conclude rather pessimistically about the impacts of or options for degrowth strategies. For example, Hardt et al. (2020) find that a shift towards labour-intensive service sectors would result in small reductions in overall energy use because of indirect energy use, while Malmaeus et al. (2020) conclude that universal basic income, a popular theme in degrowth writings, is less compatible with a labour-intensive local self-sufficiency economy than with a capital-intensive, high-tech economy. Most quantitative and qualitative studies focus on small and local issues, usually with non-representative and very small samples (e.g., often an order of magnitude of one of a few dozen interviews). In addition, a lot of the research under the label of degrowth is not original but comes down to relabelling and colonizing existing research, such as on work-time reduction, circular economy, refurbishing houses, or bioeconomy. This is ironic given the plea for "decolonizing" in the degrowth community (Hickel, 2021).

We also identify what we would call a "degrowth paradox", namely degrowth emerging as a response to effective environment/climate policies lacking sufficient public support, whereas radical degrowth strategies are not shown to, and must be expected to even less likely, get such support. In addition, the effectiveness of most degrowth strategies is unproven as well. In fact, doubt on their effectiveness is casted by a recent review of Sorrell et al. (2020). It finds that sufficiency actions have little influence on aggregate energy use due to energy and time rebounds as well as psychological spillovers.

The findings of this review inspire several recommendations for how to improve degrowth research:

Table 4
A selection of eccentric and cryptic titles (in random order).

- Education through smoke and ash: thinking without method and the argument for a post-growth education
- European Green Deal necropolitics: Exploring 'green' energy transition, degrowth & infrastructural colonization
- Degrowth in practice: Developing an ecological habitus within permaculture entrepreneurship
- Minority influence and degrowth-oriented pro-environmental conflict: When emotions betray our attachment to the social dominant paradigm
- Ecofeminist degrowth for sustaining buen convivir
- Degrowth but, where? The case for degrowth
- When greening is not degrowth: Cost-shifting insights
- Critical realism, feminisms, and degrowth: a plea for metatheory-informed pluralism in feminist ecological economics
- Implementing translational research to understand the future of COVID-19 and its long-term consequences: A degrowth perspective or the transformation of a global emergency?
- Revenge and catch-up travel or degrowth? Debating tourism post COVID-19
- Keep degrowth or go rebirth? Regulatory focus theory and the support for a sustainable downscaling of production and consumption
- The degrowth spectrum: Convergence and divergence within a diverse and conflictual alliance

1. Try getting agreement on what degrowth precisely means, to allow for more coherent and cumulative research.
2. Formulate testable hypotheses about degrowth, such as "an effective way to reduce emissions" or "a factor that dominates efficiency and composition/substitution effects in reaching environmental/climate targets", and then collect data to test these.
3. Be more ambitious in terms of case study selection to assure that local- or region-scale studies are representative and can individually or jointly be generalized or upscaled to provide a credible global picture.
4. Undertake more studies of a systemic nature to assess global and indirect economic, social and environmental effects, notably energy/carbon rebound, of well-intended strategies.
5. Set higher standards for size and representativeness of samples in empirical (quantitative and qualitative) studies.
6. Expand research on public and stakeholder support of degrowth thinking as this is its Achilles heel.
7. Strive for more systematic interaction and synergy with existing research fields (e.g., economics, psychology, policy studies) given that these offer a wealth of insights about designing effective, efficient and equitable environmental/climate policy as well as about its public support.
8. Avoid falling into the trap of reverse causality, i.e. using degrowth to merely denote economic decline or scale decreases due to conventional policies or external factors.

Perhaps this review can serve to foster a healthy degree of self-criticism and modesty in the degrowth community through drawing attention to several serious weaknesses in the way it undertakes research.

CRediT authorship contribution statement

Ivan Savin: Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Jeroen van den Bergh:** Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The author(s) declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Additional figures and tables

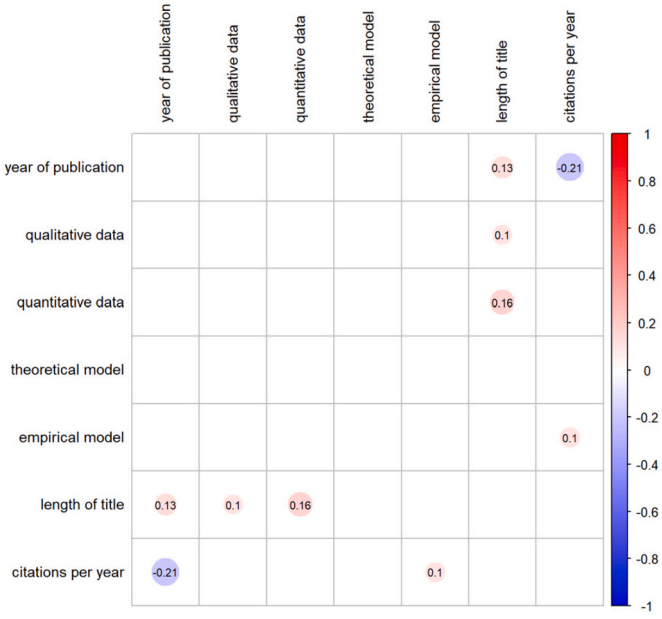

Fig. A1. Statistical correlations between characteristics of publication in our sample.
Note: Only correlations significant at 5% level are displayed.

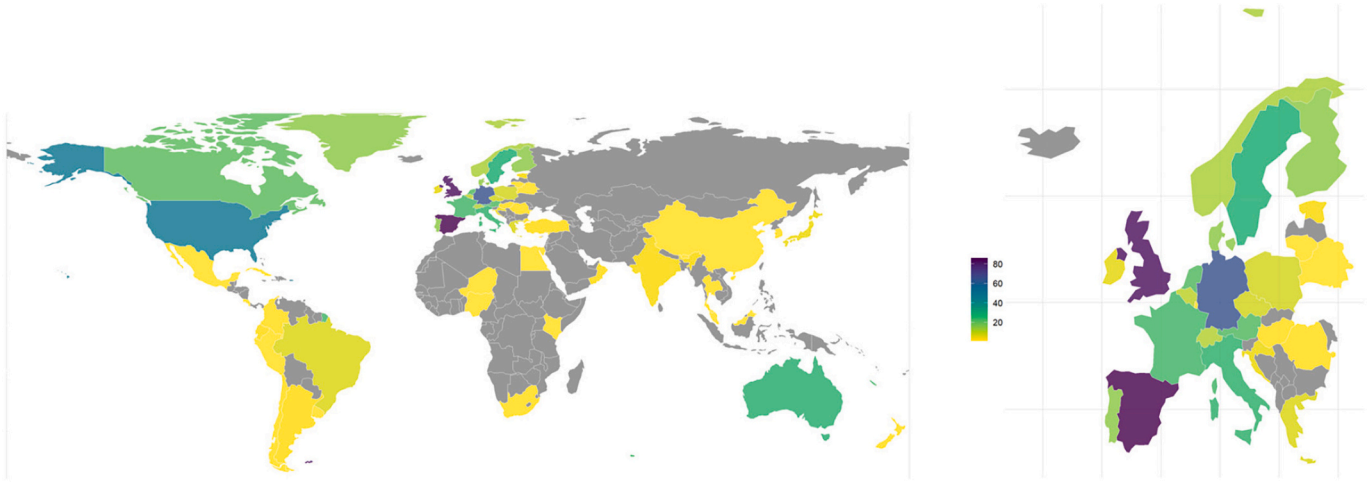

Fig. A2. Frequency of author affiliations – world (left panel) and Europe (right panel).
Note: If authors are affiliated to multiple countries, the paper is equally split between these. For example, if a study had two co-authors with one affiliated to Spain and the other to Germany, each country would receive 0.5 weight in our counting.

A.1. Data preparation and selection of optimal number of topics

A necessary step before building a topic model is pre-processing of textual data. We used the standard steps (Savin and Teplyakov, 2022): text documents were divided into separate elements (tokens); capital letters replaced; punctuation and stop words removed; and words converted to their dictionary form using lemmatization; words that are rare (i.e., that appear less or equal to 3 times in all the documents) were subsequently removed; stable word sequences called n-grams have been additionally formed (e.g., "renewable_energy", "post_growth"). As a result, our final dataset contains 2585 unique words for building a topic model and 49705total word occurrences.

To determine the optimal number of topics, we run the model for 3 to 50 topics and record model performance on the following metrics: predictive power of the model, degree of overlap between popular words within each topic (exclusivity), and degree of co-occurrence of words from the same topic in text documents (coherence). As Fig. A3 in the Appendix shows, choosing ten topics allows to maintain high model prediction accuracy and coherence while reaching relatively high exclusivity.

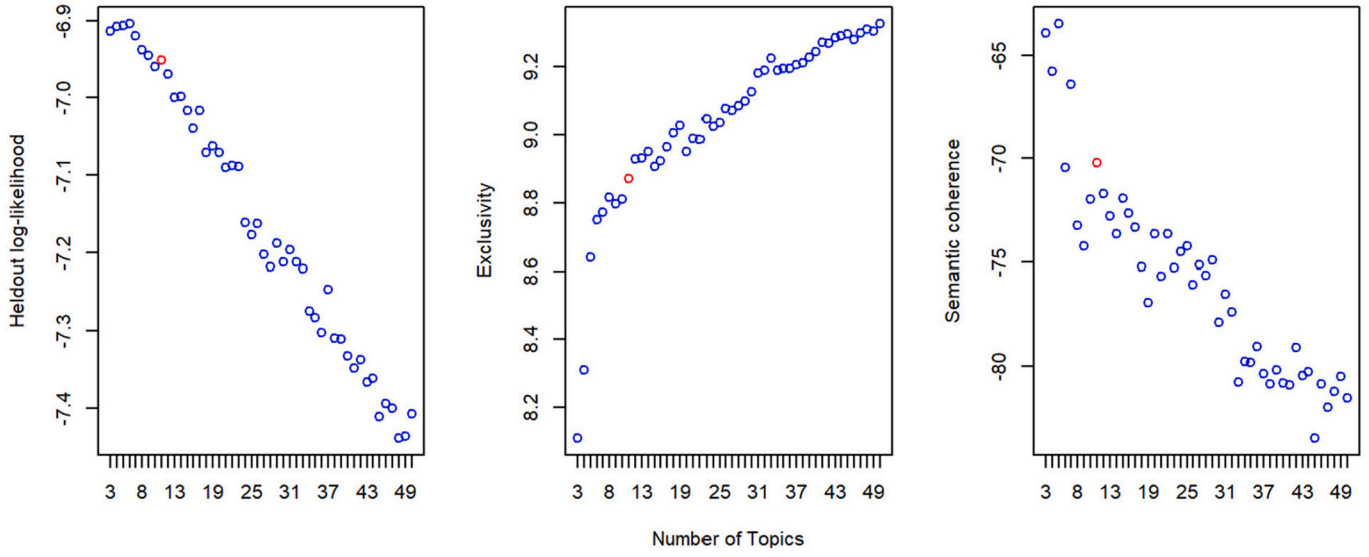

Fig. A3. Model performance depending on the number of topics.

Fig. A4. Word clouds of topics on degrowth/postgrowth.
Note: Font size reflects the probability of occurrence of the respective word given the topic, while darker colour indicates higher exclusivity.

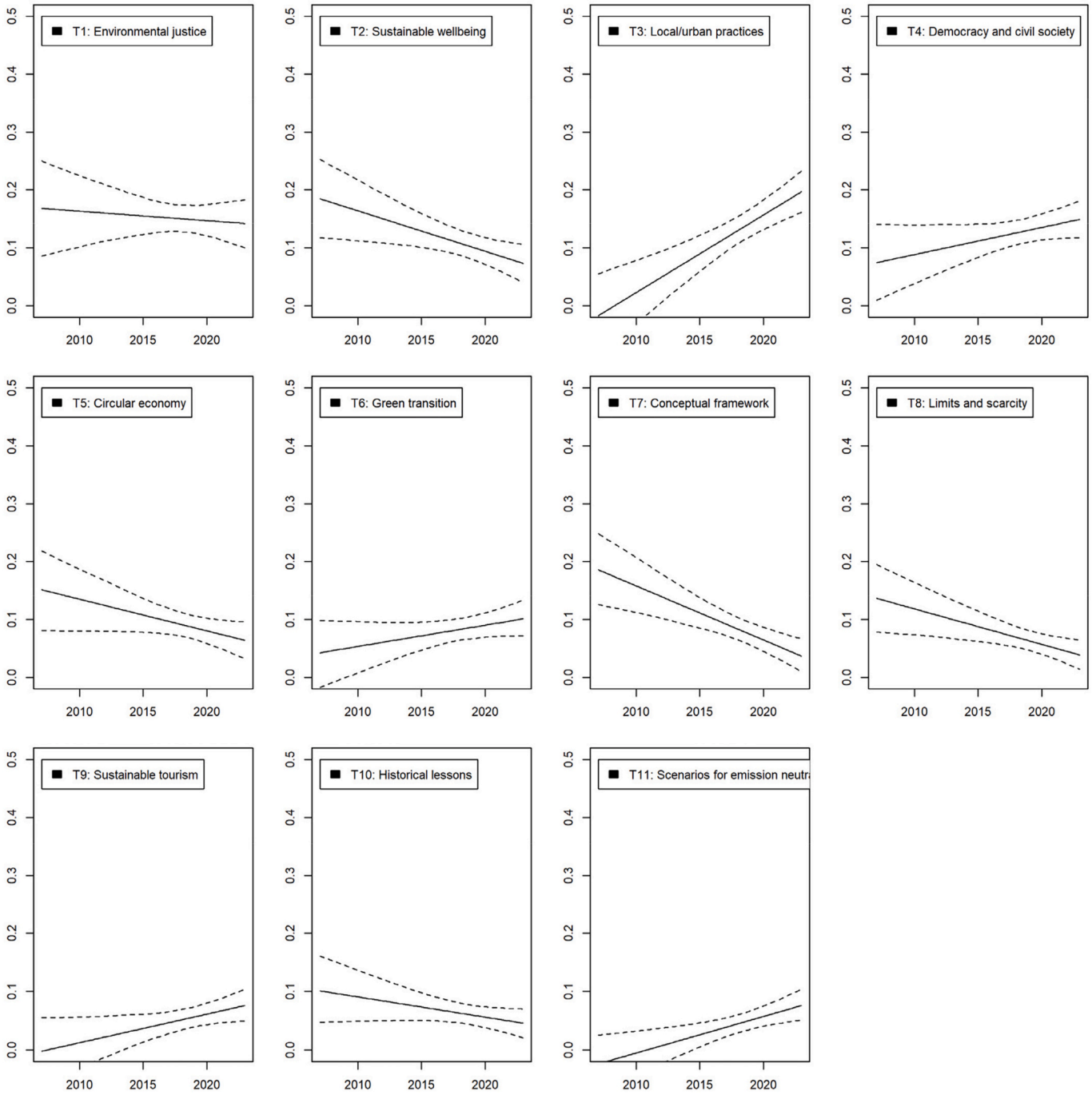

Fig. A5. Topic prevalence over time.

Note: Graphs show time patterns of coefficients generated by regressing topic prevalence in each response. Point estimates of selected covariates are plotted holding all other covariates constant. Dashed lines denote 95% confidence interval (reflecting regression & measurement uncertainty).

Table A1
Theoretical modelling studies (in chronological order).

Authors	Year	Title	Summary and assessment	Source
Oberholzer B.	2023	Post-growth transition, working time reduction, and the question of profits	This study proposes an ad hoc theoretical model to study the economic impact of worktime reduction. The finding is that it provides a threat to macroeconomic stability. The paper suggests as a solution to create employment in the public sector and several other policies, but these are not part of the model, making this advice speculative. Moreover, the study is not really about degrowth or postgrowth but just about macroeconomic impacts of worktime reduction. This is a difficult topic which invokes many different considerations, especially when the reduction is considerable (King and van den Bergh, 2017). Incidentally, the motivation for some equations is unclear, while the outcomes seem to critically depend on the assumption that production output is linearly related to labour input, which is not supported with data.	Ecological Economics 206(4), 107,748.
Monserand A.	2022	Buying into inequality: a macroeconomic analysis linking accelerated obsolescence, interpersonal inequality, and potential for degrowth	Degrowth is defined in the article as "slowdown of obsolescence of goods". This is then studied using a stock–flow consistent macroeconomic model. It is concluded that slowing "obsolescence does not necessarily lead to an opposition between economic and environmental objectives", provided the accumulation of wealth for "capitalists" is not a goal. It is not clear, however, that the model completely captures the lifecycle, income and welfare effects of a drastic change in the rate of obsolescence. This would seem necessary to arrive at a balanced and systemic judgment of all impacts. Nevertheless, this is one of the more interesting cases among the theoretical studies. The question is, though, if it is really about degrowth – it seems more about the macroeconomic impacts of a circularity strategy of avoiding early obsolescence of goods. In this regard, the term "potential for degrowth" used by the authors strikes us as unclear – more logical seems something like "reduction of income and wealth inequality are inevitable outcomes" (to avoid an error of reversing the causality - see Section 5.3.3).	European Journal of Economics and Economic Policies: Intervention 19(1), 119–137.
Malmaeus M., Alfredsson E., Birnbaum S.	2020	Basic Income and social sustainability in post-growth economies	This study develops a simple theoretical model to analyse if a universal basic income (UBI) can reduce both inequality/poverty and material consumption. It finds that UBI is less compatible with a labour-intensive, local self-sufficiency economy than with a capital-intensive, high-tech economy. In other words, the feasibility and attractiveness of a UBI depends on the specific features of the economy. The results are not easily digested as they are presented in tables with many numbers for ten deciles (argued to resemble the 2019 income distribution in Sweden). One wonders why they did not use an approach with fewer income categories to illustrate their basic point in more transparent manner (using graphics). We classified this study as theoretical since it is not clear from the paper that other model components and parameter values than the income distribution are grounded in empirical data. In fact, the equations of the model are presented in the appendix without much motivation, leaving the reader with many questions (e.g., "production is determined by the sum of inputs" – why not a multiplicative production function which is more accepted as it reflects limited substitution).	Basic Income Studies 15(1), 20,190,029.
Heikkinen T.	2020	A study of degrowth paths based on the von Neumann equilibrium model	This is part of a set of three similar papers by the same author. It is difficult to judge the relevance of this study as no clear motivation is provided for using the Von Neumann model. It moreover employs an unusual definition of degrowth: "Degrowth means a lower economic growth rate as well as reductions in the usage of materials and fossil energy; however, when the economy cannot fit within the biophysical boundary despite such reductions, degrowth can also mean a deliberate transition towards lesser and cleaner production of a smaller number of goods." It further formulates a conclusion that seems a contradictio in terminis: "Green growth can take place during degrowth."	Journal of Cleaner Production 251(4), 119,562.
Heikkinen T.	2018	An equilibrium framework for the analysis of a degrowth society with asymmetric agents, sharing and basic income	A second paper by the same author as in the previous row. Very abstract and difficult to interpret the analytical results, also as the author does not provide clear explanations. These are among the most theoretical papers of the whole database. The author uses several degrowth concepts, such as voluntary simplicity (VS), sharing and basic income. The study arrives at bold conclusions like "Sharing, collaborative consumption and basic income support welfare-increasing degrowth", trivial ones like "An increase in the share of the VS-type agents implies a degrowth transition to a lower level of average consumption",	Ecological Economics 148, 43–53.

(*continued on next page*)

Table A1 (*continued*)

Authors	Year	Title	Summary and assessment	Source
			and cryptic ones like "Any growing economy can eventually reach the size at which degrowth would improve the welfare". Assumptions made cause the model to be ad hoc and hard to connect to the wider literature on growth and environment.	
Germain M.	2017	Optimal versus sustainable degrowth policies	This paper studies the impact of "voluntary degrowth policies" on output, consumption and welfare using a Ramsey growth model with natural resource and pollution. The instrument of these policies is a tax on the natural resource." It has unclear conclusions, the title never becomes clear, and the term "voluntary … policies" lacks logic as it confuses the common distinction between voluntary action and regulation/policy. It is further uncommon to consider a tax on the natural resource as a "degrowth policy".	Ecological Economics 136, 266–281.
Heikkinen T.	2015	(De)growth and welfare in an equilibrium model with heterogeneous consumers	This is the first of the three theoretical papers by same author (all published in Ecological Economics). It is difficult to tell the differences between, and thus judge the relevance of, these papers. Like the second paper above, it studies equilibrium growth and voluntary degrowth. The approach is a dynamic equilibrium model with externalities in production, consumption, and leisure. Heterogeneity regarding voluntary simplicity is incorporated by allowing for agent-specific restrictions on maximum consumption. Numerical examples suggest that degrowth triggered through voluntary simplicity by a subset of consumers who are little affected by status competition has a positive effect on the aggregate welfare under externalities in consumption and leisure. The question is how a critical subset of such voluntary-simplicity consumers is achieved, which remains outside the analysis. A trivial conclusion is that a reduction in status competition increases the aggregate welfare and reduces the equilibrium growth rate – but the key question is how such a reduction in status competition can be achieved. The model is ad hoc, making it difficult to place in the broader theoretical literature on economic growth and environment. Despite "status" being central to the study, references to important authors like Brekke, Frank and Nyborg are missing.	Ecological Economics 116, 330–340.
Andreoni V., Galmarini S.	2014	How to increase wellbeing in a context of degrowth	This paper opens by noting two reasons why there is a lack of formal models of degrowth: an ideological rejection by degrowth supporters of formal framings, and existing growth-model studies excluding attention for degrowth strategies. The study then introduces "reciprocity work", defined as "based on voluntary work and self-production", into the "wellbeing equation" – a cryptic term. In addition, four types of capital are considered: health, social, physical and natural. Concepts and meanings of equations are not all clear, and neither are the conclusions drawn. The paper is hard to read, also as it employs unusual notation. Because of many uncommon components the model is ad hoc, making it difficult to place in the broader literature on economic growth and environment.	Futures 55, 78–89.
Bilancini E., D'Alessandro S.	2012	Long-run welfare under externalities in consumption, leisure, and production: A case for happy degrowth vs. unhappy growth	This study develops an endogenous growth model to compare three regimes: a decentralized economy where each household makes isolated choices without considering external effects (in consumption, leisure and production) of their actions, a planned economy where a myopic planner fails to recognize both leisure and consumption externalities but internalises production externalities, and a planned economy with a fully informed planner. It finds that in a decentralized economy growth is sub-optimal from a welfare standpoint; and that "happy degrowth" is possible through downscaling of production and consumption while increasing leisure. From a conceptual perspective this is an interesting model study which confirms some intuitions. The more surprising insight is that myopic intervention which overlooks consumption and leisure externalities (and as a result overly focuses on GDP growth) can translate in higher growth and labour time than in both the decentralized and fully informed regimes – which seems to suggest that laissez-faire is sometimes better than imperfect regulation. This paper is among the more valuable ones in the literature on degrowth.	Ecological Economics 84, 194–205.

Table A2
Empirical modelling studies (in chronological order).

Authors	Year	Title	Summary and assessment	Source
Espinoza V.S., Fontalvo J., Martí-Herrero J., Miguel L.J., Mediavilla M.	2022	Analysis of energy future pathways for Ecuador facing the prospects of oil availability using a system dynamics model. Is degrowth inevitable?	This study develops a system dynamics model to analyse energy supply and demand pathways under scenarios of oil availability up to 2050 for Ecuador. The model predicts that after 2038 shortages in petroleum products supply would cause contraction in economic activity measured by GDP. Like many other studies in the sample, this study uses "degrowth" to denote economic decline and not as a deliberate ex-ante strategy – i.e. it falls into the trap of "reverse causality" (see Section 5.3.3).	Energy 259, 124,963.
Bodirsky B.L., Chen D.M.-C., Weindl I., Soergel B., Beier F., Molina Bacca E.J., Gaupp F., Popp A., Lotze-Campen H.	2022	Integrating degrowth and efficiency perspectives enables an emission-neutral food system by 2100	This study uses a quantitative model, the MAgPIE 4 open-source framework, to test degrowth principles in the food and land system. It finds that reducing and redistributing income alone, within current development paradigms, leads to limited greenhouse gas (GHG) emission mitigation from agriculture and land-use change. Convergence towards a needs-based food system will achieve more reduction, based on efficient resource allocation through complementary carbon pricing. This would "integrate degrowth and efficiency perspectives". The study does not clarify, however, which policies will achieve reducing income or that these are politically feasible.	Nature Food 3(5), 341–348.
Keyßer L.T., Lenzen M.	2021	1.5 B°C degrowth scenarios suggest the need for new mitigation pathways	This study motivates its approach by noting that 1.5 °C scenarios reported by the Intergovernmental Panel on Climate Change (IPCC) rely on combinations of controversial negative emissions and unprecedented technological change, while assuming continued growth in gross domestic product (GDP). It claims that the integrated assessment modelling community and the IPCC have neglected to consider degrowth scenarios, where economic output declines due to stringent climate mitigation (which is, incidentally, a reverse causality interpretation – see Section 5.3.3). Using a stylized but empirically informed model, the authors find that the degrowth scenarios minimize key risks for feasibility and sustainability. This is doubtful, though, since an explicit degrowth strategy will face enormous political and economic uncertainties compared to a strategy of raising support for conventional climate policies. The latter may, in fact, have negative growth as an outcome, but are likely to strike a better balance with technological and compositional changes (Savin and van den Bergh, 2022). In closing, the authors admit that substantial challenges remain regarding political feasibility.	Nature Communications 12, 2676.
Hoehn D., Laso J., Margallo M., Ruiz-Salmón I., Amo-Setién F.J., Abajas-Bustillo R., Sarabia C., Quiñones A., Vázquez-Rowe I., Bala A., Batlle-Bayer L., Fullana-i-Palmer P. and Aldaco R.	2021	Introducing a degrowth approach to the circular economy policies of food production, and food loss and waste management: Towards a circular bioeconomy	This study determines, using a life cycle assessment approach for the period 2020–2040, the extent of degrowth needed in food supply chains to achieve compliance with the Paris Agreement targets. Scenarios include four pillars, called "re-territorialization", "re-vegetarianization", "re-localization", and "re-seasonalization". The approach is applied to Spain for summer and winter seasons (arguably as very different food crops are grown). The findings include so-called "degrowth" of 26.8% in 2015 and 58.9% in 2040, notably through reduction of meat and fish/seafood consumption. Very arbitrary assumptions are made about the pillars, such as a 25% reduction in the consumption of meat and fish and seafood, which casts doubts on the relevance of the results. It would have been more logical to calculate how much consumption should reduce to meet the maximum food supply under each scenario.	Sustainability (Switzerland) 13(6), 3379.
Dula I., Videira N., Größler A.	2021	Degrowth dynamics: Modelling policy proposals with system dynamics	This paper studies degrowth proposals using system dynamics (stock-and-flow modelling), "initialized with the European Union data". The central question is formulated as "What are the most important, dynamically complex degrowth policy proposals which need to be explored using a systemic perspective?" The study then develops a rather complex model that tries to address virtually all aspects of degrowth as mentioned in the literature. "Experts" in the field of degrowth were contacted by	Journal of Simulation 15, 93–129.

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Table A2 (*continued*)

Authors	Year	Title	Summary and assessment	Source
			means of an online questionnaire to support the model design: namely, through an e-mail to 45 individuals who contributed to the book D'Alisa et al. (2015), Degrowth: A vocabulary for a new era, of whom only 7 responded. Four policies were examined: basic and maximum income, work sharing, job guarantee and dematerialization (which are not really all policies; some are targets or outcomes). Results show that none of these fix all problems as each involves unintended consequences. Due to its complexity and ad-hocness, the model is difficult to judge or compare with other studies.	
Hardt L., Barrett J., Taylor P.G., Foxon T.J.	2020	Structural change for a post-growth economy: Investigating the relationship between embodied energy intensity and labour productivity	This study is about structural change towards labour-intensive services, such as care or education. The aim is to examine whether this contributes to sustainability and meaningful work. The study undertakes a multi-regional input-output analysis assessing embodied energy intensity and embodied labour productivity for economic sectors in the UK and Germany between 1995 and 2011. It finds that a shift towards five labour-intensive service sectors would result in small reductions in overall energy use because of indirect energy use. This study complements the partial and local nature of most degrowth studies, resulting in more realism and less optimism.	Sustainability (Switzerland) 12(3), 962.
Larch M., Löning M., Wanner J.	2018	Can degrowth overcome the leakage problem of unilateral climate policy?	The authors suggest this is the "first investigation of degrowth in a multi-country setting". The method used is a gravity model. The study operationalizes degrowth in an unusual and cryptic way: "degrowth not only aims at reducing the fossil fuel use in an economy, but rather (besides other social and political goals) at a reduction of all factor inputs". It studies both so-called "simple and full degrowth", terms that are not intuitive though and never become very clear. The study concludes that degrowth "significantly reduces leakage by keeping the sectoral composition of the country more stable and reducing uncommitted countries' incentives to shift towards more energy-intensive production techniques". In addition, it suggests that "higher effectiveness of degrowth in reducing carbon emissions is most pronounced for small and trade-open economies with comparatively clean production technologies". In quantitative terms the results are shocking: degrowth or scale reduction of the economy is between 49 and 86%. The study addresses a relevant topic but its assumptions and conclusions are not easy to understand. It would seem also more realistic and relevant to focus on degrowth of one country in the context of a world dominated by mainstream climate policy – rather than no policy as in the model.	Ecological Economics 152(C), 118–130.
Victor P.A.	2012	Growth, degrowth and climate change: A scenario analysis	This study uses LowGrow, a simulation model of the Canadian economy, to compare 'business as usual' (past trends continued), 'selective growth' (differential growth rates of sectors related to their direct and indirect emissions), and 'degrowth' (average GDP/capita reduced to a level that respects global environmental limits). The 2035 target for a degrowth scenario is $15,260 per Canadian, an income level enjoyed on average by Canadians in 1976. The study concludes that substantial reductions in GHG emissions cannot be achieved by improving GHG intensity alone but that cuts in the scale of the economy will be necessary as well. In addition, it is found that the degrowth scenario delivers substantial reductions in unemployment, human poverty, and the debt to GDP ratio. Such effects are evidently tentative, given the large changes taking place in the economy under this scenario (including a collapse of GDP with about 50% versus its peak value).	Ecological Economics 84, 206–212.

Table A3
Quantitative analyses (in chronological order).

Authors	Year	Title	Summary and assessment	Source
De Castro Mazarro A., George Kaliaden R., Wende W., Egermann M.	2023	Beyond urban ecomodernism: How can degrowth-aligned spatial practices enhance urban sustainability transformations	This study offers a review of the alignment of sustainable architecture, urban design and planning presented in "four international events to degrowth principles from 2012 to 2019". The motivation is that for "spatial practices" such as architecture, urban design and planning, degrowth remains an abstract concept. The study assesses 252 "sustainable spatial projects across the world operating at the building, neighbourhood and citywide scales". From 422 initial entries, approximately one quarter ($n = 106$) were deleted as they did not have a clear association with sustainability principles. The majority of projects is assessed as being representative of the dominant architecture and urban design culture while only a minority (and none of the eco-urbanization projects at the city scale) align to degrowth principles –formulated as including transformation of obsolete buildings, low-tech, convivial solutions, materials that can be composted or re-used, urban farming, etc. This study, like many others, uses degrowth in a very loose and broad manner, suggesting existing strategies like building retrofitting are aligned to degrowth principles. It gives the impression that degrowth thinking is colonizing existing approaches that do well on their own. The study is not very deep – it presents only one figure with six sustainability strategies classified into degrowth, ambivalent and growth oriented.	Urban Studies 60(7), 1304–1315.
Malerba D., Oswald Y.	2022	To grow or not to grow? Revisiting economic growth as a sustainable development goal in light of the degrowth debate	This chapter considers the controversy about economic growth by exploring the SDGs on economic growth, inequality, environmental footprints and poverty. Using a Kaya decomposition, it frames the change in inequality in terms of differing growth rates rather than an explicit redistribution of income and wealth. The inequality targets are found to be aligned with the economic growth ones but diametrically opposed to any degrowth notion. It offers a range of descriptive statistical results, concluding that the debate on growth vs. degrowth might welcome the "agrowth" perspective as it does not view growth necessarily as good or bad and is more flexible in adapting to the development needs of certain countries.	Governing the Interlinkages between the SDGs (eds. D. Malerba & Y. Oswald), Routledge, London, pp. 140–157.
Komatsu H., Rappleye J., Uchida Y.	2022	Is happiness possible in a degrowth society?	This study argues that in Japan "long-term decline in economic standards" has not led to a structural decrease in subjective wellbeing, which is suggested to support the case for degrowth. However, the approach suffers from various problems. First, it confuses Japan's low growth and fluctuating GDP with degrowth, and draws bold but unfounded conclusions from this: "Political and popular feasibility of degrowth might be higher than expected." Second, it suffers from reverse causality: Japan did not have deliberate degrowth but stagnating growth due to external factors. Third, it does not undertake a correlation or regression analysis of how happiness is associated with economic growth and other factors that might influence growth. Instead, it plots individual variables over time and draws quick conclusions without a firm basis.	Futures 144, 103,056.
Priavolou C., Troullaki K., Tsiouris N., Giotitsas C., Kostakis V.	2022	Tracing sustainable production from a degrowth and localisation perspective: A case of 3D printers	This is a rather surprising study that compares 3D printers using "values-based life cycle analysis" (an unclear term which appears in Google only a handful of times, all related to distinct versions of this article), arguably allowing for a critical evaluation of the sustainability from a degrowth perspective. The focus is motivated by 3D printers potentially reducing the environmental impact of the contemporary industrial world, as they allow for decentralized manufacturing processes and local supply chains. However, environmental impacts of their production are overlooked in this reasoning. The approach involves assessing five values: relatedness (how technology affects relations of people with nature, with other	Journal of Cleaner Production 376, 134,291.

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Table A3 (*continued*)

Authors	Year	Title	Summary and assessment	Source
			people and with technology itself), access (who can produce, use, and dispose the technology, where, and how), adaptability (how independent or linkable a technology is to its environment), bio-interaction (how a technology interacts with the ecosystem), and appropriateness (what is the relation between the inputs and outputs of the technology considering a given context). Based on these rather abstract and arbitrary criteria, the authors propose a detailed and rather subjective approach to assess these values. They then apply it to a range of printers – without explaining why these were selected – finding that open-source 3D printers come out as the best performing. Two aspects seem to be overlooked: that the whole idea of 3D printing, even when efficient, is still an energy-intensive technology that seems inconsistent with the degrowth idea of simplicity and low-tech; and that the focus on licencing ("transitioning from open-source licence to truly open documentation and from open documentation to local manufacturing") may lead to wider diffusion (rebound) of these printers, adding to economy-wide energy and material use.	
Paulson L., Büchs M.	2022	Public acceptance of post-growth: Factors and implications for post-growth strategy	This study uses the 2017 European Values Study (EVS) with 49,749 individuals from 34 European countries), notably its question whether respondents would prioritise environmental protection over economic growth or not. They conclude that "there is a majority in favour of post-growth within European countries" (60.5%). However, this is debatable as the terminology "post-growth" and associated ideas are not part of the question wording. In fact, previous research has cast doubt on the reliability of the EVS type of question based on question wording and response format as well as misunderstanding of growth and overestimation of recent growth by respondents (Drews et al., 2018, Section 4.1). The study findings also contrast with revealed preference in terms of voting behaviour where a majority of voters in most countries support conservative, liberal and moderate left-wing parties which do not question growth. Finally, the authors add an own study of interviews with 17 people from the UK to undertake an "in-depth exploration of the justifications for supporting or rejecting the different dimensions of a post-growth future". Such a small sample is clearly not representative of the UK population, while comparison with the EVS analysis based on 34 countries makes little sense either.	Futures 143, 103,020.
Avery R.A.T., Butera F.	2022	Minority Influence and degrowth-oriented pro-environmental conflict: When emotions betray our attachment to the social dominant paradigm	The motivation for this psychological study is that "human pro-environmental action is not changing with sufficient impact to keep global warming within the 1.5C° limit. Environmental psychology has identified emotions like fear and anger as barriers to radical change and to maintain societal status quo." This study reports two psychological experiments examining how participants emotionally react to a counter-normative pro-environmental minority message of advocating radical degrowth. One is a qualitative thematic analysis and the other a quantitative emotional self-report. The results show that participants report emotions resisting change, allowing them to stay in tune with the socially dominant paradigm of growth. While all participants tend to demonstrate higher proportions of control-oriented emotions (like anger, fear, sadness and avoidance of emotions), men do so more (esp. for anger and avoidance – while women score much higher on fear). According to the authors, this is in line with differences in predispositions and socialisation of girls/woman versus boys/men. They suggest that the gender difference may be partly explained by men being particularly attached to protecting their status linked to the prevailing social paradigm, which covers the aim of economic growth. Overall, the study shows that degrowth strategies are	Frontiers in Psychology 13, 899,933.

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Authors	Year	Title	Summary and assessment	Source
			perceived as a threat, implying little hope for large political support.	
Lehmann C., Delbard O., Lange S.	2022	Green growth, a-growth or degrowth? Investigating the attitudes of environmental protection specialists at the German Environment Agency	This study undertook an online survey inviting 1593 employees of the Umweltbundesamt (German Environmental Agency), resulting in 259 completed responses. The findings are: "environmental protection specialists" predominantly express a preference for growth-critical concepts (agrowth/post-growth and degrowth) as compared to green growth; specialists with more knowledge of these concepts are even more likely to prefer growth-critical concepts; a-growth/post-growth is the most favoured concept (45% versus 25–30% for growth/degrowth). This study complements previous opinion studies involving the general public and scientists (Drews and van den Bergh, 2016a, 2016b, 2017; Tomaselli et al., 2019). Its uses a consistent method (so that comparability is warranted), and produces similar results in terms of the distribution of opinions, including minority support for degrowth and larger support for agrowth.	Journal of Cleaner Production 336, 130,306.
Tunstall R.	2022	An empirical test of measures of housing degrowth: Learning from the limited experience of England and Wales, 1981–2011	This study analyses "housing degrowth" which is argued to contrast with prevailing housing policy that assumes more housing is good. It defines housing degrowth as a reduction of the total resources going into housing production and use, without an increase in inequality or a loss of wellbeing. The study uses data on the housing system in England and Wales for the period 1981–2011. The total number of rooms is the key indicator, which the authors admit is an imperfect proxy for degrowth. They find that both England and Wales experienced significant increases in embodied CO_2 (from housing construction, maintenance and disposal). Few areas experienced reductions, where moreover inequality increased and reduced space per person likely resulted in lower wellbeing. While estimated data on direct CO2 production by homes during 2008–18 showed a reduction, the poorest households were hit the hardest by rising energy costs. Because the statements on (changes in) wellbeing seem rather speculative and the study uses a debatable proxy for degrowth, the findings should be taken with a grain of salt. Despite not finding evidence for housing degrowth so far, the authors strangely end with an optimistic conclusion that housing degrowth is feasible.	Urban Studies 60(7), 1285–1303.
Carson D.B., Carson D.A., Lundmark L., Hurtig A.-K.	2022	Resource deserts, village hierarchies and de-growth in sparsely populated areas: The case of Southern Lapland, Sweden	This study focuses on small villages in Lapland Sweden, characterized by a decrease in key services (schools, shops and public transport) since the 1970s, in response to population loss and increased per capita costs. The authors suggest that recently policy thinking includes a 'de-growth' approach where digitalisation and increased personal mobility are used to provide new ways of delivering services. Later in the paper they suggest that with de-growth they mean "manage the process of population loss while maintaining and even improving equity and quality of life", while they also make the cryptic statement "move from a decline-disinvestment approach to de-growth-reinvestment". The study assesses the spatial distribution of neighbourhood services among villages, confirming the trend which motivated the study (one wonders why they needed to study it then). While they suggest in their introduction the trend was market- rather than policy-driven, they later argue that "political decisions on service allocations" matter. Their interpretations of degrowth are confusing and not clearly in line with the degrowth movement. Moreover, they do not speak much about degrowth in the analysis, and not even in the conclusions – where they propose a shift to "de-growth" with the aim "to eliminate resource deserts and promote equity of service access across all villages" and through "new models of service delivery". It further seems to address a rather non-	Fennia 200(2), 210–227.

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Authors	Year	Title	Summary and assessment	Source
			representative case without a clear environmental angle (see Section 5.1.5).	
Priewe J.	2022	Growth in the ecological transition: Green, zero or de-growth?	The study assesses whether a transition to climate neutrality in 2050 is best achieved through green growth, zero growth or de-growth. Different scenarios of the global transition with different combinations of GDP growth and reduction rates of the emission-to-GDP ratio are examined. The result is that both variables matter, but reduction in the emissions ratio is more important. In other words, zero growth is not effective to reach climate neutrality (i.e. the Paris goals). The author advises low green growth in the North (under certain conditions also zero growth) and moderate green growth in the South. He assesses proposals for degrowth as diverse and involving important shortcomings, especially regarding lack of clarity about macroeconomic impacts and risks. The study does not really offer much quantitative analysis – rather back-of-the-envelope calculations – but provides clear and well-argued conclusions.	European Journal of Economics and Economic Policies: Intervention 19 (1), 19–40.
Dartnell L.R., Kish K.	2021	Do responses to the COVID-19 pandemic anticipate a long-lasting shift towards peer-to-peer production or degrowth?	The study claims that the COVID-19 pandemic offered a unique opportunity to study shifts in degrowth type of behaviour to understand its potential for long-term sustainability of production and consumption. It analyses public data on the internet regarding search traffic and financial returns of firms to track shifts in public interest and consumer behaviour. It finds an increase in interest in home-making and small-scale production at the beginning of the pandemic, and a "sustained shift in consumer preference for peer-to-peer e-commerce platforms relative to more-established online vendors". It further suggests a shift to "do-it-yourself" practices through two non-representative cases, namely "home-made facemasks supplied through Etsy", and "decentralized efforts of the 3D printer community". The claim of sustained shifts in preferences and behaviours lacks any basis – indeed, long-term effects are not part of the study. Moreover, no subtle quantitative analysis is undertaken – merely reporting Google trends indicating Amazon was popular during COVID is suggestive at best.	Sustainable Production and Consumption 27, 2165–2177.
Tomaselli M.F., Kozak R., Gifford R., Sheppard S.R. J.	2021	Degrowth or not degrowth: the Importance of message frames for characterizing the new economy	This psychological study uses framing theory to examine, through an online survey involving 1250 Canadian respondents, the effects of four message frames about transitioning to a non-growth paradigm: environmental gain of degrowth, environmental loss of no degrowth, wellbeing gain of degrowth, and wellbeing loss of not degrowth. The environmental loss frame generated more negative emotions, while the wellbeing gain frame produced more positive emotional reactions. The study finds that the messages elicited frame-consistent thoughts, suggesting the relevance of being strategic and deliberate in communicating post-growth ideas to the public. The study further examined reactions to different economic terms: "green economy" and "economic growth" were perceived as favourably ("moving forward") while "sustainable degrowth" received by far the most unfavourable ("moving backward") responses. The other two terms, "steady state economy" and postgrowth", were seen by most respondents as "neutral" (neither favourable nor unfavourable).	Ecological Economics 183, 106,952.
Krpan D., Basso F.	2021	Keep degrowth or go rebirth? Regulatory focus theory and the support for a sustainable downscaling of production and consumption	Another psychological study, using Regulatory Focus Theory, is motivated by degrowth maintaining a rather negative public perception. It undertakes four online studies (N = 2408) in the US and UK to see if support is affected by labelling (Rebirth vs. Degrowth) and framing (Promotion vs. Prevention). The main finding is that support increased when positive consequences are stressed (Promotion) rather than avoiding negative consequences (Prevention), regardless of its name labelling. What makes this study less convincing is that neither of the terms considered – "promotion", "prevention" and "rebirth"	Journal of Environmental Psychology 74, 101,586.

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Authors	Year	Title	Summary and assessment	Source
			– are common in academic or popular publications promoting degrowth.	
Fontanari M., Traskevich A., Seraphin H.	2021	(De)growth imperative: the importance of destination resilience in the context of overtourism	Examines the notion "overtourism" to arrive at management solutions for "destination degrowth and resilience-building". It uses a Delphi survey of 104 tourism experts who have studied overtourism conceptually or empirically: academics, managers of tourism associations, journalists, and German ministries' representatives. The results are presented in tables with all details (no statistical aggregation) which makes them hard to digest. Results are presented for ten statements, several of which are cryptic or difficult to respond to otherwise: e.g., "Overtourism results from the accumulation of non-existent strategic planning and the absence of spatial and destination design." – cryptic and too many factors (what if one factor is deemed important but another not?); or "Overtourism is a question of individual perceptions, both for locals and for tourists" – what if the answer is different for locals and tourists? These two examples were even among the clearest – many other statements were extremely long and complex.	In: Issues and Cases of Degrowth in Tourism (ed. K. Andriotis), CABI, Wallingford, UK, pp. 22–41.
Akizu-Gardoki O., Kunze C., Coxeter A., Bueno G., Wiedmann T., Lopez-Guede J.M.	2020	Discovery of a possible wellbeing turning point within energy footprint accounts which may support the degrowth theory	This study examines energy footprints using a dataset including 176 nations, based on Global Multi Regional Input Output analysis, which accounts for energy embodied in imported/exported products and services. It claims to offer evidence for a negative correlation between energy consumption and wellbeing after a so-called "Wellbeing Turning Point" (WTP), measured using the Human Development Index. It finds logarithmic growth of wellbeing and saturation for certain countries, which are claimed of "supporting degrowth" – but this is again a "reverse causality" error (see Section 5.3.3). The results are not robust against excluding outlier countries or including a factor for considering the weight of high population countries. The study uses the confusing term "wellbeing degrowth", which seems to deviate from how degrowth is used in the literature on sustainable degrowth. It seems that the study would have been clearer in its meaning without the use of the notion of degrowth, instead focusing on the hypothesis of a diminishing marginal contribution of energy to wellbeing. Moreover, the negative correlation is confusing and should best have been explained or tested through regression analysis uncovering multiple factors of wellbeing. For instance, Fig. 5 in the paper shows Arabic oil states as having among the highest energy footprints but not the highest wellbeing – likely reasons for the latter are factors such as lack of freedom and democracy or limited rights for women.	Energy for Sustainable Development 59, 22–32.
Vuković B.M., Ančić B., Domazet M.	2020	Values underpinning a degrowth transformation of the socio-political system	The study uses data from the International Social Survey Program (2017) with 1026 respondents from Croatia. It combines this with a 'degrowth scale' created from nine items out of the 22 from Drews and van den Bergh (2016) – although they do not clarify which ones. The results are that 285 respondents (27.8%) agree with statements relating to the "end of growth" – which is, however, not the same as "degrowth". It is a pity that there is no clear reporting of results on green growth, degrowth and agrowth. They suggest that out of 1026 respondents, only 88 strongly support (answering 4 agree and 5 completely agree) all variables of the degrowth scale. These dimensions are then (statistically) contextualised within respondents' socio-demographic characteristics, and their other values and attitudes. The results are presented through many numbers in the text instead of through figures, which is rather unattractive.	Traditiones 49(1), 141–158.
Haller A.	2020	From classical and neoclassical economic growth to degrowth in Europe. Challenges for public administration	A study of the relationship between economic growth, measured by GDP per capita, and greenhouse gas emissions, for the EU28 during the period 1980–2016. Using simple and multiple linear regression, the	Administratie si Management Public 34, 150–170.

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Authors	Year	Title	Summary and assessment	Source
			relation is assessed as positive and strong – hardly suprising. Activities that produce natural gas emissions have the largest influence on European economic growth followed by those from coal and coke, and by those from petroleum. Given heterogeneity of the EU28 members, it is suggested that "a common emission reduction policy in EU28 is not possible" – which is unclear as one might argue the nature of the problem matters, not the heterogenous carbon intensity of the economy. The connection with degrowth is unclear – the main statement on this is: "As a result of this study we will see to what extend Europe is in position to choose between continuing on the same path of progress or opting to apply the principles of degrowth economy."	
Weber G., Cabras I., Calaf-Forn M., Puig-Ventosa I., D'Alisa G.	2019	Promoting waste degrowth and environmental justice at a local level: the case of unit-pricing schemes in Spain	This paper investigates the introduction of unit-pricing in waste management. There is a large theoretical and empirical literature on this, finding that it leads to illegal burning, dumping elsewhere, or reducing the volume through stomping (resulting in fewer bags for which to pay). Data and information are gathered from four municipalities in Spain (three in Catalanonia and one from Mallorca). The findings indicate that free-rider behaviour found in other studies is limited here, arguably due to local social cohesion. In addition, grassroots initiatives help increasing awareness regarding environmental issues among the public. Waste pricing is further judged as effective for "waste degrowth" (reduction of waste) and "deontological justice" ("fairer and more sustainable waste management practices") – the latter being a bit unclear as poor households will pay as well.	Ecological Economics 156, 306–317.
Drews S., Reese G.	2018	Degrowth" vs. other types of growth: Labeling affects emotions but not attitudes	The paper examines whether the term degrowth works well in communication with the wider public. Two tests are undertaken of how degrowth is perceived versus other possible terms. The first study (conducted online, 93 respondents, 28 male and 64 female) finds that "degrowth" elicits more negative affective and emotional reactions than "post-growth" or "prosperity without growth". The second (200 participants, 73 male and 123 female) finds that the effects of labelling on attitudes and voting intentions are relatively small. The authors conclude that these initial results suggest degrowth may evoke somewhat more negative emotional reactions than similar terms but this does not necessarily have significant consequences. They advise against a careless use of the word "degrowth" in public communication.	Environmental Communication 12 (6), 763–772.
Eversberg D., Schmelzer M.	2018	The degrowth spectrum: Convergence and divergence within a diverse and conflictual alliance	This article presents the results of a survey conducted at the 2014 International Degrowth Conference (n = 814, of whom 685 lived in Germany while 2/3 of the sample is female). It contained a series of 29 statements with which participants had to indicate their intensity of (dis)agreement. The statements express some vague ideas, such as "Cities as we know them today will need to be largely dismantled in order to create a post-growth society" (387 agree vs 122 disagree) or "To live more sustainably, we should remember and revive the lifestyles of previous generations" (277 agree vs 263 disagree) but also relevant ones like "A shrinking economy will definitely lead to harsher conflicts about the distribution of wealth in society" (282 agree vs 263 disagree). The results reveal that opinions are quite divided for most statements, with consensus prevailing for only seven statements. In line with this, the authors identify five streams: eco-radical sufficiency-oriented critics of civilisation; moderate immanent reformers; voluntarist-pacifist idealists; modernist rationalist left; and the alternative practical left. These are rather ad hoc terms which do not present a clearly disjunct classification of opinions. It is surprising that the title of the paper does not convey information about it reporting the outcome of a survey.	Environmental Values 27(3), 245–267.

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Authors	Year	Title	Summary and assessment	Source
Xue J.	2015	Sustainable housing development: decoupling or degrowth? A comparative study of Copenhagen and Hangzhou	Studies decoupling between "economic and housing stock growth from negative environmental impacts" for two cities: Hangzhou (China) and Copenhagen (Denmark). Degrowth is seen as reduced size of urbanized area divided by GDP. Results indicate possibly weak decoupling. The logic is unclear of comparing a relatively small capital city (Copenhagen) with 600 thousand inhabitants to a city of more than 10 million people in another continent and political-economic system. If there are so many differences between the two cases, their comparison cannot provide unambiguous insights. While the paper speaks of decoupling and degrowth strategies in relation to housing development, it doesn't make evident that there are, or have been, deliberate strategies in this regard in either city.	Environment and Planning C: Government and Policy 33(3), 620–639.
Ančić B., Domazet M.	2015	Potential for degrowth: Attitudes and behaviours across 18 European countries	Studies environmentally motivated degrowth using the International Social Survey Program (ISSP) module Environment survey data from 2011, containing data for 18 European 'old' and 'new' democracies (13,514 individuals). As degrowth indicators it uses ISSP variables reflecting willingness to make a sacrifice to protect the environment, personal behaviour in line with degrowth principles, and attitudes regarding the trade-off between growth and environment. The insights are not very clear as a brief conclusions section is missing and the authors instead offer very broad and rather cryptic interpretations of the results: "prevalence of common awareness of environmental limits to growth among all participating European national populations, but a different potential to apply them in a degrowth scenario between 'richer' and 'poorer' states, as well as between younger and older European degrowthers". Moreover, the degrowth indicators are debatable: sorting waste for recycling, buying fruit or vegetables without pesticides, and using one's car less (rather than deliberately not opting for a car) are considered indicative of degrowth behaviour. This reflects a very tolerant and broad interpretation of the concept. More generally, one can doubt the usefulness of such general and publicly available data for answering questions about something so peculiar as degrowth.	Teorija in Praksa 52(3), 456–475,
Harasym J., Podeszwa T.	2015	Towards sustainable de-growth - Medical survey data as predictors for estimation of niche market value - Gluten-free beer market case	This study aims to "bridge the gap between company profits and sustainable de-growth". To this end, it examines if there are niche markets with a growth potential. It zooms in on the food industry and suggests the relevance of considering consumer health. It focuses on the potential role of gluten-free beer in the wider beer market, motivated by the "rising occurrence of celiac disease and gluten intolerance". It assumes that "elaboration of gluten-free beer market value calculations can be made on medical report basis". Results indicate that almost 6.5 million of adult people in Europe need a gluten-free diet, translating in a value of the gluten-free beer market in Europe to be 3.3 billion EUR/annual, contributing to 0.1–1% of total beer sales. This is a surprising study about degrowth, defines it as "the parallel way of economic growth putting the primary accents on human wellbeing not on economic growth and better quality of life with stronger social, local and natural relations." This study illustrates that the notion of degrowth inspires unexpected research. Note that the abstract starts with the statement: "Big brewing companies often look for sustainable resource and energy management rather than for minimization of negative social impact or maximization of positive ones. That's why sustainable degrowth in production sounds like nightmare to them." However, if degrowth means more demand for gluten-free beer, as interpreted in this study, big brewers may well supply that demand.	Journal of Cleaner Production 108, 1232–1238.
Kalimeris P., Richardson C., Bithas K.	2014	A meta-analysis investigation of the direction of the energy-GDP causal	Studies the direction of causality between energy use and economic growth at a macrolevel. Undertakes a	Journal of Cleaner Production 67, 1–13.

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Authors	Year	Title	Summary and assessment	Source
		relationship: Implications for the growth-degrowth dialogue	"meta-analysis" of 158 studies in the period 1978–2011, covering a total of 686 country cases. These cases are classified by the authors as satisfying: the growth hypothesis (E → GDP) in 193 cases (28.1%), the conservation hypothesis (GDP → E) in 163 (23.8%), the feedback or bi-directional hypothesis (E ↔ GDP) in 175 (25.5%), and the neutrality hypothesis or no causality in 155 (22.6%). The study then aggregates all these studies using "rough set data analysis" and multinomial logistic regression analysis. The results of this neither support the existence of a fundamental causal direction nor the neutrality hypothesis, which is not surprising given that the distribution of cases comprises a large diversity of empirical findings. While this is study is not specially about degrowth, its findings suggest that reducing or limiting growth will not necessarily translate in similar effects on energy use and associated climate/environmental impacts.	
Canavan B.	2014	Sustainable tourism: development, decline and de-growth. Management issues from the Isle of Man	This paper studies, using mixed-methods, tourism on the Isle of Man, UK. This involved 355 responses to a postal questionnaire (44% response rate) and 32 in-depth personal interviews with residents, managers, employees, tourists, NGO representatives and politicians. The research finds negative environmental and social impacts of tourism decline in a small island. A distinction is made between tangible impact, such as facilities closing, and as less tangible ones, such as a sense of rejection by off-islanders. The author suggests as a solution "urban and rural landscape protection" and "application of the principles of sustainable tourism" in the "context of decline, rather than development". This goes a bit against the findings of the survey which indicate that respondents do not see tourists as bad for the local social and natural environment and strongly prefer more tourists (e.g., the statements "More tourists would be good for the Isle of Man" and "The Isle of Man should become more of a tourist destination" received the highest mean scores). The connection with degrowth as "planned decline" is only discussed in the conclusions, where the author gives a "warning note about the complex reactions to de-growth and its implications", advising: "Thus, it may be too simplistic to assume that de-growth offers advantages over traditional sustainability perspectives …, and rather, caution should be taken about overenthusiastic take-up of the new paradigm."	Journal of Sustainable Tourism 22 (1), 127–147.
D'Alisa G., Cattaneo C.	2013	Household work and energy consumption: A degrowth perspective. Catalonia's case study	This is an "explorative case study of Catalonia", relating the use of time to the "relative consumption of energy". The empirical study is hard to understand, while the results seem not very innovative. It combines data with time origins separated more than 10 years, which casts doubts on the relevance of the analysis. The authors stress "the importance of combining time use studies with energy analysis" but without a clear motivation. Surprisingly, they report time use and energy use in separate sections without ever combining the results (e.g., through integrated indicators, correlation or regression). In other words, the analysis seems incomplete. The paper, moreover, jumps from one topic to another (time use, energy use, household composition, GDP growth, debt crisis) without strong connections and overall structure. It ends by stating, a bit out of the blue, that a degrowth perspective suggests reallocating resources towards the unpaid and the community.	Journal of Cleaner Production 38, 71–79.
Sorman A.H., Giampietro M.	2013	The energetic metabolism of societies and the degrowth paradigm: Analyzing biophysical constraints and realities	This paper studies the implications, the feasibility and the desirability of possible trajectories of degrowth as downscaling from an energetic perspective. The quantitative analysis is through "societal metabolism". It finds that several assumptions and recipes of the degrowth movement are problematic: (i) population is ignored but a relevant variable; (ii) worktime reduction is impractical unless a catastrophe will reset civilization to pre-industrial	Journal of Cleaner Production 38, 80–93.

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Authors	Year	Title	Summary and assessment	Source
			standards; and (iii) voluntary reduction of personal energy consumption will not solve the problems. The paper is not easy to understand as the MuSIASEM approach used is not spelled out and hard to understand for outsiders. On the positive side, it adopts a systemic and macro perspective that allows assessing all kinds of indirect effects on energy and other resource use, which is rare in degrowth studies. It ends with a pessimistic conclusion about degrowth as a solution to environmental problems.	
Borowy I.	2013	Degrowth and public health in Cuba: Lessons from the past?	After the collapse of the Communist Bloc in the 1990s Cuba experienced a severe economic crisis. The author argues that its drastic reduction in fuels, its negative economic growth, and its adaptation to shrinking resources through local, labour-intensive production can be seen as an "experiment in degrowth". The study identifies a commitment to social services, a shift in agricultural methods, and a high level of social capital as key factors. Balancing this positive interpretation with negative aspects, notably the lack of political freedom and of long-term sustainability, the paper draws lessons for planned degrowth. This is again a case of reverse causality error, confusing ex-post decline with ex-ante degrowth (see Section 5.3.3). Interesting, though, that someone dares to connect degrowth with failed communism as many other degrowth studies are merely communism in disguise. The quantitative analysis is superficial, comprising a few descriptive data plots.	Journal of Cleaner Production 38, 17–26.
Infante Amate J., González De Molina M.	2013	'Sustainable de-growth' in agriculture and food: An agro-ecological perspective on Spain's agri-food system (year 2000)	Between production and consumption of food, previously insignificant processes such as transportation, packaging, processing, distribution and preservation have become more important. This article evaluates the energy cost of the Spanish agri-food (AFS) system in the year 2000 with a view to ascertaining the relative importance of each link in the agri-food chain. The results indicate that feeding the Spanish population is an energy-intensive process. Agrarian production is the most important source of this (34% of the primary energy consumed). Additional factors are preservation and preparation of food in the home (18%), transportation (17%) and packaging (10%). A change to organic farming and corresponding altered consumption patterns (i.e., local, seasonal food, less meat consumption) can considerably reduce resource use. The results are well known and not worth the extensive life cycle analysis of the Spanish agricultural and food sector. Why not address a more exciting and innovative question, such as how to get society to move away from current food patterns, notably how to overcome resistance from farmers and meat-lovers. The link with degrowth is a bit far-fetched.	Journal of Cleaner Production 38, 27–35.
Domènech L., March H., Saurí D.	2013	Degrowth initiatives in the urban water sector? A social multi-criteria evaluation of non-conventional water alternatives in Metropolitan Barcelona	This paper examines the compatibility of non-conventional centralised and decentralized water supply technologies (desalination, reclaimed water reuse, greywater reuse and rainwater harvesting) with degrowth principles. Taking as a case study the Metropolitan Area of Barcelona (Spain), the study explores the pros and cons of the different water alternatives in two different (and hypothetic) societies: one based on growth (business-as-usual) and one based on degrowth. The authors undertake social multi-criteria evaluation (SMCE) to shed light on the social desirability, acceptability and feasibility of implementing non-conventional water supply systems. They suggest this method can also unveil which social actors may favour or block the adoption of each alternative. The results indicate that rainwater harvesting and reclaimed water reuse are the most preferred alternatives from a degrowth perspective while reclaimed water reuse and desalination are the most preferred alternatives from a growth perspective. The authors admit that the method SMCE relies heavily on experts and involves little	Journal of Cleaner Production 38, 44–55.

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Authors	Year	Title	Summary and assessment	Source
			participation of citizens, going against degrowth principles. They end by advising to decrease "the consumption and/or withdrawal of water in the benefit of the environment. It must bring about a fairer and more equal access to water resources as well". To increase feasibility, they recommend that city council managers and environmental groups promote rainwater harvesting.	
Cattaneo C., Gavaldà M.	2010	The experience of urban squats in Collserola, Barcelona: what kind of degrowth?	Studies "rural-urban (rurban) squatting" in the Barcelona hills of Collserola, focusing on two houses, namely Kan Pasqual and Can Masdeu. This involves an assessment of energy and time use, resulting in a rather superficial analysis (i.e. one table with results for both houses). The result is interpreted as suggesting that it is possible to live well with little energy. Seems a bit naïve as a view on solving society's environmental problems since squatting is a kind of "parasitic" activity that requires buildings to be constructed in the first place. Indeed, a systems perspective is missing here as one cannot imagine all society to be squatting. The paper defines degrowth as "collectively consented choice of life, not an externally-imposed imperative" and says "degrowth should not be the primer social objective but the outcome of a general transition towards a more democratic and autonomous social and political organisation."	Journal of Cleaner Production 18(6), 581–589.

Table A4
Qualitative analyses (in chronological order).

Authors	Year	Title	Summary and assessment	Source
Colombo L.A., Bailey A.R., Gomes M.V.P.	2023	Scaling in a post-growth era: learning from social agricultural cooperatives	Studies up-scaling in the context of "post-growth organisations", focusing on three Italian Social Agricultural Cooperatives (SACs) – with 260, 30 and 5 (sub-coop) members. It includes a long discussion on scaling, identifying nine different scaling routes: organizational growth (vertical and horizontal); organizational downscaling, impact on policies; multiplication; impact on organizational culture; impact on societal culture; aggregation; and diffusion. Not all of these are clear. It then argues, supported by interviews with 41 individuals of the three SACs, that post-growth scaling requires synergistic interaction of these strategies rather than "organizational growth". There is no sharp separation made between the outcome of the interviews and the hopes of the authors. One wonders why only three cooperatives were studied given that the article notes that Italy had 430 of such SACs in 2017. It promotes an idealistic approach: "Life after capitalism requires post-growth – and the idea of living within a 'safe and just space' can only be enabled by a more holistic system approach."	Organisation,
Kallis G., Varvarousis A., Petridis P.	2022	Southern thought, islandness and real-existing degrowth in the Mediterranean	The starting point for this study is that "The cultural geography of small islands provides fertile context for degrowth." Focusing on Ikaria and Gavdos, two remote islands in the Greek archipelago, the authors suggest that cases of "real-existing degrowth develop" in relation to 'islandness' – a physical and cultural condition specific to small islands." Of course, the question is how representative such islands are for most of the modern world. It is also unclear why these particular islands were chosen, because their populations sizes are very different (Ikaria around 8000 and Gavdos around 200), which complicates their comparability. Four graphs show energy use and supply over time – but it seems a very incomplete way to capture degrowth. The curves show stability – which is logical given a small island with limited resources and income – instead of a degrowth (decline) type of pattern. All in all, the applied study does not meet the high ambitions suggested by its rich language: "Geography, historical contingency, and processes of myth-making combine to re-valorise what otherwise would be seen as "undeveloped" places, thereby generating space for real-existing degrowth."	World Development 157, 105,957.

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Authors	Year	Title	Summary and assessment	Source
Rooney A., Vallianatos H.	2022	Evidence of Degrowth Values in Food Justice in a Northern Canadian Municipality	A case study applying a "holistic model of degrowth" in a small-scale context, embedded within larger capitalist economies, to examine degrowth opportunities and constraints. To this end, ten interviews were undertaken with leaders of organisations in the greater region of Edmonton (Canada) whose programmes address local food issues, including food procurement by and for marginalised communities, sustainable growing, and local food distribution. The results reveal opportunities and challenges for local food, by altering local food supplies, reducing food waste and decreasing consumption. It further identifies the role of social relationships in "food justice work". The small number of interviews is motivated by researcher time constraints, interviewee availability during the busy summer months, and a small defined study population (36 relevant organisations were identified).	Environmental Values 31 (3), 323–342.
Windegger F., Spash C.L.	2022	Reconceptualising freedom in the 21st century: neoliberalism vs. degrowth	This study combines a philosophical discussion of freedom with a questionnaire at the 2018 Degrowth Conference in Malmö, Sweden. The findings of the study are based on 149 unrepresentative respondents (76% younger than 34 years, 51% Germans). One can argue about whether doing a questionnaire at a single conference guarantees a good sample or is a good research method in general. In addition, the respondents were not asked about their expertise but about their personal opinions – for this better serve general and representative public opinion surveys. Unfortunately, the paper presents unreadable tables with all the detailed answers (raw data), instead of statistically aggregating and processing these into easily readable output as is customary in academic publications. Anyway, the conclusions of the study are that "the prevalent understanding of freedom among those who participated in the 2018 Degrowth Conference is largely in line with the theory based on Castoriadis' notion of autonomy. Neoliberal positions and arguments were firmly rejected by the majority of respondents." The first result is probably too esoteric for most minds, while the second is not really a surprising opinion within the degrowth community. The authors advice that the degrowth community elaborates its "vision of freedom compatible with a future degrowth society in order to avoid potential co-option and becoming sub-hegemonic".	New Political Economy 28 (4), 554–573.
Ruiz-Alejos C., Prats V.	2021	In quest of implementing degrowth in local urban planning policies	This paper examines how a strong sustainability concept such as degrowth can be integrated in planning practice. It zooms in on the Swedish municipality of Södertälje, a city of about 100,000 inhabitants in the Stockholm region. The motivation is that "The authors had previously been working with this municipality, which eased the analysis." They summarise degrowth in four values: (1) Seeking pleasure and meaning outside the work-and-spend cycle, a slower pace of life and less working hours, (2) Nurturing the commons, (3) A drastic reduction in land and material consumption, and a circular economy, and (4) A relocalisation of production close to consumption. They speculate that for urban planning in Södertälje this might mean: more citizen initiatives in planning, less space for commuting and cars, agricultural and industrial production closer to the city, and reuse of existing buildings instead of tearing them down. The study involves six interviews with municipal urban planners. It is found that integrating a degrowth approach in planning practice means that urban planning needs to be subordinated to overarching social and environmental goals, implying a completely different way of planning. There is little attention for realism and political support of the proposed radical changes.	Local Environment 27(4), 423–439.
Mete S.	2022	Towards degrowth housing development? Lessons from a scenario-based gaming session in the Oslo region	A gaming session with 10 experts in the field of housing and planning in the Oslo region is used to study factors hindering or facilitating a degrowth scenario for housing: namely, reducing housing space per capita from currently 50.5 to 44.2 m^2. The gaming used "causal layered analysis" for "roleplay with allies and enemies", with as layers: litany, systemic causes, worldviews and metaphors. The participants had to fill in a so-called PESTEC table with political, economic, social, technological, ecological-planning and cultural enabling and blocking conditions. The results, which also included transcriptions of a video recording of the game and subsequent conversations, are analysed using "morphogenetic theory, theory of political economy of environmental sustainability and critical urban theory". The conclusions are a bit tautological	Local Environment 27(4), 517–536.

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Authors	Year	Title	Summary and assessment	Source
			("the current growth-based housing development represents the main structural blocking condition to realizing degrowth scenario") without providing for a realistic path towards such a goal.	
Cucca R., Friesenecker M.	2022	Potential and limitations of innovative housing solutions in planning for degrowth: the case of Vienna	Studies the "implications, in terms of socio-spatial inequalities, of innovative housing solutions oriented to a degrowth agenda". Aims to answer the following questions: what are the socio-spatial implications of the most common innovative housing solutions that can best fulfil the degrowth principles/vision? And how is it possible to ensure socio-spatial justice in housing projects inspired by a degrowth narrative? Based on two cases of housing innovation in Vienna it is argued that "many innovative housing projects … show high level of elitism reproducing socio-spatial inequalities." It is suggested that local authorities can play a central role in up-scaling these housing innovations to ensure more inclusiveness. No attention is given to political feasibility. The study relies on just two cases – a broader basis would have allowed drawing more general insights.	Local Environment 27(4), 502–516.
Hankammer S., Kleer R., Mühl L., Euler J.	2021	Principles for organisations striving for sustainable degrowth: Framework development and application to four B Corps	Since business activity is a key driving force behind economic growth, the role of corporate organisations in a transition towards a post-growth society is examined. The study focuses on guiding principles for organisations approaching degrowth, using a two-step approach. First, based on a systematic literature review, it derives principles for a conceptual framework. Second, the framework is applied to four organisations certified as B Corps (a private certification of for-profit companies of their social and environmental performance) based on company data and interviews. The findings indicate that B Corps companies implement some degrowth-approaching principles in their organisation, but that tensions with a growth-orientation remain. The method is a bit unclear in terms of selection of the companies and distinct approaches to interviews between the companies (e.g., 3 CEO vs a manager group for a fourth company). It is also unclear why mainly CEOs were interviewed instead of aiming for a broader opinion and expert basis.	Journal of Cleaner Production 300, 126,818.
O'Manique C., Rowe J.K., Shaw K.	2021	Degrowth, political acceptability and the Green New Deal	The motivation of this study is that the degrowth movement has struggled to gain political acceptability. To understand this limited uptake of degrowth discourse in the English-speaking world 14 Canadian environmental activists are interviewed. The main conclusions is "There is a general consensus among interview participants that the degrowth movement has had minimal influence, not only on policy and institutions in Canada, but on environmental organising." According to the authors, the results indicate that "class interests" – particularly "those of fossil fuel companies" – are a substantial barrier to realizing degrowth goals. They suggest that "class-conscious environmentalism, anti-purity politics, and decolonization" can overcome these class interests. The paper ends with unpacking the Green New Deal and its "just transition" as "a promising non-reformist reform" because it "does not currently address critical questions of growth, an omission that some in the degrowth community have warned leaves open the possibility for the ever-expanding production of 'green products' facilitated by the state rather than by private industry." The selected interviewees seem all in favour of degrowth, which indicates a narrow basis of opinions: "Many respondents spoke of the difficulties they experience in trying to advance a degrowth perspective". Given the research question, it is strange that the scope was not broader, including politicians, policy makers, journalists, etc. The language in the paper breathes righteousness, as if there are no doubts about degrowth being the way forward.	Journal of Human Rights and the Environment 12 (2), 254–276.
Muler González V., Galí Espelt N.	2021	How do degrowth values in tourism influence the host-guest exchange? An exploratory analysis in small towns in the rurality	Exploratory research based on a case study in the small town of Besalú in Spain, located between Barcelona and Costa Brava. The town has experienced an increase in visitors and more recently in apartment rentals. It was therefore considered suitable by the authors "to explore the emergence of degrowth values and the role they play in residents' understanding of their exchanges with tourists". Interviews with 12 residents (8 females, 4 males) were undertaken. The results show that degrowth values such as conviviality express themselves by providing tourists with a bathroom, while environmental preservation comes out as less significant. The authors expect "degrowth will grow in the face of new environmental and	Journal of Tourism and Cultural Change 19(6), 884–903.

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Authors	Year	Title	Summary and assessment	Source
			social challenges". This is a rather uncritical study with a sample that is far too small and unbalanced to draw firm conclusions. One wonders why no interviews were undertaken with other stakeholders, notably tourists.	
Tsagkari M., Roca J., Kallis G.	2021	From local island energy to degrowth? Exploring democracy, self-sufficiency, and renewable energy production in Greece and Spain	Two small islands in distinct countries are selected for comparison: El Hierro in the Atlantic Ocean (part of the Canary Islands), with a population size of 10,162, and Tilos in the Aegean sea with a population of 780 people. The motivation is that these have "pioneer local energy initiatives" with "a complex ownership model that includes various public and private actors, and aspirations that go beyond merely electricity production to other economic and social goals." They are thus suggested to be on a degrowth path. Based on 25 interviews (with municipality representatives, technical staff, research partners, private companies and representatives of environmental organisations and business owners) and descriptive graphs of energy use and qualitative analysis, it is concluded, however, that "despite the degrowth potential of these local energy projects, their prospects are limited to revitalizing local economies and empowering local communities, but not necessarily reducing energy use or creating an alternative to the growth orientation of the islands." While the text contains a lot of ambitious concepts and terms, the analysis is meagre: it describes electricity consumption per capita over two very different period: 2015 to 2019 for El Hierro and 2002–2019 for Tilos, and somewhat confusingly a third graph with a "Profile of monthly energy consumption in Tilos" for the period 2016–2018 is provided which seems to overlap with the other graph for this island. It is unclear how one can derive relevant insights for degrowth from this. The graphs show no clear trend but merely seasonal fluctuations due to tourists coming and residents leaving. Unclear also why two islands with very different population sizes in distinct countries were selected – comparison does not make much sense. Why not include more islands to achieve diversity and statistical significance (enough islands in the world, or even in Greece, to choose from).	Energy Research and Social Science 81, 102,288.
Brossmann J., Islar M.	2020	Living degrowth? Investigating degrowth practices through performative methods	Drawing upon practice theory and using performative methods, this paper explores the ways in which "degrowth scholars" and practitioners experience and understand degrowth. It provides a preliminary account of living degrowth by portraying a diverse range of interrelated practices grouped in five spheres: (1) rethinking society, (2) acting political, (3) creating alternatives, (4) fostering connections, and (5) unveiling the self. Drawing upon the spheres of practices, it conceptualizes "living degrowth" as an endeavour that aims to transform current problems into imagined futures in multiple realms. The data is audio-, video- and photo-equipment and participants' notes from a performative theatre workshop. The paper presents only one concrete output, namely a rather silly photo (with the even sillier title "A statue from the theatre workshop representing the struggle with "internalized structures""). Difficult to learn anything relevant from this for solving urgent problems in reality.	Sustainability Science 15 (3), 917–930.
Robra B., Heikkurinen P., Nesterova I.	2020	Commons-based peer production for degrowth? - The case for eco-sufficiency in economic organisations	Operationalises eco-sufficiency, i.e. producing and consuming enough, as an indicator for degrowth. It then considers how eco-sufficiency orientations manifest themselves in a commons-based peer production organisation. This was done through seven interviews with board members, founders and directors of WindEmpowerment, a "renewable energy commons-based peer production organisation". This focused on the contrast between eco-sufficiency and eco-efficiency. The finding is that manifestation of sufficiency is marginal. It is unclear why on would ask providers of renewable wind turbines to focus on sufficiency? Moreover, why study only one organisation – any findings have little generality then.	Sustainable Futures 2, 100,035.
Çakar K., Uzut I.	2020	Exploring the stakeholder's role in sustainable degrowth within the context of tourist destination governance: the case of Istanbul, Turkey	Studies the role of tourism stakeholders in "sustainable degrowth of tourism, within the context of overtourism and destination governance". Data was gathered from document analysis and 15 face-to-face interviews with key tourism stakeholders in Istanbul Turkey (about 15 million residents and visitors in 2019). The results are indefinite, not clearly saying that the number of tourists or visits should decrease but keeping it rather vague. Instead, the authors focus on normative issues like "tourism establishments and travel agencies must adopt an environmentally friendly certification scheme to reduce the	Journal of Travel and Tourism Marketing 37, 917–932.

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Authors	Year	Title	Summary and assessment	Source
			negative impacts of tourism on the environment". In addition, the conclusions mix concepts in an unusual way (e.g., "Alternative types of tourism need to be promoted and developed, such as community-based tourism, while fostering a steady-state economy" and suggest issues which have no clear degrowth connection:" … "gastronomy and health tourism").	
Domazet M., Ančić B.	2019	Complementarity between the EJ movement and degrowth on the European semiperiphery: An empirical study	Presents the findings of empirical research concerning the pitfalls and possibilities of an alliance between degrowth and environmental justice (EJ) movements as understood by prominent Croatian EJ movement leaders. To this end 8 interviews were undertaken. The findings are said to indicate a limited but positive potential for degrowth to "provide a theoretical framework for the semiperipheral EJ movement". In the words of the authors, both the EJ movement and degrowth are said to "share a materialist motivation", but not for reasons of under-development of semiperipheral societies. Semiperipheral EJ activists are open to a politico-metabolic reconfiguration proposal, though they are presently not aware that a viable reconfiguration strategy is offered by the degrowth research community. On the European semiperiphery, an alliance between theory and movement would benefit from a clearer explication of such a strategy. EJ activists see degrowth as a theoretical concept, not as existing movement. All in all, this seems a far-fetched topic with a weak empirical basis. Because of considerable cryptic and abstract terminology the paper is not easy to understand.	Ecological Economics 157, 120–128.
Buhr K., Isaksson K., Hagbert P.	2018	Local interpretations of degrowth-actors, arenas and attempts to influence policy	A case study of degrowth potential in the small town of Alingsås, Sweden. It undertakes 10 interviews with a total of 11 respondents (two respondents were present in one of the interviews). The results revealed two different, yet interrelated, local growth discourses in Alingsås: one relating to population growth and one relating to economic growth. Degrowth-related ideas have not had any significant overall impact on local policy and planning. People tend not to connect "the global problem of growth" with "municipal growth". In practice, degrowth-interested individuals tend to adjust their arguments to the mainstream sustainability discourse and turn to arenas beyond the formal municipal organisation when discussing transformative ideas about development, progress, and quality of life. First the authors selected five "civil servants working for Alingsås municipality with key positions in either local planning and development or sustainable development". These interviewees were asked to identify individuals who are influential in discussing degrowth locally, resulting in three workers for municipal companies and two of civil society. This reflects a procedure that, through personal contacts and resulting similarity of ideas, can lead to biased outcomes. The paper does not motivate the relevance of studying this particular town.	Sustainability (Switzerland) 10(6), 1899.
Schmid B.	2018	Structured diversity: A practice theory approach to post-growth organisations	The paper argues that "innovative forms of organising are a crucial pillar of post-growth transitions", using the term "post-growth organisations" (PGOs). It develops a "more fluid notion which is based on the 'thick description' of organisations." The first half of the paper is a long discussion with very abstract and pretentious language that feels empty. To illustrate, here is a random text part: "practice theories' flat ontology is integrated with a structured notion of diversity as inspired by perspectives on systems, institutional orders and worlds. Nicolini proposes the metaphor of zooming to capture the analytical movement across non-hierarchical scale". The second part of the paper studies "alternative economies in Stuttgart", without motivating the choice of city. Potential PGOs are identified through "snowballing". That snowballing through existing contacts can create biases was implicitly recognized but was deemed "useful in the present study" without providing any arguments. Interviews were conducted with founders or local representatives of 14 organisations. Although the paper refers to PGOs in the case study, this seems to conflict with the statement in the first part of the paper that "situated within a growth-based institutional context, actually existing forms of postgrowth organising are ambiguous." No information is offered about why the specific organisations were selected (selection criteria are not made explicit) or whether they together are representative of the wider economy. From the brief descriptions one can derive that various offer repair services of some kind or "promote" food waste avoidance,	Management Revue 29(3), 281–310.

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Authors	Year	Title	Summary and assessment	Source
			circular economy or open-source hardware and software. It is suggested that "several of the organisations' practices break with growth-based institutions. Open-sourcing, communing, providing low-threshold access, cross-subsidising, and various non-commodified practices transcend capitalist markets." However, these are hardly activities that will fundamentally change the economy. The authors seem to recognize this in concluding cryptically that "This paper does not provide a simple answer to the question of distinguishing PGOs from other organisations."	
Wiefek J., Heinitz K.	2018	Common good-oriented companies: Exploring corporate values, characteristics and practices that could support a development towards degrowth	Conducts interviews with 11 companies which have joined the Economy for the Common Good, a social movement which identifies the common good as the purpose of economic activity. The results indicate that in the companies studied values change in line with Latouche's transformation towards degrowth through eight 'R's: re-evaluate, reconceptualize, restructure, redistribute, relocalize, reduce, re-use and recycle. The companies' management is guided by values like fairness, cooperation, diversity, independence, democracy, transparency, and ecological sustainability. This is exemplified by democratic ownership and decision-making structures, cooperative trade relations, a preference for local suppliers and the redistribution of surpluses. Furthermore, for these companies, profits are of reduced significance as an indicator of success. It is stated that "some companies in our sample do still consider further company growth to be necessary" and "Non-growing companies are a prerequisite for a reduction in macroeconomic growth". This may confuse the company with the system perspective and overlooks changes needed during a transition. Company selection was done through"generic purposive sampling", meaning subjective sampling where the researcher relies on own judgment when creating the sample. The company sizes range from 1 to 500 employees. Although it is not clear that the diversity of the sample is representative of the wider economy, the authors conclude optimistically "[companies] from our sample … bear the potential to support a societal transition towards degrowth."	Management Revue 29(3), 311–331.
Pansera M., Owen R.	2018	Innovation for de-growth: A case study of counter-hegemonic practices from Kerala, India	This is a rare study of degrowth in a low-income region. Alternative, minority framings with different normative underpinnings for technology and innovation that challenge the pro-growth and market-led dominant paradigm are identified. A case study is conducted in the Indian state of Kerala, arguably because of the Kerala Science Literature Movement (KSSP), where the People's Science Movements (PSMs) aimed at emancipating Indian people through popularization of scientific thinking. KSSP has according to the authors contributed to high literacy rates and low rates of infant mortality in Kerala. Data come from 9 interviews with so-called "PSM activists" who "oppose the top-down technological modernization and growth agenda". In addition, the study makes use of non-participant observation, dissemination material, case studies, photos and videos. The results are abstract and hard to understand: "The story of the KSSP, we think, provides interesting insights for the degrowth community … First it shows a concrete example of an alternative framing of technology as the outcome of a set of linked, normative principles which include and accommodate those intimately connected to those of degrowth … Second, the KSSP case shows that alternative technological paradigms based on principles aligned with those of degrowth are not only possible but can and do co-exist with the hegemonic paradigm.". Degrowth is interpreted in a very specific way, namely as a focus on low-tech technologies.	Journal of Cleaner Production 197, 1872–1883.
McGuirk E.	2017	Timebanking in New Zealand as a prefigurative strategy within a wider degrowth movement	The author, a co-founder of the Dunedin Timebank, argues that a movement is gaining traction in New Zealand around timebanks, networks of support in which members exchange favours such as gardening, lifts to the supermarket, pet care, language lessons, career advice, or smartphone tutorials. A total of 27 timebanks exists covering a total of 4054 people. Each uses an online currency to track exchanges, with one hour of work earning one-time credit. It is hypothesised that such timebanking can reshape motivations and opportunities for engaging in labour, and relocalise networks of solidarity, friendship, and resources. To study this, ethnographic research among seven North Island timebanks is undertaken which involved 20 interviews with "timebank developers".	Journal of Political Ecology 24(1), 595–609.

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Table A4 (*continued*)

Authors	Year	Title	Summary and assessment	Source
			Participants reported examples of developing unexpected friendships and renewed enthusiasm for a larger collective project of building alternatives to the currently dominant growth-addicted economic model. They suggest processes contribute to the establishment of small-scale networks and offer potential to be scaled up or linked. The connection with degrowth is indirect: "While I have not heard the term 'degrowth' used in New Zealand in connection with timebanking, I perceive that the timebanks … share in the broad visions and philosophy advanced by other actors and movements who/that are using the term." A clear and informative paper. One challenge posed by local currencies and timebanks getting (hypothetically) large is that the informal economy would increase its share in the overall economy, resulting in lower tax revenues and thus less budget for public goods (health care, education, public transport and social welfare).	
DeVore J.	2017	Trees and springs as social property: A perspective on degrowth and redistributive democracy from a Brazilian squatter community	Drawing from several years of ethnographic research with rural squatters in the cacao lands of Bahia (Brazil), the author brings together alternative ways of conceptualizing property. The article examines local practices of property-making through two cases focused on the private ownership and stewardship of natural springs, and the processes whereby squatters convert forest into agroforest. The analysis highlights the ways in which these private properties are intersected by public interests and collective practices, while considering the different kinds of relations that these intersections afford among people and between humans and the non-human environment. Based on these cases, the author suggests that current conversations about degrowth may benefit by drawing together frameworks from political ecology, economic anthropology, and property jurisprudence. The presentation concludes by highlighting potential synergies between concerns for degrowth and claims for property democratization. No information is provided about data collection. The relevance and representativeness of the study are questionable. Furthermore, when studying private vs collective property as in this study a biased answer seems implicit in the case selection of squatting activity.	Journal of Political Ecology 24(1), 644–666.
Hayden A.	2015	Bhutan: blazing a trail to a postgrowth future? Or stepping on the treadmill of production?	Bhutan is a rare case of a state with a development objective, Gross National Happiness (GNH), that emerged from a critical perspective on economic (or GDP) growth. However, Bhutan is not immune from pressures to value economic growth positively. It thus represents a valuable case to examine the possibilities and challenges facing a "politics of sufficiency". In addition to providing an overview of the GNH development approach, the article examines how ideas of sufficiency have been incorporated into this approach. The study draws on interviews, document analysis, and participant observation in GNH-related events. Interviews were conducted with nine individuals—Bhutanese officials (in government and civil society) and foreign advisors – who were selected for their knowledge of, and their role in, the development and promotion of the idea of GNH and the related "New Development Paradigm". The study further analysed documents from Bhutan's government, GNH Commission, New Development Paradigm Secretariat, and political parties. The results indicate that both a sufficiency-based critique of consumerism and pleas for endless growth remain present, i.e. a "weak" rather than a "strong GNH" applies. This is rare study of a lower-middle-income country.	Journal of Environment and Development 24(2), 161–186.
Nierling L.	2012	"This is a bit of the good life": Recognition of unpaid work from the perspective of degrowth	The author states that "decommodification of work activity is central for conceiving work from a degrowth perspective". Yet personal dependence on paid work is very high, whereas unpaid work activity, such as providing care, community service and subsistence, continues to be neglected by individuals and society. The study undertakes ten interviews with people performing unpaid work. All interviewees were associated with a non-profit organisation in a large German town that has existed for 20 years. This centre offers people an infrastructure and setting to work without pay so as to create products for their own use through handicrafts. It is unclear how representative this is of modern society, and why individuals from only one organisation were interviewed. No information is given about the type of interviewees or the specific centre (which is referred to as "Centre for Creativity"). Findings are reported in a rather short section with few	Ecological Economics 84, 240–246.

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Table A4 (*continued*)

Authors	Year	Title	Summary and assessment	Source
			statements from the interviews. It is claimed that unpaid work can play a significant role in one's personal wellbeing at the individual level. This leads to the advice that "Measures to guarantee that the basic needs of the unemployed or of those working under precarious working conditions are covered, i.e. through social welfare or basic income, are of special importance … establish societal structures which ensure the subsistence of marginalised persons in order to allow them to explore the features of unpaid work, at both personal and societal levels. With regard to the transition process towards a society of degrowth, however, a key seems to be a change in the normative paradigm concerning work at the individual level." This is very abstract and general language. It also seems an over-generalization of findings from one specific centre. It would have been more informative to undertake interviews with a greater variety of people, including people who work fulltime and parttime, and show distinct contributions to unpaid voluntary work.	

References

Akizu-Gardoki, O., Kunze, C., Coxeter, A., Bueno, G., Wiedmann, T., Lopez-Guede, J.M., 2020. Discovery of a possible wellbeing turning point within energy footprint accounts which may support the degrowth theory. Energy Sustain. Dev. 59, 22–32.

Ambrosino, P., Moretta, P., Lanzillo, A., Formisano, R., Maniscalco, M., 2022. Implementing translational research to understand the future of COVID-19 and its long-term consequences: a degrowth perspective or the transformation of a global emergency? Biomedicines 11 (1), 117.

Ančić, B., Domazet, M., 2015. Potential for degrowth: attitudes and behaviours across 18 European countries. Teorija in Praksa 52 (3), 456–475.

Andreoni, V., Galmarini, S., 2014. How to increase wellbeing in a context of degrowth. Futures 55, 78–89.

Ángeles Oviedo-García, M., 2021. Journal citation reports and the definition of a predatory journal: the case of the Multidisciplinary Digital Publishing Institute (MDPI). Research Evaluation 30 (3), 405–419.

Avery, R.A.T., Butera, F., 2022. Minority influence and degrowth-oriented pro-environmental conflict: when emotions betray our attachment to the social dominant paradigm. Front. Psychol. 13, 899933.

Bilancini, E., D'Alessandro, S., 2012. Long-run welfare under externalities in consumption, leisure, and production: a case for happy degrowth vs. unhappy growth. Ecol. Econ. 84, 194–205.

Blei, D.M., 2012. Probabilistic topic models. Commun. ACM 55 (4), 77–84.

Bobulescu, R., 2021. Wake up, managers, times have changed! A plea for degrowth pedagogy in business schools. Policy Futures in Education 20 (2), 188–200.

Bodirsky, B.L., Chen, D.M.-C., Weindl, I., Soergel, B., Beier, F., Molina Bacca, E.J., Gaupp, F., Popp, A., Lotze-Campen, H., 2022. Integrating degrowth and efficiency perspectives enables an emission-neutral food system by 2100. Nature Food 3 (5), 341–348.

Borowy, I., 2013. Degrowth and public health in Cuba: lessons from the past? J. Clean. Prod. 38, 17–26.

Bouma, J.A., Verbraak, M., Dietz, F., Brouwer, R., 2018. Policy mix: mess or merit? J. Environ. Econ. Policy 8 (1), 1–16.

Brossmann, J., Islar, M., 2020. Living degrowth? Investigating degrowth practices through performative methods. Sustain. Sci. 15 (3), 917–930.

Büchs, M., Koch, M., 2019. Challenges for the degrowth transition: the debate about wellbeing. Futures 105, 155–165.

Buhr, K., Isaksson, K., Hagbert, P., 2018. Local interpretations of degrowth-actors, arenas and attempts to influence policy. Sustainability 10, 1899.

Çakar, K., Uzut, I., 2020. Exploring the stakeholder's role in sustainable degrowth within the context of tourist destination governance: the case of Istanbul, Turkey. J. Travel Tour. Mark. 37, 917–932.

Canavan, B., 2014. Sustainable tourism: development, decline and de-growth. Management issues from the Isle of Man. J. Sustain. Tour. 22 (1), 127–147.

Carson, D.B., Carson, D.A., Lundmark, L., Hurtig, A.-K., 2022. Resource deserts, village hierarchies and de-growth in sparsely populated areas: the case of Southern Lapland, Sweden. Fennia 200 (2), 210–227.

Cattaneo, C., Gavaldà, M., 2010. The experience of urban squats in Collserola, Barcelona: what kind of degrowth? J. Clean. Prod. 18 (6), 581–589.

Colombo, L.A., Bailey, A.R., Gomes, M.V.P., 2023. Scaling in a post-growth era: learning from social agricultural cooperatives. Organization. https://doi.org/10.1177/13505084221147480.

Cosme, I., Santos, R., O'Neill, D.W., 2017. Assessing the degrowth discourse: a review and analysis of academic degrowth policy proposals. J. Clean. Prod. 149, 321e334.

Creutzburg, L., 2022. Growing trees for a degrowth society: an approach to Switzerland's Forest sector. Environ. Values 31 (6), 721–750.

Cucca, R., Friesenecker, M., 2022. Potential and limitations of innovative housing solutions in planning for degrowth: the case of Vienna. Local Environ. 27 (4), 502–516.

D'Alessandro, S., Cieplinski, A., Distefano, T., Ditmer, K., 2020. Feasible alternatives to green growth. Nature Sustainability 3, 329–335.

D'Alisa, G., Cattaneo, C., 2013. Household work and energy consumption: a degrowth perspective. Catalonia's case study. J. Clean. Prod. 38, 71–79.

Dartnell, L.R., Kish, K., 2021. Do responses to the COVID-19 pandemic anticipate a long-lasting shift towards peer-to-peer production or degrowth? Sustain. Prod. Consumption 27, 2165–2177.

De Castro Mazarro, A., George, Kaliaden R., Wende, W., Egermann, M., 2023. Beyond urban ecomodernism: how can degrowth-aligned spatial practices enhance urban sustainability transformations. Urban Stud. 60 (7), 1304–1315.

DeVore, J., 2017. Trees and springs as social property: a perspective on degrowth and redistributive democracy from a Brazilian squatter community. J. Polit. Ecol. 24 (1), 644–666.

Domazet, M., Ančić, B., 2019. Complementarity between the EJ movement and degrowth on the European semiperiphery: an empirical study. Ecol. Econ. 157, 120–128.

Domènech, L., March, H., Saurí¬ D., 2013. Degrowth initiatives in the urban water sector? A social multi-criteria evaluation of non-conventional water alternatives in metropolitan Barcelona. J. Clean. Prod. 38, 44–55.

Douthwaite, R., 2012. Degrowth and the supply of money in an energy-scarce world. Ecol. Econ. 84 (C), 187–193.

Drews, S., Reese, G., 2018. "Degrowth" vs. other types of growth: labeling affects emotions but not attitudes. Environ. Commun. 12 (6), 763–772.

Drews, S., van den Bergh, J.C.J.M., 2016a. What explains public support for climate policies? A review of empirical studies. Clim. Pol. 16 (7), 855–876.

Drews, S., van den Bergh, J.C.J.M., 2016b. Public views on economic growth, the environment and prosperity: results of a questionnaire survey. Glob. Environ. Chang. 39, 1–14.

Drews, S., van den Bergh, J., 2017. Scientists' views on economic growth versus the environment: a questionnaire survey among economists and non-economists. Glob. Environ. Chang. 46, 88–103.

Drews, S., Savin, I., van den Bergh, J., 2019. Opinion clusters in academic and public debates on growth-vs-environment. Ecol. Econ. 157, 141–155.

Drews, S., Savin, I., van den Bergh, J., Villamayor, S., 2022. Climate concern and policy acceptance before and after COVID-19. Ecol. Econ. 199, 107507.

Đula, I., Videira, N., Größler, A., 2021. Degrowth dynamics: modelling policy proposals with system dynamics. J. Simulation 1–37.

Ecker, U.K., Butler, L.H., Cook, J., Hurlstone, M.J., Kurz, T., Lewandowsky, S., 2020. Using the COVID-19 economic crisis to frame climate change as a secondary issue reduces mitigation support. J. Environ. Psychol. 70, 101464.

Espinoza, V.S., Fontalvo, J., Martí-Herrero, J., Miguel, L.J., Mediavilla, M., 2022. Analysis of energy future pathways for Ecuador facing the prospects of oil availability using a system dynamics model. Is degrowth inevitable? Energy 259 (124963).

Eversberg, D., Schmelzer, M., 2018. The degrowth spectrum: convergence and divergence within a diverse and conflictual alliance. Environ. Values 27 (3), 245–267.

Ewald, J., Sterner, T., Sterner, E., 2022. Understanding the resistance to carbon taxes: drivers and barriers among the general public and fuel-tax protesters. Resour. Energy Econ. 70, 101331.

Fearon, S., Barry, J., 2022. Beyond growth and partition: post-growth and ecological perspectives on the political economy of Irish reunification. Ir. Stud. Int. Aff. 33 (2), 373–405.

Fitzpatrick, N., Parrique, T., Cosme, I., 2022. Exploring degrowth policy proposals: a systematic mapping with thematic synthesis. J. Clean. Prod. 365, 132764.

Flexner, J.L., 2020. Degrowth and a sustainable future for archaeology. Archaeological Dialogues 27, 159–171.

Fontanari, M., Traskevich, A., Seraphin, H., 2021. (De)growth imperative: The importance of destination resilience in the context of overtourism. In: Andriotis, K. (Ed.), Issues and Cases of Degrowth in Tourism. CABI, Wallingford, UK, pp. 22–41.
Gerber, J.-F., Raina, R.S., 2018. Post-growth in the global south? Some reflections from India and Bhutan. Ecol. Econ. 150, 353–358.
Germain, M., 2017. Optimal versus sustainable degrowth policies. Ecol. Econ. 136, 266–281.
Haller, A., 2020. From classical and neoclassical economic growth to degrowth in Europe. Challenges for public administration. Administratie si Management Public 34, 150–170.
Hankammer, S., Kleer, R., Mühl, L., Euler, J., 2021. Principles for organizations striving for sustainable degrowth: framework development and application to four B corps. J. Clean. Prod. 300, 126818.
Harasym, J., Podeszwa, T., 2015. Towards sustainable de-growth - medical survey data as predictors for estimation of niche market value - gluten-free beer market case. J. Clean. Prod. 108, 1232–1238.
Hardt, L., Barrett, J., Taylor, P.G., Foxon, T.J., 2020. Structural change for a post-growth economy: investigating the relationship between embodied energy intensity and labour productivity. Sustainability 12 (3), 962.
Hayden, A., 2015. Bhutan: blazing a trail to a postgrowth future? Or stepping on the treadmill of production? J. Environ. Dev. 24 (2), 161–186.
Heikkinen, T., 2015. (De)growth and welfare in an equilibrium model with heterogeneous consumers. Ecol. Econ. 116, 330–340.
Heikkinen, T., 2018. An equilibrium framework for the analysis of a degrowth society with asymmetric agents, sharing and basic income. Ecol. Econ. 148, 43–53.
Heikkinen, T., 2020. A study of degrowth paths based on the von Neumann equilibrium model. J. Clean. Prod. 251 (4), 119562.
Hickel, J., 2021. Less Is More: How Degrowth Will Save the World. Windmill Publ, London.
Hickel, J., Brockway, P., Kallis, G., Keyßer, L., Lenzen, M., Slameršak, A., Steinberger, J., Ürge-Vorsatz, D., 2021. Urgent need for post-growth climate mitigation scenarios. Nat. Energy 6, 766–768.
Hoehn, D., Laso, J., Margallo, M., Ruiz-Salmón, I., Amo-Setién, F.J., Abajas-Bustillo, R., Sarabia, C., Quiñones, A., Vázquez-Rowe, I., Bala, A., Batlle-Bayer, L., Fullana-i-Palmer, P., Aldaco, R., 2021. Introducing a degrowth approach to the circular economy policies of food production, and food loss and waste management: towards a circular bioeconomy. Sustainability 13 (6), 3379.
Hong, G.H., Schneider, T., 2020. Shrinkonomics: lessons from Japan. IMF Fin. Dev. 20–23.
Infante, Amate J., González De Molina, M., 2013. Sustainable de-growth' in agriculture and food: an agro-ecological perspective on Spain's Agri-food system (year 2000). J. Clean. Prod. 38, 27–35.
Jackson, T., 2019. The post-growth challenge: secular stagnation, inequality and the limits to growth. Ecol. Econ. 156 (C), 236–246.
Kalimeris, P., Richardson, C., Bithas, K., 2014. A meta-analysis investigation of the direction of the energy-GDP causal relationship: implications for the growth-degrowth dialogue. J. Clean. Prod. 67, 1–13.
Kallbekken, S., 2023. (2023). Research on public support for climate policy instruments must broaden its scope. Nat. Clim. Chang. 13, 206–208.
Kallis, G., 2021. Limits, ecomodernism and degrowth. Polit. Geogr. 87, 102367.
Kallis, G., Kostakis, V., Lange, S., Muraca, B., Paulson, S., Schmelzer, M., 2018. Research on degrowth. Annu. Rev. Environ. Resour. 43, 291–316.
Kallis, G., Varvarousis, A., Petridis, P., 2022. Southern thought, islandness and real-existing degrowth in the Mediterranean. World Dev. 157, 105957.
Keyßer, L.T., Lenzen, M., 2021. 1.5°C degrowth scenarios suggest the need for new mitigation pathways. Nat. Commun. 12, 2676.
King, L.C., van den Bergh, J.C.J.M., 2017. Worktime reduction as a solution to climate change: five scenarios compared for the UK. Ecol. Econ. 132, 124–134.
King, L., van den Bergh, J., 2021. Potential carbon leakage under the Paris agreement. Clim. Chang. 165, 52.
King, L.C., Savin, I., Drews, S., 2023. Shades of green growth skepticism among climate policy researchers. Nature Sustainability 6, 1316–1320.
Klein, N., 2014. This Changes Everything: Capitalism Vs. the Climate. Penguin, New York.
Koch, M., 2020. Structure, action and change: a Bourdieusian perspective on the preconditions for a degrowth transition. Sustainability: Science, Practice and Policy 16 (1), 4–14.
Komatsu, H., Rappleye, J., Uchida, Y., 2022. Is happiness possible in a degrowth society? Futures 144, 103056.
Kongshøj, K., 2023. Social policy in a future of degrowth? Challenges for decommodification, commoning and public support. Human. Soc. Sci. Commun. 10, 850.
Krpan, D., Basso, F., 2021. Keep degrowth or go rebirth? Regulatory focus theory and the support for a sustainable downscaling of production and consumption. J. Environ. Psychol. 74, 101586.
Kurz, R., 2019. Post-growth perspectives: sustainable development based on efficiency and on sufficiency. Public Sector Econ. 43 (4), 401–422.
Kyselá, E., Ščasný, M., Zvěřinová, I., 2019. Attitudes toward climate change mitigation policies: a review of measures and a construct of policy attitudes. Clim. Pol. 19, 878–892.
Larch, M., Löning, M., Wanner, J., 2018. Can degrowth overcome the leakage problem of unilateral climate policy? Ecol. Econ. 152 (C), 118–130.
Lehmann, C., Delbard, O., Lange, S., 2022. Green growth, a-growth or degrowth? Investigating the attitudes of environmental protection specialists at the German environment agency. J. Clean. Prod. 336, 130306.
Letchford, A., Moa, H.S., Preis, T., 2015. The advantage of short paper titles. R. Soc. Open Sci. 2, 150266.
Lewandowsky, S., Facer, K., Ecker, U.K.H., 2021. Losses, hopes, and expectations for sustainable futures after COVID. Human. Soc. Sci. Commun. 8 (1), 296.
Lockyer, J., 2017. Community, commons, and degrowth at dancing rabbit ecovillage. J. Polit. Ecol. 24 (1), 519–542.
Malerba, D., Oswald, Y., 2022. To grow or not to grow? Revisiting economic growth as a sustainable development goal in light of the degrowth debate. In: Malerba, D., Oswald, Y. (Eds.), Governing the Interlinkages between the SDGs: Approaches, Opportunities and Challenges. Routledge, London, pp. 140–157.
Malmaeus, M., Alfredsson, E., Birnbaum, S., 2020. Basic income and social sustainability in post-growth economies. Basic Income Studies 15 (1), 20190029.
McGuirk, E., 2017. Timebanking in New Zealand as a prefigurative strategy within a wider degrowth movement. J. Polit. Ecol. 24 (1), 595–609.
Mete, S., 2022. Towards degrowth housing development? Lessons from a scenario-based gaming session in the Oslo region. Local Environ. 27 (4), 517–536.
Missemer, A., 2017. Nicholas Georgescu-Roegen and degrowth. Eur. J. Hist. Econ. Thought 24 (3), 493–506.
Monios, J., Wilmsmeier, G., 2022. Maritime governance after COVID-19: how responses to market developments and environmental challenges lead towards degrowth. Maritime Econ. Logistics 24, 699–722.
Monserand, A., 2022. Buying into inequality: a macroeconomic analysis linking accelerated obsolescence, interpersonal inequality, and potential for degrowth. Eur. J. Econ. Econ. Policies Intervention 19 (1), 119–137.
Muler, González V., Galí, Espelt N., 2021. How do degrowth values in tourism influence the host-guest exchange? An exploratory analysis in small towns in the rurality. J. Tour. Cult. Chang. 19 (6), 884–903.
Nierling, L., 2012. "This is a bit of the good life": recognition of unpaid work from the perspective of degrowth. Ecol. Econ. 84, 240–246.
Nieto, J., Carpintero, Ó., Miguel, L.J., de Blas, I., 2020. Macroeconomic modelling under energy constraints: global low carbon transition scenarios. Energy Policy 137, 11090.
Nørgård, J., Xue, J., 2016. Between green growth and degrowth: Decoupling, rebound effects and the politics for long-term sustainability. In: Santarius, T., Walnum, H., Aall, C. (Eds.), Rethinking Climate and Energy Policies. Springer, Cham.
Oberholzer, B., 2023. Post-growth transition, working time reduction, and the question of profits. Ecol. Econ. 206 (4), 107748.
O'Manique, C., Rowe, J.K., Shaw, K., 2021. Degrowth, political acceptability and the green new Deal. J. Human Rights Environ. 12 (2), 254–276.
Pansera, M., Owen, R., 2018. Innovation for de-growth: a case study of counter-hegemonic practices from Kerala, India. J. Clean. Prod. 197, 1872–1883.
Panzer-Krause, S., 2021. Growing degrowth-oriented tourism? CSR certified tour operators as change agents. In: Andriotis, K. (Ed.), Issues and Cases of Degrowth in Tourism. CABI, Wallingford, UK.
Panzer-Krause, S., 2022. Rural tourism in and after the COVID-19 era: "revenge travel" or chance for a degrowth-oriented restart? Cases from Ireland and Germany. Tourism Hospitality 3 (2), 1–17.
Paulson, L., Büchs, M., 2022. Public acceptance of post-growth: factors and implications for post-growth strategy. Futures 143, 103020.
Pinker, S., 2015. The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century. Penguin, New York.
Priavolou, C., Troullaki, K., Tsiouris, N., Giotitsas, C., Kostakis, V., 2022. Tracing sustainable production from a degrowth and localisation perspective: a case of 3D printer. J. Clean. Prod. 376, 134291.
Priewe, J., 2022. Growth in the ecological transition: green, zero or de-growth? Eur. J. Econ. Econ. Policies Intervention 19 (1), 19–40.
Roberts, M.E., Stewart, B.M., Tingley, D., Lucas, C., Leder-Luis, J., Gadarian, S.K., Albertson, B., Rand, D.G., 2014. Structural topic models for open-ended survey responses. Am. J. Polit. Sci. 58 (4), 1064–1082.
Roberts, M.E., Stewart, B.M., Tingley, D., 2019. STM: an R package for structural topic models. J. Stat. Softw. 91 (2), 1–40.
Robra, B., Heikkurinen, P., Nesterova, I., 2020. Commons-based peer production for degrowth? - the case for eco-sufficiency in economic organisations. Sustainable Futures 2, 100035.
Rooney, A., Vallianatos, H., 2022. Evidence of degrowth values in food justice in a northern Canadian municipality. Environ. Values 31 (3), 323–342.
Ruggiero, V., 2022. The degrowth movement and crime prevention. Crime, Law and Social Change 77 (5), 463–478.
Ruiz-Alejos, C., Prats, V., 2021. In quest of implementing degrowth in local urban planning policies. Local Environ. 27, 423–439.
Savin, I., 2023. Evolution and recombination of topics in Technological Forecasting and Social Change. In: Technological Forecasting and Social Change, 194, p. 122723.
Savin, I., Teplyakov, N., 2022. Using computational linguistics to analyse main research directions in economy of regions. Econ. Regions 18 (2).
Savin, I., van den Bergh, J., 2021. Main topics in EIST during its first decade: a computational linguistic analysis. Environ. Innovation Societal Transition 41, 10–17.
Savin, I., van den Bergh, J., 2022. Tired of climate targets? Shift IPCC scenario focus from emission and growth targets to policies in its current form for publication. Ann. N. Y. Acad. Sci. 1517 (1), 5–10.
Savin, I., Chukavina, K., Pushkarev, A., 2022a. Topic-based classification and identification of global trends for startup companies. Small Bus. Econ. (forthcoming).
Savin, I., Drews, S., van den Bergh, J., Villamayor, S., 2022b. Public expectations about the impact of COVID-19 on climate action by citizens and government. PLoS One 17 (6), e0266979.
Schmid, B., 2018. Structured diversity: a practice theory approach to post-growth organisations. Manag. Rev. 29 (3), 281–310.

Siler, K., 2020. Demarcating spectrums of predatory publishing: Economic and institutional sources of academic legitimacy. J. Assoc. Inf. Sci. Technol. 71, 1386–1401.
Sorman, A.H., Giampietro, M., 2013. The energetic metabolism of societies and the degrowth paradigm: analyzing biophysical constraints and realities. J. Clean. Prod. 38, 80–93.
Sorrell, S., Gatersleben, B., Druckman, A., 2020. The limits of energy sufficiency: a review of the evidence for rebound effects and negative spillovers from behavioural change. Energy Res. Soc. Sci. 64, 101439.
Strzałkowski, A., 2024. Adaptation and operationalisation of sustainable degrowth for policy: why we need to translate research papers into legislative drafts? Ecol. Econ. 220, 108176.
Tokic, D., 2012. The economic and financial dimensions of degrowth. Ecol. Econ. 84, 49–56.
Tomaselli, M.F., Sheppard, S.R.J., Kozak, R., Gifford, R., 2019. What do Canadians think about economic growth, prosperity and the environment? Ecol. Econ. 161, 41–49.
Tomaselli, M.F., Kozak, R., Gifford, R., Sheppard, S.R.J., 2021. Degrowth or not degrowth: the importance of message frames for characterizing the new economy. Ecol. Econ. 183, 106952.
Tsagkari, M., Roca, J., Kallis, G., 2021. From local island energy to degrowth? Exploring democracy, self-sufficiency, and renewable energy production in Greece and Spain. Energy Res. Soc. Sci. 81, 102288.
Tunstall, R., 2022. An empirical test of measures of housing degrowth: learning from the limited experience of England and Wales, 1981-2011. Urban Stud. 60 (7), 1285–1303.
van den Bergh, J., 2011. Environment versus growth – a criticism of “degrowth” and a plea for “a-growth”? Ecol. Econ. 70 (5), 881–890.
van den Bergh, J., Castro, J., Drews, S., Exadaktylos, F., Foramitti, J., Klein, F., Konc, T., Savin, I., 2021. Designing an effective climate-policy mix: accounting for instrument synergy. Clim. Pol. 21 (6), 745–764.
Vandeventer, J.S.C., Zografose, C., 2019. A degrowth transition: pathways for the degrowth niche to replace the capitalist-growth regime. Ecol. Econ. 156 (2019), 272–286.
Victor, P.A., 2012. Growth, degrowth and climate change: a scenario analysis. Ecol. Econ. 84, 206–212.
Vuković, B.M., Ančić, B., Domazet, M., 2020. Values underpinning a degrowth transformation of the socio-political system. Traditiones 49 (1), 141–158.
Watson, S., 2021. Degrowth in development-led archaeology and opportunities for change. A comment on Zorzin. Archaeological Dialogues 28, 22–25.
Weber, G., Cabras, I., Calaf-Forn, M., Puig-Ventosa, I., D’Alisa, G., 2019. Promoting waste degrowth and environmental justice at a local level: the case of unit-pricing schemes in Spain. Ecol. Econ. 156, 306–317.
Wiefek, J., Heinitz, K., 2018. Common good-oriented companies: exploring corporate values, characteristics and practices that could support a development towards degrowth. Manag. Rev. 29 (3), 311–331.
Windegger, F., Spash, C.L., 2022. Reconceptualising freedom in the 21st century: neoliberalism vs. degrowth. New Political Econ. 28 (4), 554–573.
Wurst, L.A., 2021. Degrowth, anti-capitalism or post-archaeology? A response to Nicolas Zorzin. Archaeological Dialogues 28 (1), 25–28.
Xue, J., 2015. Sustainable housing development: decoupling or degrowth? A comparative study of Copenhagen and Hangzhou. Environ. Plan. C Govern. Policy 33 (3), 620–639.
Zorzin, N., 2021. Is archaeology conceivable within the degrowth movement? Archaeological Dialogues 28, 1–16.