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A BETTER KNOWLEDGE IS POSSIBLE

TRANSFORMING SCIENCE AND TECHNOLOGY FOR JUSTICE, PLURALISM, AND SUSTAINABILITY

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SCIENCE, CAPITALISM, COLONIALISM

I will start by stating the obvious: we are in trouble. The worlds in which we live are rapidly changing under the influence of intersecting crises of climate change, biodiversity loss, and growing global inequality. These crises share the same root causes and these root causes are accelerating. The continued fixation of our economic policies on growth, indexed by the flawed metric of Gross Domestic Product (GDP), continue to drive overproduction and overconsumption, inequality, and the exploitation of people and nature[1].

Despite promises to the contrary, our governments continue to fund and incentivize the destruction of our planet at scales that dwarf investments in sustainability and conservation. This unfettered continuation of exploitation and destruction is rationalized through powerful narratives: that economic growth is necessary and beneficial for all; that we can rely on technologies and on corporations to fix our problems through voluntary measures; and that climate and nature are expensive and therefore bad for jobs and people.

These narratives are false. We know that GDP growth disproportionally benefits an increasingly small part of the population and that trickle-down economics does not work[2]. We know that, at best, corporate sustainability initiatives only slow down environmental degradation[3]. We know that there is no evidence of the decoupling of GDP growth from resource use[4].

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[1] McElwee et al. 2020, One Earth; Turnhout et al. 2021, Conservation Letters
[2] Raworth 2017, Doughnut Economics; Stiglitz et al. 2009, The measurement of economic performance and social progress revisited
[3] McElwee et al. 2020, One Earth; Turnhout et al. 2021, Conservation Letters
[4] McElwee et al. 2020, One Earth; Turnhout et al. 2021, Conservation Letters

And we know that nature inclusive alternatives are in fact possible[5]. So, if we have all this evidence that demonstrates the decline in nature, the lack of effectiveness of current approaches, and the availability of alternatives, how can this situation persist?

Antonio Gramsci's notion of cultural hegemony is useful here[6]. This concept highlights that the domination of people and nature operates not just through physical or material processes, but also through ideas. The false narratives I mentioned above are continuously being promoted by corporations, the state, the media, and education systems, and they have been so successful that they are seen as natural and as common sense. According to Gramsci, cultural hegemony leads to a situation in which people develop a concept of success and well-being that serves the interests of those in power. Consequently, the unjust and destructive consequences of these narratives are either hidden from view, cast as individual choice or failure, or accepted as natural and inevitable. In our current societal and political culture, we need to recognize the contribution of science in maintaining this cultural hegemony. I do not dispute that scientific research has been and continues to be important to provide criticisms of these false narratives and develop alternative ideas and actions. However, by and large, science and technology are failing us.

Anticolonial scholarship has pointed to the intimate connections between science, technology, colonialism, and capitalism. As different commentators have observed, science is not just a neutral tool that can be used in colonialism or capitalism; it is a core foundation[7] and the similarities between the language and practices of the natural sciences and those of colonialism and capitalism are by no means a coincidence. As Max Liboiron writes:

> *Western science has long been recognized as a practice that assumes mastery over nature, reproduces the doctrine of discovery, revels in exploration and appropriation[8].*

[5] Jackson 2017, Prosperity without growth; Nicholls et al. 2018, Agroecology and Sustainable Food Systems
[6] Gramsci 1971, Selections from the prison notebooks
[7] A recent example is Gosh 2022, The nutmeg's curse
[8] Liboiron 2021, Pollution is colonialism, pg. 22

Science[9] operates on the basis of a worldview that cuts up the world into different parts and that establishes dichotomous distinctions between categories such as culture and nature, subject and object, human and non-human[10]. This worldview enables exploitation and extraction by casting nature as separate from humans, by expressing it as objects - as natural resources or, more recently, as services, and by applying calculative methods to optimize the production of these resources, goods, and services. This has not only profoundly affected how nature is seen, it has also enabled the material production of nature to conform to this worldview[11]. As Vandana Shiva has noted, monocultures on our lands result from monocultures of the mind[12]:

> *A single, one-dimensional way of thinking has created a monoculture of the mind. And the monoculture of the mind has become a self-fulfilling prophecy. This is the root of why we have pitted equity against ecology and sustainability against justice[13].*

The continued cultural hegemony of Western, capitalist, and scientific values and worldviews is one of the reasons why, despite the fact that in some sense colonialism as a political project has ended, it continues by other means. Uneven patterns of exploitation and destruction, also in the current age, continue to follow colonial lines[14].

THE TROUBLING POLITICS OF SUSTAINABILITY SCIENCE

Capitalist values and neo-colonial inclinations can also be recognized in those sciences that aim to inform and contribute to sustainability. Global expert organisations like the Intergovernmental Panel for Climate Change (IPCC) or the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) have defined their role in line with what is known as the linear model. This means that they present themselves as scientific bodies that are independent from policy and society. This presumed independence

[9] When I use the term science, I mainly refer to dominant positivist and reductionist approaches and paradigms as they are enacted in the natural sciences as well as in specific social science domains

[10] Latour 1993, We have never been modern

[11] Scott 1998, Seeing like a state; Turnhout 2018, Conservation and Society

[12] Shiva 1993, Monocultures of the mind

[13] This quote is taken from an interview by London 2016, The Ecologist

[14] Sultana 2022, Political Geography

allows them to produce what is seen as objective truth and speak said truth to power. In fulfilling this function, they have taken a dominant orientation towards quantitative modelling to assess the state of the planet and identify drivers of change. This orientation may work well for their audience of global policy makers gathered at United Nations meetings, but it also signals a problematic situation in which science and policy are locked into a tight relationship and a specific mode of working together that is difficult to break out of[15]. As Lahsen and Turnhout write:

> *The continued reproduction of the linear model of science society relations in IPBES is not just convenient for experts, it is also demanded by policy makers and institutionalized in the rules and procedures that govern assessment processes; global environmental science and global governance are locked into a shared belief in a singular world for science to represent and assess, and for policy makers to govern[16].*

This locked-in situation creates a number of problems. A first problem is that taking the planet as the object of knowledge production risks injustice. We have large inequities between those who are most responsible for environmental degradation and those who are most vulnerable to its consequences. Yet, expressions that refer to a 'global we', such as the well-known phrase that is often uttered in global climate negotiations 'we are all in the same boat', obscure this inequality[17]. Environmental modelling and assessment enable and support this idea of a singular planet with a global human population, specifically by their use of abstract global aggregates and concepts such as drivers. For example, the IPBES Global Assessment identifies direct and indirect drivers such as land-use change, global population, or consumption and production and calculates the expected impacts of these drivers on global biodiversity. Such abstractions are not actionable because they lack specificity in the way in which they attribute causality. This lack of specificity not only hides inequalities within these aggregates, it also allows actors to evade their responsibility for environmental destruction[18] and it enables inadequate problem framings and unjust solutions. For example, it continues

[15] Turnhout et al. 2014, Environment and Planning A; Turnhout et al. 2016, Current Opinion in Environmental Sustainability
[16] Lahsen and Turnhout 2021, Environmental Research Letters
[17] Demeritt 2001, Annals of the Association of American Geographers
[18] Pascual et al. 2021, Nature Sustainability

to enable the highly problematic frame that considers population growth as the main cause of environmental degradation[19].

A second problem is that sustainability science operates on a dangerous illusion of neutrality. Many see neutrality as indispensable for the production of truth, but it is not just unattainable, it is actually harmful[20]. In this quote, Julia Steinberger discusses the use of so-called negative emission technologies in IPCC modelling:

> *within these models we have … imaginary technologies, like carbon removal from the atmosphere, that are only in the models in order to protect existing powerful industries. And ... we are told within the IPCC [that] you shouldn't be political, you shouldn't be policy prescriptive. But we are acting in a politicised domain. Climate change has been politicized by these industries … we have to give ourselves the right to not just observe … If we don't fight to expose these interconnections … we will reproduce them and we will constantly be contributing to make things worse[21].*

It is well known that the carbon removal technologies that Steinberger refers to, including direct air capture, carbon storage, or massive tree planting are extremely unlikely to ever be effective as sufficient scale[22]. Yet, the existence of these technologies in modeling does mean that their imagined, potential climate benefits can be calculated, and, as we are currently witnessing, these imagined benefits are being used to avoid and delay the reduction of emissions[23]. As a result, the IPCC serves vested interests and reproduces the status quo, while operating on the problematic assumption that the incorporating of these technologies in modeling is neutral[24].

A third problem is the imperialist hubris of much of sustainability science.

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[19] Carmenta et al. under review

[20] Turnhout and Lahsen 2022, Climate and Development

[21] The quote is taken from a presentation by Julia Steinberger on 11 June 2021 at 'Against apartheid: global rally for justice'. Steinberger's presentation starts at 21.20 minutes, https://youtu.be/j9LzajO1sWw

[22] Dyke et al. 2021, The conservation

[23] Carton et al. 2020, WIRES Climate Change; Turnhout and Lahsen 2022, Climate and Development

[24] Lahsen and Turnhout 2021, Environmental Research Letters; Turnhout and Lahsen 2022, Climate and Development

In her book A Billion Black Anthropocenes or None, Kathryn Yusoff powerfully dissects the discourse of the Anthropocene as it features in sustainability science. This discourse heralds Western science and its ability to diagnose the incumbent end of the world and announce a new era, while remaining blind to the many worlds that have already ended and continue to end[25]. As Yusoff writes:

> *If the Anthropocene proclaims a sudden concern with the exposures of environmental harm to white liberal communities, it does so in the wake of histories in which these harms have been knowingly exported to black and brown communities under the rubric of civilization, progress, modernization, and capitalism. The Anthropocene might seem to offer a dystopic future that laments the end of the world, but imperialism and ongoing (settler) colonialisms have been ending worlds for as long as they have been in existence. The Anthropocene as a politically infused geology and scientific/popular discourse is just now noticing the extinction it has chosen to continually overlook in the making of its modernity and freedom[26].*

Moreover, Yusoff suggests that sustainability science furthers neocolonialism as it subsequently casts the West - a West that has now woken up to the fact that it might no longer be able to protect itself against its destructive tendencies - as the savior of the world. This, as Yusoff puts it,

> *indicates a desire to overcome coloniality without a corresponding relinquishing of power. The responsibility for the world is articulated anew as the white man's burden – a paternalism that is tied to a redemptive narrative of saving the world from harm on account of others[27].*

SCIENCE AS THE ACCOUNTANT OF DESTRUCTION

The bleak conclusion is that the role of current sustainability scientists can be seen as accountants of destruction[28]; detached bystanders that

[25] Yusoff 2021, A billion black anthropocenes or none
[26] Yusoff 2018, A billion black anthropocenes or none, pg. xiii
[27] Yusoff 2018, A billion black anthropocenes or none, pg. 27
[28] This phrasing has been inspired by Ivan Illich, see Cayley 1992, Ivan Illich: in conversation; Nikofurik 2019, The Tyee; Michler 2020, Daily Maverick

calculate and report on the end of their world as accurately as possible. The subsequent calls for societal change that they make are stunted due a combination of problematic scientific orthodoxy and political naivety. As a result of a misguided idea of neutrality and a fear of being seen as political, they continue to produce knowledge that lacks actionability, reproduces the status quo, and ignores power, including power – and imperialist and colonial tendencies – within science itself. All in all, this knowledge has not only failed to actually support the much-needed transformations that it continues to call for, it has also largely kept intact the cultural hegemony of neo-colonialism and capitalism, and it continues to facilitate the rationalization and normalization of the resulting exploitation, extraction, and destruction of people and nature.

To considerable extent, the social sciences have fallen victim to the same developments. Also in these fields, the framing of research problems is often dominated by instrumental, technocratic, and hubristic logics that aim to solve problems that are assumed to simply exist. Conceptualizations of method in the social sciences tend to facilitate extractivist and dehumanizing practices[29]. They cast researchers as detached observers that extract data from research subjects and force-fit these data into predefined categories, and they cast research subjects as passive data points instead of analysts and knowledge holders in their own right. As Katherine McKittrick notes, "discipline is empire"[30], so it is no wonder that many social science disciplines exhibit similar neo-colonial tendencies.

PARTICIPATION IN SCIENCE AND TECHNOLOGY

There are parts of science that try to address the problems that I have outlined and that aim to go beyond easy technofixes and improve the actionability of knowledge. In this context, we have seen the emergence of a participatory turn in knowledge production based on the idea that the inclusion of non-scientists can result in knowledge that is legitimate as well as actionable.

[29] Smith 1999, Decolonizing methodologies; Chilisa 2019, Indigenous research methodologies; Watson 2021, Nature

[30] McKittrick 2021, Dear science, pg. 38

One of these approaches is citizen science[31]. As we see the increasing uptake of this concept, it is important to be mindful of the diversity within citizen science. Some initiatives such as Public Lab or Clear take an explicit environmental justice approach where the aim is to produce science that serves the needs of communities[32]. Yet, an increasingly dominant interpretation of citizen science takes the opposite approach. Here, citizen science benefits science because it forms a low-cost tool to increase data collection and analysis capacity[33]. We need to pay close attention to prevent citizen science from repeating science's extractivist and exploitative practices. Instead of using citizens for science, it is vital to ensure that we mobilize science for citizens and contribute to community needs[34].

The example of citizen science makes clear that participation in science and technology is challenging, and that it can often, despite good intentions, produce negative outcomes[35]. There are three reasons for this. First of all, processes that simply invite all perspectives and stakeholders to the table without addressing power often result in the strengthening of existing power inequalities, and not in their levelling out as is often the hope. Second, processes that prioritize consensus or integration often end up excluding those voices that are seen as unreasonable and uncooperative. This violates the aim to be inclusive of diverse perspectives that these processes often start out with. A third challenge is related to their transformative impact. In many governance domains in the Netherlands, we see a proliferation of pilots and projects. The domain of agriculture, for example, is full of them. While it can certainly be useful to create safe spaces for experimentation and co-production, we need to recognize that their impact is limited by design. Pilots exist because institutional change is not seen as desirable or possible. They exist because they are harmless and because they do not threaten dominant actors, interests, and institutions.

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[31] Citizen science has been identified as a key theme at the University of Twente, this is a great opportunity for teaching and research. Yet, as the term citizen science is becoming mainstream, it is important to recognize that the category of citizen can be a problematic and exclusionary term, and that in some contexts, concepts such as public or community may be more appropriate.

[32] Public Lab: https://publiclab.org; Clear: https://civiclaboratory.nl

[33] Mirowski 2017, Aeon

[34] Turnhout et al. 2016, Conservation Biology

[35] Turnhout et al. 2021, Current Opinion in Environmental Sustainability

The problems in participatory approaches to science and technology are due to similar patterns and dynamics as those discussed earlier in relation to sustainability science. Due to a lack of explicit recognition of power and politics, participatory initiatives have tended to reproduce unequal power relations between scientific and non-scientific forms of knowledge and they have been constrained and coopted by dominant values and powerful interests. To be sure, participation is a crucial ingredient of any effort to improve the societal legitimacy of science and technology and connect knowledge to meaningful action, and participation in science and technology deserves much more support than it currently receives. However, as these approaches continue to grow and develop, it is important to avoid well known problems and ensure that they support the transformative changes we need for human and ecological well-being.

SCIENCE AS AN OBSTACLE FOR TRANSFORMATION

As I have argued to far, science, including social science and participatory research, has largely failed to support transformative change. I have also identified two reasons for why this is the case. First, I have pointed to science's adherence to problematic values such as neutrality or objectivity and maladaptive ideals about what it means to produce good science and about how science should relate to society. Second, I have noted a failure on the part of science to recognize and address power and politics, including the politics and power of and within science. These problems persist because of a general lack of recognition of the inevitability and consequences of framing[36]. Clearly, facts do not and cannot speak for themselves. Rather, facts and values entwine in frames. Since framing is inevitable, it is impossible to disentangle facts and values[37]. These frames have consequences; they define not only what the problem is, including what items the problem consists of and how they are related, but also what solutions are possible and rational, and what knowledge is relevant[38].

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[36] Turnhout et al. 2019, Environmental expertise

[37] Although for scientists, this is perhaps still an uncomfortable proposition, the entwinement of facts and values has long been established in philosophy and social studies of science. See Turnhout 2018, Conservation and Society for a longer version of this argument.

[38] The concept of 'measurementality' has been introduced to highlight the dynamics through which common concepts such as ecosystem services simultaneously shape the production of knowledge and the focus of decision making, and how, as a result of these dynamics, these concepts become naturalized, see Turnhout et al. 2014, Environment and Planning A

It is important to recognize that many scientists and policy actors consider this to be a good thing. When the production of knowledge and its uptake take place in a singular shared frame, they will celebrate this as an example of an effective science policy interface. But it would be a mistake to take such a superficial notion of effectiveness as a sign of success. The example of the IPCC and carbon removal technologies provides a useful reminder of this, but there are many more examples of how seemingly usable knowledge and effective science policy interactions create bad political and societal outcomes[39]. Common frames might provide the glue for connecting specific actors in science and society, but they do so by excluding other perspectives, values, and forms of knowledge[40]. As these frames institutionalize in knowledge production, decision making, and science-policy interactions, this will create a situation of lock-in which sustains the continued production of bad outcomes.

Unfortunately, many scientists fail to fully appreciate their complicity in these bad outcomes and take responsibility for them. They don't think that this is their problem. This is one reason why the scientific community continues to resist proposals to transform science[41]. The blindness created by the false ideal of neutrality allows science to continue to continue to reinforce dominant values, interests, and knowledge systems, because questioning them is seen as political, while not questioning them is seen as neutral. And this will continue to normalize and justify the exclusion or co-optation of marginalized perspectives and knowledges. In so doing, science has become an obstacle for transformation.

EXCLUSION AND MARGINALISATION

Due to this refusal of science to change, knowledge inequities continue to persist. I will give two examples. First, a recent article in Nature states that only 5% of total global research funding in agriculture is relevant for smallholders[42] while smallholders make up 70% of global farmers and are essential for food sovereignty and food security. Supporting the urgent transformation of food systems requires that we transform food systems research and address

[39] Halffman and Pastoors 2019, Expertise for European fisheries policy
[40] Turnhout et al. 2019, Environmental Expertise
[41] Other reasons are more mundane and related to a fear for the loss of authority, funding, or careers, see Lahsen and Turnhout 2021, Environmental Research Letters
[42] Nature 2022

these knowledge inequities[43]. Second, many commentators have noted that to address sustainability challenges, the biggest research needs are in social science and collaborative research, to identify barriers and obstacles and to design options for action. Yet, a study of climate research funding, shows that the social sciences receive only 0,12% of total funding[44].

Marginalization of the social sciences is actively kept in place, also in interdisciplinary research. My extensive experience in interdisciplinary collaboration, including in research projects, committee work, and global integrated assessments is that these spaces are dominated by natural scientists with social scientists in a minority position. Moreover, these spaces are dominated by particular natural science-based integrated frameworks that define what counts as interdisciplinarity. These frameworks define the puzzle, so to say, within which the different disciplinary pieces should then (be made to) fit. Knowledge that does not fit within these frameworks, that resists integration, or that questions the puzzle altogether and criticizes these supposedly integrated frameworks will be excluded. As a social scientist in these settings, we are told that our job is not to be critical but to be constructive, so a failure to conform provides all the justification that is needed for exclusion. The ironic result of this is that interdisciplinary research will consider the reduction and co-optation of diversity as a requirement for success. Paraphrasing McKittrick[45], interdisciplinarity is discipline is empire.

Marginalization leads to further marginalization. If your value is not evident to those in power, they will see this not as a result of marginalization, but as a reason for further marginalization. This is what makes it possible for right-wing member of parliament Van der Woude to openly question the contribution of the social sciences and humanities to the economy and society, and to suggest that more money should be allocated to technology, information sciences, and medicine[46]. This would be disastrous. Exacerbating the already highly unequal funding situation for social sciences and humanities will result in even stronger pressure to instrumentalize their role as problem solvers or creators of public support for science and technology. Openly questioning whose problems should be solved and whether science and technology

[43] Turnhout et al. 2021, Science
[44] Overland and Savocool 2020, Energy Research and Social Science
[45] McKittrick 2021, Dear science
[46] ScienceGuide 2022

actually deserve support will become more difficult because of the risk of being excluded from funding. Inclusion will effectively become conditional on the willingness to submit to and be coopted by dominant discourse. Either way, critical social sciences and humanities are left without a voice. This is one reason why Gayatri Spivak poses the question whether the subaltern can speak, and why Spivak answers it with an unequivocal no[47]. And things get progressively worse for those who face intersecting forms of oppression, on the basis of not just paradigm, but also race, gender, or knowledge system.

All in all, critical research, including critical research about science, that threatens the status quo will not get funded and it will not get done. And when it gets done it will either be dismissed or ignored, or it will pose a risk to those that undertake it. Drawing on work by Linsey McGoey[48], this will ultimately result in the production of ignorance about transformative change.

A BETTER KNOWLEDGE IS POSSIBLE

The field of Science and Technology Studies (STS) has a lot to offer to address these deep-seated problems of science and technology. It has done ground breaking work in the understanding of social and cultural values in knowledge practices, the democratization and societal embedding of science and technology, and the political and ethical dimensions and implications of scientific methods and worldviews[49]. To be sure, research practices in STS have not been immune to the problems identified in this lecture. Also in STS, we have seen an uncritical overreliance on protocolized methodologies and participation, and a general reluctance to question dominant frames in society, policy, and industry. It is, however, a testament to the vibrancy of the field that it has been STS researchers that have been among the fiercest critics in pointing to these problems and the most innovative in developing alternatives. Inspired by feminist and activist STS, and by posthumanist, black and anti-colonial studies, I express the hope and ambition that a better knowledge must be possible.

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[47] Spivak 1988, Can the subaltern speak?

[48] McGoey 2019, The unknowers

[49] STS research in Twente has a strong reputation in the development of such approaches. Examples are Constructive Technology Assessment, see Schot and Rip 1997, Technological Forecasting and Social Change, and Design Ethics, see Verbeek 2006, Science, Technology, & Human Values

The single most important requirement for such better knowledge is to ensure that it does better things. For this, we need to put social and environmental justice center stage[50]. Just action for humans and nature has to take priority over the accuracy and presumed neutrality of knowledge, over instrumental and simplistic solutionisms, and over the production of knowledge that is relevant or, perhaps better, palatable for elites. This implies that research must focus on the common underlying causes of our intersecting crises of inequality, climate change, and biodiversity loss, including critical investigation of the actors and institutions that block sustainability transformations and the strategies they use to keep the cultural hegemony of their false narratives intact. It also requires that research resists problem framings that distract attention away from these structural causes by promoting voluntary measures or by targeting individual behavior or consumer choices. And it means that science has to stop producing and enabling technocratic and unjust solutions. One example is the 30 by 30 proposal currently on the table for the Convention on Biological Diversity, which risks placing a disproportionate share of the burden of conservation onto those that have contributed the least to biodiversity loss[51]. Instead, it is high time to consider policies that directly target inequality, and particularly excessive wealth and overconsumption, as biodiversity and climate actions[52].

There can be no social and environmental justice without epistemic and ontological justice[53]. This means that we cannot allow dominant research practices to continue if they are intolerant of difference; if they continue to impose the idea of a singular world that can only be known by science, thereby erasing not just alternative knowledges, but also the lives and practices that shape and are shaped by these knowledges. As Karl Popper has famously said, the only thing tolerance cannot be tolerant of is intolerance[54], and this has to apply to knowledge production as well. But what we see of course is that those that speak out about the intolerance of dominant knowledge systems and paradigms will themselves be accused of being intolerant. This is one reason why transformation requires radical equity and pluralism.

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[50] There can be no environmental justice without social justice. We can only succeed in addressing the global crises of growing inequality, climate change, and biodiversity loss if we resist the separation of environmental and social justice.

[51] Büscher et al. 2017, Oryx.

[52] Turnhout and Purvis 2021, Griffith Law Review

[53] Fricker 2007, Epistemic injustice; Santos 2018, Decolonizing the university

[54] Popper 1945, The open society and its enemies

We need to recognize that transformation cannot happen by only elevating nice things. We need to also, and at the same time, actively disempower those that resist change, and dismantle approaches that are intolerant of difference.

It follows that pluralism is both a condition for and an outcome of justice. The challenge of political ontology, as Arturo Escobar amongst others has noted, is to see struggles of knowledge as struggles over human and non-human lives, practices, and realities; they are struggles to shift from the oppression of a singular world to a world where many worlds fit; a pluriverse[55]. This suggestion should not be seen as a solution, nor is it a utopia[56]; that would defeat the purpose. The idea is not to purify and separate multiple ontologies, but to put continuous effort into fostering connections. Drawing on the work of Chantal Mouffe[57], the pluriverse requires that we enable struggles and debates to occur in the public space. Instead of placing science outside politics or allowing science to foreclose the possibility of politics, knowledge production practices need to be become part of political and dialogue and contestation. A central ambition of my chair is, then, to create open-ended and anticolonial knowledges, methodologies, technologies, and designs that allow for the pluriverse to flourish.

WITHER SUSTAINABILITY?

What does this all lead to, you may ask? I have used the term sustainability in the title, but I am deeply troubled by it for two reasons. First of all, the impetus to define goals and outcomes is one of ways that science has gotten into trouble. The assumption that we only know what to do if we translate goals and objectives into well-defined and measurable targets and indicators is not just frankly absurd, it has also produced bad outcomes. Since targets and indicators are the tangible operationalization of underlying goals, they inevitably come to stand for and replace those goals[58]; a process that intensifies when targets and indicators are tied to incentives. We all know examples, particularly in academia I would say, where the focus on outcomes has enabled practices that actually corrupt underlying objectives,

[56] Achterhuis 1998, Erfenis van de utopie
[57] I refer here to the notion of agonism; a form of productive dialogue that recognizes and respects difference, see Mouffe 2005, On the political
[58] Van Thiel and Leeuw 2002, Public Performance & Management Review
[59] Craig et al. 2014, Financial Accountability & Management

even when they meet targets and indicators[59]. So, it behooves us to approach the question what the desirable future end-point of transformative change can look like with openness and humility.

The second reason why sustainability makes me uncomfortable is that we have seen what it has done in practice. The false narrative that promotes the possibility of green capitalist GDP growth has been massively enabled by the idea of sustainability and the term has also strengthened problematic notions of modernization and development[60]. The splitting up of sustainability in the three supposedly equally important pillars of people, planet, and profit has further exacerbated this problem by putting people against nature and enabling problematic reductionist approaches. These come in at least two competing flavors. Some argue that we need profit first. The environment and people will have to suffer until enough profit has been made and then, they will be taken care of[61]. Despite a lack of solid evidence, this idea continues to be mobilized in economics and policy[62]. Others argue that nature is the condition for the other two. This is what is behind the infamous 'wedding cake' interpretation of the Sustainable Development Goals[63], and it also features in emerging ecofascist discourse[64]. The idea here is that we first need to protect nature before it is too late. There is no time to take care of people and without nature we are all doomed anyway. Transformative change requires that we reject both, including the false dichotomies they are based on. There can be no separation between environmental justice and social justice.

But what's the alternative? The reason why we so often draw a blank when it comes to imagining positive futures is also the reason why we so desperately need them. Cultural hegemony has been very successful at implanting the idea, made famous by Margaret Thatcher, that there is no alternative; that our societies and economies are naturally given. We need ideas and visions that can challenge and supercede this ideology. There are promising initiatives to innovate our ideas of economy, society, and nature, in academia as well as in

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[60] This is evident in the win-win discourse of ecological modernization and its insistence on depoliticized technofixes, see Dryzek 1997, The politics of the earth

[61] Valladares and Boelens 2019, Geoforum

[62] The unsupported theories of the Kuznet's curve, the environmental Kuznet's curve, and trickle-down economics are all based on this idea, see Raworth 2017, Doughnut economics

[63] Obrecht et al. 2021

[64] Thomas and Gosink 2021, Perspectives on Global Development and Technology

society. You can easily recognize them by the way in which cultural hegemony continues to ridicule, marginalize, and erase them. They will be seen as left-wing hobbies, not constructive, anti-freedom or communist, irrational, anti-science, or romantic. Degrowth, solidarity economics, limitarianism, and agroecology are all examples of ideas that continue to receive those kinds of accusations. This is a sign of course. If elites feel the need to marginalize and ridicule people and ideas, this is because they feel threatened by them. And this in turn might mean that they might be on to something useful, and that you should consider joining them.

The endpoint of transformative change should not be defined, and especially not by science. I do however see it as a core task of my chair to foster the generation of radical alternative imaginaries as well as options for change that are guided by values of justice and pluralism and to join forces with societal actors to put them into practice. Knowledge and learning are an indispensable component of this task. Processes of transformation are complex and they will inevitably create unanticipated effects. It is crucial that we need to build knowledge infrastructures to track these changes and effects[65]. However, we need to do so in ways that counter the current emphasis on key performance indicators, control, and evaluation, and that facilitate emancipation, learning and reflection. Storytelling can be a method to support these knowledge infrastructures. Stories resist hubris and detachment because they are relational, because they combine the emotional, the personal, the factual, and the fictional, and because they are incomplete and open. As McKittrick writes:

> *telling, sharing, listening to, and hearing stories are relational and interdisciplinary acts that are animated by all sorts of people, places, narrative devices, theoretical queries, plots. …The story has no answers…Indeed, the story cannot tell itself without our willingness to imagine what it cannot tell…The story asks that we live with what cannot be explained…. The story asks that we live with the difficult and frustrating ways of knowing differentially. (And some things we can keep to ourselves. They cannot have everything. Stop her autopsy.) They cannot have everything[66].*

[65] Turnhout et al. 2021, Conservation Letters
[66] MCKittrick 2021, Dear science, pg. 6-7

TRANSFORMING THE UNIVERSITY

This chair is personal to me and I am grateful and humbled by the trust granted in me to fill this position. It is also personal in the sense that this is not just a job. It is of course a great privilege to be able to say this and I am very aware of that. But what this means for me is that I am here as a person, with values and emotions, and with a deep-felt sense of responsibility and commitment. This is why I need to bring this close to home now, to the university. And it is also fitting for a chair of Science, Technology, and Society that I dedicate myself to improving not just relations between the university and society, but also its inner workings.

The university is in dire need for a better story and it has been for some time now. The same cultural hegemony, with its values of effectiveness, efficiency, and productivity, that is destroying the planet also rules our institutions. The sense of self of many academics has been profoundly shaped by these values, including how they view their own worth and success, and how they compare themselves with others. This ideology breeds competitiveness. Competition is a core foundation and principle of current research systems, not an unfortunate side effect of scarce resources as we often prefer to think. Even more so, the need for competition will continue to create scarcity[67].

In turn, competition breeds precarity, exclusion, and injustice. After all, not everyone can be successful, right? Blinded by the illusion of meritocracy, and a general lack of fair and transparent procedures, universities create all kinds of oppression, violence, and exclusion on the basis of paradigm, gender, race, neurodiversity, or health. Despite all the care and commitment that many of us bring to our job, our institutions, to paraphrase Sarah Jaffe[68], do not love us back. In case of a perceived threat, the main interest and knee-jerk response of the institution will be to protect the institution. And as Sarah Ahmed has pointed out, in practice this means that it will protect specific people, those who hold power in our institutions, over other people that are seen as disposable[69]. I am glad to see that social and workplace safety are on the agenda of universities[70] and I sincerely hope that serious consideration is given to the inherent difficulties in addressing marginalization and exclusion and prevent well known problems and pitfalls of past efforts[71].

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[67] Achterhuis 1988, Het rijk van de schaarste
[68] Jaffe 2022, Work won't love you back
[69] Ahmed 2021, Complaint!
[70] Jansen et al. 2022, De Groene Amsterdammer; KNAW 2022

Those of you who know me, know that I am not a pessimist. I would not be here if I did not believe that a better knowledge is indeed possible; that we can create better universities, better teaching and learning systems, and better science and technology. I am regularly reminded of this potential. One of the great privileges of this job is that you get to learn so much, especially from students and PhD students. As a university, we can do much better to capitalize on this potential an create spaces where teachers and students can both learn and flourish. One example is the Transformative Research PhD course that I co-teach with wonderful colleagues from Eindhoven, Wageningen, and Utrecht University[72]. This course is special because of the learning environment we collectively create, together with all participants. The course deprioritizes assessment and knowledge dissemination to allow for values and emotions, humility, questioning, and generosity. The depth and quality of knowledge generation and mutual learning that such an approach generates are inspiring and transformative.

We need much more of this in our universities. I am referring here not just to Bachelor and Master education, but also to research and to the university more generally. Transformative and emancipatory approaches to teaching and learning have much to offer in this respect[73]. They can help us unlearn harmful and oppressive hierarchical, patriarchal, and individualistic patterns and behaviours, disrupt our uncritical acceptance of exploitation and our dismissal of injustice, and foster mutual respect, care, and generosity. If we are able to change how we treat students and each other, we will have made a profound and crucial first step in the transformation of the university, and of science and technology.

[71] Ahmed 2012, On being included; Ahmed 2021, Complaint!

[72] For more information about the course see https://www.wur.nl/en/activity/transformative-research-for-sustainability-challenges.htm

[73] Freire 1970, Pedagogy of the oppressed; Lotz-Sisitka et al. 2015, Current Opinion in Environmental Sustainability

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Creating better knowledge for people and nature is the core ambition of my chair and this requires collaboration outside academia. I am very grateful to organisations such as Wij.Land and the Agroecology Federation for inviting the likes of me into their midst. I hope to be able to reach out to many more, also in the Twente region.

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