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EMERGENCY TECHNOCENTRISM

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ABSTRACT

Stabilising the climate at less than 1.5°C demands very rapid rates of decarbonisation. Within the environmental movement solutions have been sought in two somewhat divergent forms, one emphasising fundamental social and lifestyle changes, the other relatively ‘superficial’ technical changes. In recent years, much scholarly attention has been paid to a wide range of largely social measures, symbolised by the UN Sustainable Development Goals, and these have come to define the commonly-understood meaning of ‘sustainability’ in higher education institutions. Using simple physical analogies, we argue that there is a severe mismatch between this broad ‘pan-humanistic’ approach and the physical requirement for rapid decarbonisation. Instead, a series of technical measures appear necessary, which the authors call ‘Emergency Technocentrism’. The central paradox is that while this conclusion should be obvious, it is widely ignored and even disparaged in many scholarly circles, and greatly affects the tone and content of HE teaching on sustainability. This discussion paper examines the reasons for the divergence of the two perspectives, finding that they tend to attract different kinds of practitioners, with surprisingly different assumptions and worldviews. Some basic principles are suggested for dealing rationally with the present environmental emergency, and it is suggested these should form the basis for a new approach to teaching and research in higher education.

KEYWORDS:

climate change, emergency, pan-humanism, planetary boundaries, sustainability, technocentrism

THE PROBLEM AND THE PARADOX

Beyond the climatic temperature threshold of 1.5°C, there are risks that include the possibility of extremely serious, possibly catastrophic, outcomes (IPPC, 2018). Further, in addition to climate, there are other thresholds of concern, summarised in Figure 3. The central paradox is an ethical one. From the perspective of mainstream human morality, these risks should not be incurred under any circumstances. Yet while ethical imperatives endure, the risks are clearly in prospect.

The policy question is whether, and how, humanity will take necessary steps to avoid crossing these thresholds and incurring the risks. The timescale is short, with the IPCC concluding that to have any reasonable chance global greenhouse-gas emissions (GHGE) must decline to net-zero by 2050. This is a change from positive historical growth of emissions at around 3% a year, to a *decrease* of about the same rate, maintained for the next thirty years. Even more rapid reductions (up to 10% a year) will be required in wealthy countries. At present rates – i.e., with no change – the allowable global ‘emissions budget’ will be exhausted by 2030. The global situation is therefore both serious and urgent, so it is natural to ask what this implies for climate policy, and (in the present context) how it is to be approached within the Higher Education sector.

It is important to emphasise seriousness and urgency, because it is the custom in ordinary discourse within the HE sector to see climate change as just one of many other problems, all of which require attention. This is a grave conceptual mistake, and while it is understandable for the general public and politicians, it is not so easy to forgive in universities, which pride themselves on clear and rational thought. It seems obvious to us that in the circumstances, the climate issue should be the principal touchstone of internal debate and curricula for higher education. Yet it is not, hence the polemical tone of our discussion.

The combination of seriousness and urgency is illustrated graphically in Figure 1. The climate crisis is often characterised as a ‘wicked problem’ (Stang and Ujvari, 2015) yet the underlying logic is paradoxically simple. At the risk of labouring the obvious, a person tied to a railway track is easily released by simply untying the knots. This is the preferred strategy if there are no trains, or if it is known there are none due. However, if a train *is* due, or indeed actually approaching, the ‘untying’ strategy is too slow. A faster, perhaps less elegant, strategy is necessary.

NO NO, USE A KNIFE, CUT HER FREE!

I’M UNDOING THE KNOTS

*Figure 1: Cartoon representation of the underlying logic of The Problem.*

In the view of the authors, this represents the debate within the wider sustainability community. In one corner, as it were, we have those that might be called ‘knottists’, with a careful, humane ‘ecocentric’ approach[[1]](#footnote-1). In the other corner we find a more ‘technocentric’ tendency arguing for a decisive switch of strategy, to a more brutal ‘never mind the niceties, cut the \*\*\*\*\*\* rope’ approach. We shall argue for the latter view,[[2]](#footnote-2) and spell out some of its implications.

PERSONAL BACKGROUNDS

By way of context, we should say a little about the backgrounds of the authors. We have both been personally and professionally involved in environmental and ‘sustainability’ problems for many decades (Boyle and Harper, 1976; Peake, 1994). Atfirst, [partly due to a long-running techno-social experiment in mid-Wales (Harper, 2016)], we shared a general consensus within lay environmental circles, that the modern consumerist project is not compatible with biospheric stability; and that only a profound reorientation of lifestyles and aspirations would deliver a permanent solution. This might well have been, and indeed might still, be the case in the long term (Jackson, 2009; Smil, 2019). However, in the intervening period, global-scale problems of physical sustainability have become worse, not better, and humanity appears be running out of time to avoid major physical discontinuities. We have been forced to confront the dilemma of whether to re-emphasise the need for cultural shifts or switch to an ‘emergency’ rapid-response mode based on technology and infrastructural changes.

TWO DISCOURSES

Although the two approaches are in principle complementary, this is not what we observe. There are two *separate* discourses, each with its associated community. One emphasises cultural, holistic, bottom-up ‘micro’ measures; the other top-down, focused, technical, ‘macro’ measures. The first of these, which we shall call ‘Pan-Humanism’, tends to be the domain of social scientists, the humanities, mainstream environmentalism, academic subjects such as Education for Sustainability (EfS), and social movements such as Transition Towns. The second, which we will call ‘Emergency Technocentrism’, tends to be the domain of physical scientists, engineers, civil servants and policy analysts. The two are compared in Table 1. To some extent these two ‘schools’ pursue their themes without reference to each other, and it is unusual to find active researchers ‘crossing the line’. But we have done so, and for good reasons that we hope are evident in this article.

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| --- | --- | --- |
|  | **PAN-HUMANISM** | **EMERGENCY TECHNOCENTRISM** |
| General orientations | Non-Physicalist, holistic, multidimensional, optimising  | Physicalist, impatient, focused, satisficing  |
| Favoured response to sustainability | Bottom-up, micro-changes, ‘leading by example’ | Top-down, macro-changes, ‘democratic dirigisme’ |
| Tends to attract | Social scientists, educators, humanities teachers | Physical scientistsEngineers |
| Time horizon | Long: 100+ years; thresholds unimportant | Short: 20-50 years: thresholds a critical aspect |
| Ethical perspective | Humanistic values maintained; aversion to ranking; present generation favoured | Emphasis on sequencing of action; physical factors given priority; future generations favoured |
| Style | Holistic, wide/soft focus, both-and, fuzzy logic | Quantitative, sharp focus, either-or, standard logic |
| Educational purpose | To produce better citizens with humanistic sustainability values and skills | To produce critically informed graduates and professional fuss-makers |
| Educational approach | Using sustainability patterns to educate students | Using educational techniques to communicate sustainability patterns |
| Relation to ecocentrism | Indirect, complex ecocentrism; disguised anthropocentrism | Direct, simple ecocentrism |
| Status | Orthodoxy, embracing a widely-understood meaning of ‘sustainability’ | Minority: Conception of sustainability too literal for widespread acceptance |
| Locus | More common in new universities | Uncommon in universities |

Table 1: *Deconstructing and comparing Pan-Humanism and Emergency Technocentrism*

We shall argue that although both tendencies have played significant roles in the development of modern environmentalism, there has been a substantial cultural and institutional divergence – possibly reflecting of a long-standing schism in elite culture (Snow, 1959; Ortolano, 2009). Each contains self-reinforcing processes that have accentuated initial differences. The contrast between the two approaches can be expressed by sampling their activities and concerns. Table 2 shows a selection of session topics from the 4th conference on Sustainability in Higher Education in Swansea, 2019, and a contemporary list of topics from the UK Committee on Climate Change technical report *Net Zero* (2019).

|  |  |
| --- | --- |
| **Pan-humanism: Items from SHE Conference 2019** | **Technocentrism: Items from CCC *Net Zero* Report** |
| Nature and wellbeingGlobal citizenshipFarmers MarketsTeam teachingBike sharingSustainable fashionBecoming a forestParentingPermaculture | Abating direct emissions from ‘hard-to-decarbonise’ homesAccelerated electrification and the GB electricity systemBioenergy with carbon capture and storage,Non-CO2 abatement in the UK agricultural sector by 2050Zero Emission HGV Infrastructure RequirementsPower and HydrogenLow-carbon options for aviation and shippingReducing emissions from the waste sectorLow-carbon heat networks |

Table 2: Examples of typical categories of concern from the pan-humanist tradition (Left) and the technocentric tradition (Right)

The differences in mood, style, and culture between the two lists in Table 2 are striking. It might be said that the left-hand list applies to individuals, households and small groups or businesses, while the right-hand list applies to government and industry. In principle, these approaches are compatible, but in our observation the two tendencies have settled on mutually exclusive prescriptions and tend to be dismissive of each other’s potential roles. In particular, the two approaches attach radically different meanings to the word ‘sustainability’: one is broad and ‘literary’, the other narrow and ‘literal’. This has a bearing on the character of teaching and research in sustainability in higher education, and is one of the reasons we have engaged in this debate. Within universities, we have found that the term ‘sustainability’ and the academic niches associated with it, are largely dominated by Pan-Humanist narratives. Colleagues in other fields assume that this particular interpretation of the term is fully agreed and uncontested, that is, a broad progressive project that aims to deliver conditions to the whole world that its wealthier parts take for granted. It is undoubtedly attractive, and it is no wonder that many university staff outside the strict field of sustainability, have accepted it as the consensus view of the specialists.

EXPLAINING THE DIVERGENCE

In some ways it is puzzling that such a difference has occurred. As with many divergences, perhaps this goes back to a central narrative or metaphor, often referred to as a *paradigm* (Lakatos and Musgrave, 1990) on which discourses are subsequently constructed. There are several candidates for such a founding narrative. The most common is this: that the seeds of environmental destruction are found in the secular, analytical mindset that emerged in the 17th century Europe, often labelled ‘the Enlightenment’. This was, and still is, essentially a mechanistic programme, able to create larger and larger technical processes. According to one important strand of theory, these can escape control and potentially destroy civilisation (Miller, 1959; Dewing, 2019). This is a compelling narrative, but it is interpreted in two incompatible ways. On the pan-humanist side, it is argued that a complete alternative programme must be found to the basic mechanistic approach. On the technocentric side it is argued that once the ‘modern world’ created by the enlightenment project, has come into being, the only way to control it is through constant adjustments and interventions, largely of a mechanistic kind.

THE TECHNOCENTRIC SCHOOL

In a larger sense the roots of ‘modernity’ go back far beyond the Enlightenment (Henrich, 2020) but the physical impacts on climate are clearly due to growing populations, economic activity and amplifying technologies (Ehrlich and Holdren, 1968), forces released by the successful Enlightenment project to ‘crack the codes’ of the universe. We now know (roughly) how the physical world works, and this allows us to manipulate it on a large scale, a characteristic (and widely deplored) feature of technocentrism (McKibben, 1989; Merchant, 2019). This code-cracking was a necessary condition of the industrial revolution, probably the key process in the modern predicament. Despite some *bien pensant* grumbling (Blake, 1804; Cobbett, 2005) and undoubted urban squalor, the industrial revolution became generally popular, permitting rapidly rising standards of living, and eventually highly effective political patterns such as social democracy (Fukuyama, 2012; Acemoglu and Robinson, 2013). It is important to understand that the sheer filth of industrialisation was not generally regarded as a regrettable cost, but became celebrated as symbolic of newfound security and prosperity (Figure 2). Nevertheless, in the post-war period the physical downsides of heedless modernity were becoming obvious and this marks the beginning of modern environmentalism (Vogt, 1951; Bookchin, 1962; Carson, 1962; Platt, 1968). There followed a proliferation of NGOs, government agencies, regulations and inspectorates, along with new training programmes, jobs and careers (Turner et al., 1990).



Figure 2: A British political poster from the 1930s, showing acceptance, even approval, of the environmental impacts of industrial development.

We can see here the emergence of a professionalised environmental ‘movement’ emphasising technological responses to what are essentially physical problems. It reinforces itself through professional advancement, legislation, huge flows of money, and many undoubted achievements. To this movement can be credited solutions to most of the ‘classical’ environmental problems: urban air quality, acid rain, eutrophication, lead in petrol, toxic materials in paints and other products, and bathing water quality. It also achieved the ‘repair’ of the infamous ozone hole, the establishment of nature reserves and other protected areas on land and in the sea, regulation of food additives, improved food security and supply; and widespread reduction of energy and carbon intensities in energy supply and other industrial processes (Smil, 2019).

The technocentric programme tries to mitigate problems that emerge from the general trajectory of human development without fundamentally challenging the process. For this reason, it is sometimes labelled ‘eco-modernisation’ (Mol, Sonnenfeld and Spaargaren, 2009). It does not overly concern itself with underlying causes; it prefers to fix physical problems as they arise. While this technocentric approach has achieved much, it struggles with global problems dominated by collective-action effects (Olson, 1965; Hardin, 1968), sometimes described as ‘market failures’ (Kay, 2003; Stern, 2006). These include climate/greenhouse emissions and biospheric integrity, the principal modern challenges, and we shall return to them later.

[The ET critique can perhaps be stated another way, in terms of inter-generational equity. This is an uncommon notion, but has been officially recognised in in one of the devolved administrations of the UK, the Well-Being of Future Generations Act passed by the Welsh Government in 2015 (Llywodraeth Cymru, 2015). A significant *démarche*, this obliges legislation to take account of the interests of future generations. There is considerable uncertainty about what might be considered ‘interests’, but philosophically this can be dealt with by a kind of temporal ‘veil of ignorance’ (Rawls, 1981; Krznaric, 2020). This perspective suggests that (in terms of Maslow’s widely accepted Hierarchy of Needs, Maslow, 1943), fundamental lower-level needs of the future are being sacrificed to satisfy higher-level needs today. It is simply unjust.]

THE PAN-HUMANIST SCHOOL

The pan-humanist critique is as much cultural as physical, drawing on a long tradition starting perhaps with the Romantic movement in the 18th century and continuing through the 19thand 20th centuries to the present day (Cook and Wedderburn, 1903; Berlin, 2000). The critique is fundamental, aimed at most of the core features of modernity, especially perhaps those that have made it so successful: reason, quantification, instrumentalism, hierarchy, specialisation, science, analysis, growth, logic, data, convergent thought, record-keeping, individualism, materialism, reductionism, automation, technical complexity, machine metaphors, prosperity, extrinsic values and so on.

It is rather striking that to a large extent, the pan-humanist world has not tried to cherry-pick the good and reject the bad. Its general practice has been to create a complete anti-world which celebrates features directly *opposite* or antithetical to the technocentric world. It is a historical curiosity that initially, this tendency arose on the fringes of western societies in the 1960s and 70s, and was then labelled ‘alternative’ (Roszak, 1969; Saunders, 1975; Harper, 2016) but is now much more widespread and indeed has captured a large part of the lay environmental movement, including many teachers in higher education. It has created a special broad-spectrum meaning for the widely-used term ‘sustainability’. Common features are listed in Table 3. All this hangs together remarkably well as a coherent world-view. It is easily able to maintain its integrity through in-group reinforcement (Janis, 1982) and the simple heuristic ‘whatever they do, we do the opposite’. Unfortunately, this tends to generate an antipathy to *any* technocentric interventions, even of the provisional ‘emergency’ kind.

BOX: FEATURES OF THE HOLISTIC/PAN-HUMANIST PERSPECTIVE

* An emphasis on demand, rather than modifications of supply
* Lifestyle change rather than applications of technology
* A sharp distinction between the Natural and the artificial
* Nature regarded as both sacred and fragile
* Direct engagement with the natural world: Deep Ecology
* Anti-authoritarian politics, equality, diffusion of power
* Decentralisation, self-sufficiency, community self-organisation
* Interest in pre-modern and non-agricultural societies
* Simpler technologies, voluntary simplicity
* Hostility to both markets and command-and-control economic systems
* Hostility to economic growth; steady-state or degrowth patterns favoured
* Holistic, intuitive perspectives, divergent thinking, emergent properties
* Intrinsic rather than extrinsic values, quality of life rather than standard of living
* Interest in esoteric and earth-centred spirituality or religious traditions
* Low-tech/organic food production, concern for ‘wholesome’ food
* Willingness to entertain apocalyptic/social collapse scenarios
* Conflation of mitigation and adaptation
* Susceptibility to conspiracy theories and fringe science

Table 3 *Common features of pan-humanist thought.*

Our difficulty should now be plain. We are not unsympathetic to the pan-humanist case and the pan-humanist programme. As previously mentioned, we have been there ourselves (Harper and Sadler, 2020). But the current situation demands a rapid response, and it is difficult to see how broad-spectrum, holistic cultural programmes could bring results *in time*. A series of temporary technical fixes is more plausible, so we need to spell out how these might be applied, and what the implications might be. It is probably fair to say our proposals represent a divergence from the mainstream technocentric agenda, which is not very proactive –indeed rather conservative—and finds strategic transitions difficult (Hays, 1959).

Essentially, we regard Technocentrism as a regrettable and temporary necessity, although in the present circumstance the necessity is absolute. Hence our term ‘Emergency Technocentrism’. As university teachers, we are concerned to introduce this emergency programme into university curricula as fast as possible. We believe that universities have a unique role to play in providing the necessary change-makers, along with appropriate skills, analysis and research (Harper, 2019).

THE EMERGENCY TECHNOCENTRISM APPROACH

Emergency Technocentrism (ET) strives to be rationally coherent and to match the requirements of ‘The Situation’. It focuses on severe global problems with incipientthresholds, and aims to prevent the crossing of the thresholds with subsequent risks of irreversibility. It recognises two broad classes of such global problems:

* Global heating, and associated knock-on effects (*i.e.,* climate change in all its manifestations)
* Biodiversity/ecosystem services, and associated effects

These problems have to be ‘solved’ in parallel, because they risk serious irreversible conditions within a few decades. Their drivers are summarised in Figure 3, derived largely from the work of the Stockholm Resilience Centre. The windows for action are 20-40 years for the entire world (Rockström et al., 2017); 10-20 years for wealthy, net-importing countries with large historical emissions, such as the UK (CAT, 2013; PWC, 2019). ET recognises that these are collective global problems that cannot be fully solved locally, but to which each sovereign nation must contribute an appropriate share. The analysis therefore oscillates constantly from a global to a national perspective.



*Figure 3: Principal global processes underlying physical sustainability, showing directional trends and their relation to critical boundaries, represented by the dashed line, using data from the Stockholm Resilience Centre (Steffen et al., 2015). They all affect ecosystem services.*

Given these time scales, rapid transitions are obviously necessary. Such transitions need to be formulated as strategic plans with a clear view of the end goals, as in a military operation or a major national project such as the Apollo Programme (Randers and Gilding, 2010). Plans like these need to unfold in the correct sequence. They require strong central direction and a solid consensus. It is true there is little peacetime precedent for the prosecution of such plans and such a rapid rate of directed investment. But logically there is no alternative, so this process must be on the table for general discussion, and would be an important subject for research and teaching. There is obviously a key role for higher education.

In the final section of this paper, we raise a number of important topics that, in various degrees, diverge from the prevailing consensus. This is not a matter of choice. These are corollaries of the rational, quantitative approach we have adopted, and they serve to underline the sharp polarisation we have observed within the HE sector.

*Prevention versus adaptation*

Principal responses to the climate crisis fall into two classes often labelled ‘mitigation’ (trying to stop it or slow it down) and ‘adaptation’ (reducing the damage arising from climate processes). In our observation, the term ‘mitigation’ is not always understood clearly. Its other uses in English and its etymological roots imply some kind of ‘softening’ or rendering more benign. Sometimes it is even confused with adaptation. We feel these obscurities can be avoided simply by using the term ‘prevention’, because that is after all what we are trying to do: to *prevent* the crossing of the guardrail thresholds, simply because there are risks of irreversible change. In what follows, the term *prevention* is used for clarity, but is essentially coterminous with *mitigation*.

*Prevention and adaptation are logically or ethically distinct*.

Consider these two assertions:

* Adaptation has concentrated benefits and dispersed costs.
* Prevention has concentrated costs and dispersed benefits.

This important pair of patterns in costs and benefits was first explored by Olson (1965). It applies strongly to prevention and adaptation. In any competition for attention and resources, adaptation will have a large advantage and seize a disproportionate share of the opportunity-costs (Buchanan, 2017). However, the effects of climate-change adaptation are generally temporary and over time lead to an endless regression of increasingly desperate measures. The goal-posts do not stand still. Adaptation can be deeply attractive in the short term, largely on account of its immediate and tangible benefits, but is ultimately a fool’s errand. Note that we are not saying all adaptation is wrong, or should not be studied at all. It just should not be a significant part of a university programme dedicated to preventing the worst outcomes. Others will do it, and it will seize progressively more of the resources available for prevention. There is no need to pour fuel on this fire.

Having said this, there are overlaps, such as preventive measures that also serve adaptation. These are acceptable for study and teaching. For example, increasing organic matter in soils can both sequester CO2 and provide crop resilience against changed conditions. This subset of overlapping measures will be an important topic for ET programmes in HE.

*Deep adaptation*

The standard meaning of ‘adaptation’ might be considered simple or ‘shallow’ adaptation. This contrasts with a novel approach associated with Jem Bendell, known a ‘deep adaptation’ (Bendell, 2017). In this perspective, prevention is already too late, so there is no problem of opportunity costs. Therefore, we need a much more strategic, long-term approach to adaptation rather than piecemeal reactions to climatic events. This approach is logically coherent, but ethically eccentric. If the thresholds are passed, then there are much greater risks of fundamental changes and billions of deaths. Deep adaptation is about how some can survive indefinitely: it does not address the question of *who*. Who are the saved and who are the damned? The assumption that it is too late to prevent the crossing of the thresholds is defensible, given the looming deadlines and lack of progress on the matter since 1992. However, the ET approach insists on prevention while it is still technically possible, which for the time being, it is. If the Rawlsian notion of the ‘veil of ignorance’ is applied temporally, we arrive at a much higher weighting of future generations that casts severe doubt on the ethics of Deep Adaptation (Rawls, 1959; Krznaric, 2020).

*Adaptation under ET*

Is there to be no adaptation at all in a rapid transition? Yes. ET-style transition programmes do entail considerable disruption and change, and populations need to be helped to adapt. But note this is *adaptation to planned prevention measures*, not adaptation to climatic *force majeure*. It would be part of the strategic planning. We are minded to label this ‘reflexive adaptation’, with acknowledgements to the work of those late-20th century theorists who explored the notion of ‘reflexive modernity’: that the task of post-modern societies is to deal with issues they have themselves created. (Beck, Giddens and Lasch, 1994).

*The primacy of physical processes*

One common fallacy within much sustainability discourse, is that the physical and non-physical aspects of the problem are to be treated in parallel as co-equal aspects. For example, the 17 UN Sustainable Development Goals (SDGs) are widely used as a framework (UN, 2015), with the general assumption that they are all pursued on a broad front. Similar assumptions lie behind the ‘triple bottom line’ idea that sustainability has co-equal environmental, social and economic strands (Elkington, 1999, 2018). While these assumptions sound wise and humane, they fail to grasp the fundamental principle that the physical world necessarily dominates the situation, and physically plausible solutions must be at the heart of serious analysis. Of course, non-physical aspects feature hugely in *delivery*, but they must be built around a solid core of ‘physics’ rather than the other way about, which is what tends to happen.

*Micro- and macro-sustainability*

We have drawn a contrast between small-scale, bottom up, largely cultural measures; and mass-scale, top-down technological measures. We can label these Micro- and Macro-sustainability respectively. Table 2 contrasts various features of the two, one of which approximates the assumptions and programme of the ET approach. To make this clearer, Pan-Humanism tends to favour ‘bottom-up’ **behavioural and lifestyle** changes, ET tends to favour ‘top-down’ **technical changes of infrastructure**, notably in energy, industry and land-use. Our argument is that, broadly speaking, micro-measures are too slow, too diffuse, and too narrowly-based. In contrast, macro-measures can be rapid, well-targeted and affect the whole population.

*Infrastructure not lifestyles*

A further corollary of the ET perspective is that lifestyle changes are relatively unimportant. This directly contradicts the perspectives found in Education for Sustainability and the green movement generally. Lifestyle changes are undertaken voluntarily by about 10% of the population, and typically result in 20-40% reductions in participating household carbon emissions so have very little real impact overall (Moran et al., 2018). This is ‘micro-sustainability’ as previously discussed. If lifestyle changes are *not* voluntary but actually imposed, there is an almost certain prospect of resistance, inevitably encouraged by parts of the media and many politicians, leading to a permanent *gilets jaunes* style insurgency (Natalini, 2019). A cultural transition programme would almost certainly lose these battles, and it is important to try and avoid them. This is a strategic rather than physical aspect of the ET programme; that emphasis should switch to relatively ‘invisible’ infrastructural changes that will allow everyday life to continue without undue disruption. Paradoxically perhaps, macro-measures are far less salient to ordinary consumers. It can be convincingly demonstrated that such changes could bring large and rapid reductions in impacts, even to the level of the much-vaunted ‘net zero’ (CAT, 2010). Macro-measures do not improve the quality of life directly; but critically, they improve the chances that its physical basis can be maintained.

*Contributions from different disciplines*

Despite its emphasis on technology, ET is unavoidably an interdisciplinary framework. In the necessary transition process, it would be the task of pure science to analyse the problems and suggest potential solutions; and of engineers to design practical measures and apply them. These matters are challenging but do-able. Much more difficult would be the many tasks for social scientists, economists and the political class, who would need to help the general population in ‘reflexive adaptation’ to the large infrastructural changes taking place. Admittedly these changes will often be at one remove – the countryside perhaps, or at sea – but sometimes they will be at least temporarily intrusive – building-retrofits, transport arrangements for example – and we will all need reassurance that our most cherished comforts and values are not permanently threatened.

Having emphasised the primacy of infrastructural change, there remain two areas where technical solutions are difficult, and where necessary changes do impinge on lifestyles and cultural preferences: flying, and livestock products. These could easily trigger *gilets-jaunes*-style revolts. Even here, technical alternatives are being developed and will probably emerge in due course, but in the meantime the transition programme would be critically dependent on Pan-Humanist skills. There is plenty to be done.

SUMMARY

To summarise the distinctive features of the ET approach:

* There is a **double challenge** from both climate change and damage to ecosystem services
* They are both **very serious and very urgent**
* Both must be tackled **in parallel**
* They both require **physical solutions**
* There must be a **rapid transition** to the low-impact state
* This is **possible** without undue cost or destruction
* The transition needs careful proactive **strategic** planning
* The emphasis must be on **prevention**, not adaptation.
* The principal changes are **macro-scale transformation** of infrastructure, not lifestyles.

This interdisciplinary but coherent approach makes an ideal basis for a university-level programme of teaching at either undergraduate or postgraduate level. It draws on widely-shared values and seeks internal consistency and ‘consilience’ among all the disciplines concerned. It suggests countless areas of research, not least in planning the transition. And it would be highly attractive to the rising generation of prospective students looking for university courses that match their ethical vision.

It is conceivable that occasionally, university administrations will accept our argument, and shoe-horn a few more climate-related or biodiversity programmes into some courses. This is not good enough, although it might be better than nothing. Departments are normally clustered into Faculties of coherently related subjects, yet sustainability problems are inherently interdisciplinary. What are required then, are **new interdisciplinary faculties**. Doubtless this suggestion will be met by incredulous resistance, and this vindicates our case perfectly: even prestigious universities have failed to grasp the seriousness and urgency of the crisis that now looms.

NOTE:

*A longer version of this paper is available from the corresponding author peter@peterharper.org.*

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1. The terms ‘ecocentric’ and ‘technocentric’ are widely used. Helpful definitions and examples can be found in O’Riordan (1981). [↑](#footnote-ref-1)
2. Educated readers will doubtless pick up echoes of the tale of the Gordian Knot in ancient Phrygia, of which it was said ‘whoever looses this will rule all Asia’. According to legend, it was shown to Alexander of Macedon, who rather unsportingly drew his sword and sliced it in half, then went on to fulfil his destiny. Alexander’s action, for better or worse, might be considered to represent the technocentric approach. [↑](#footnote-ref-2)