

Water, Transport, Oil and Food: A Political–Economy–Ecology Lens on Changing Conceptions of Work, Learning and Skills Development in Africa

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Introduction

Not enough has been said about the kinds of skills development that are needed if we are to stem the rising tides and impacts of political economies that have been driving what some call ‘fossil capital’ (Malm, 2016). In this book, we are producing an emerging argument that it is necessary to also rethink and reframe vocational education and training (VET) logics and approaches if we are to fully consider the implications of a warming future. This chapter provides the context of why this is such an urgent challenge and some thinking tools for understanding where we have come from and where we need to go.

The prognosis is that it is now almost impossible to stop global warming below 2°C. The 2021 Intergovernmental Panel on Climate Change (IPCC) report issued a ‘red alert’ for humanity, noting climate change to be one of the most severe challenges facing human societies for decades and potentially centuries to come. Scientists are warning that we have entered a new ‘geological epoch’, named the ‘Anthropocene’, in which human activity, especially the release of carbon dioxide into the atmosphere through fossil-based pollution, is transforming the stability of the earth system and creating knock on effects such as ice melt and methane release, which exacerbate the impacts of pollutants on the stability of the earth system.

This gains significance if we come to understand that human settlements and especially agriculture (such as food production systems to support those human settlements) became possible due to the largely stable climate patterns in the Holocene period, the geological epoch that we are now moving out of (Steffen et al, 2007, 2011).

The prognosis of the impact of climate change on existing activity and life as we know it has devastating implications for Africa. Southern Africa is particularly vulnerable to climate changes, as the region has already been experiencing changes that are more rapid, with impacts that are more severe, than the global average. This has severe consequences for water security and availability. Existing patterns of global warming and projections for future warming indicate that warming and drying will be greater than the global average, for a vast part of Southern Africa, especially the south-western countries and regions, while the eastern parts will be wetter and subject to more extreme and intense weather events such as floods and cyclones, as has already been seen in the early 2020s. In Uganda, too, climate change threatens food production on a scale that is hitherto unknown. Changes in temperature – projected to be in the region of 4.3°C by the 2080s – are likely to have significant implications for water resources, food security, natural resource management, human health, settlements and infrastructure (DFID, 2008), with a strong likelihood of increased food insecurity and other economic impacts. These challenges arise partly from centuries of political economy thinking that has failed to adequately recognize political ecology and include it in associated VET models and trajectories, ignoring environmental concerns as a result.

Water challenges and associated warming patterns have implications for food production, and especially the provision of adequate water resources for a steady supply of food. In both South Africa and Uganda, agriculture has been identified as one of the sectors that are ‘particularly vulnerable’ to climate change, with potential drops in crop yields and increased livestock losses projected. This is particularly the case in contexts where there is a high reliance on rainfed agriculture, which characterizes the reality of most smallholder farmers across Africa (such as those in Alice). The scale of the challenge gains meaning when recognizing that roughly 65 per cent of Africa’s population relies on small-scale farming (Savage, 2019).

There are numerous calls for concerted action, and multiple studies at national, regional and international levels continue to confirm the seriousness of the impending impacts, many of which are already visible to farming communities. It is not only the challenges associated with water for food that are at issue but those associated with heating of soils and the climatic pattern effects on plant life. Already there are changes to phenology, ‘the timing of annually recurrent biological events, which is one of the most sensitive bio-indicators of climate change’ (Fitchett, 2021). This provides indicators

of how biodiversity and plant life are changing. For example, consistent early blossoming of apple and pear are being observed in South Africa.

The IPCC is already warning that short-term adaptation strategies may not be enough, and that longer-term thinking is needed to fully consider the impending implications of overshooting the 1.5 and 2°C targets.

Oil, transport, water and food: locating VET Africa 4.0

Oil, transport, water and food (which materially partly define our cases in this book) are intimately embroiled in the challenge of rethinking the VET logics and approaches mentioned earlier for their historical, contemporary and future relationships to climate change.

The following summarizes the key messages of the World Bank's country climate risk profiles for Uganda and South Africa ([World Bank, 2021](#)), supplemented with other sources. While drawing on this data to give a quick view of the current nature of the climate change crisis in the two countries where our cases reside, in relation to the core focal areas of concern for VET development in these contexts, we recognize the oftentimes 'imperialist character' of global environmental programmes and data, which also have patriarchal overtones as are also found in mainstream sustainable development discourse ([Shiva, 1994](#)). [Sachs \(1993\)](#) critiqued mainstream environmental narratives that circulate in international development agencies for being shaped by powerful corporate interests, imperialist agendas, gender biases and racist assumptions. Most recently, these are also being shaped by universalizing behavioural economic narratives (for example, [UNEP, 2020](#); [UNDP, 2021](#)). As [Tetrault \(2017\)](#) notes, early political ecology works advocated alternatives such as acting locally, valuing traditional ecological knowledge and strengthening local institutions for collective resource management (see, for example, [Agarwal and Narain, 1993](#); [Shiva, 1994](#); [Esteva and Prakash, 1997](#)), arguments we also emphasize in developing the social ecosystems for skills model in this book.

Country climate risk profiles

Both countries will experience the worsening of existing climate challenges. In Uganda, temperatures are increasing, with 1.5°C being projected by 2040, alongside a reduction in annual as well as seasonal rainfall. Since 2000, western, northern and north-eastern regions have experienced more frequent and longer-lasting drought conditions, and extreme events such as floods, droughts and landslides have increased. In South Africa, average temperatures have increased by 1.5°C since the 1960s, with more marked increases across arid, inland areas of the country. Temperature extremes

have also increased significantly, both in frequency and intensity. Rainfall has decreased in the west, while an increase in extreme weather events in the east, such as flooding, is already occurring.

Both will face increasing water challenges, although the nature of this challenge is different within and between the two countries. Although Uganda is endowed with both surface and ground water resources, projected climate change and variability are already affecting availability. This is impacting upon sectors such as agriculture and fisheries, forestry and tourism. Water stress is considered highly likely for much of Uganda's population. South Africa is already highly water-stressed and highly vulnerable to a changing climate (a key theme of the Alice case). Projected climate change impacts could exacerbate existing conflicts and further increase inequalities regarding the limited access to potable water. Changes in the quality and availability of water will be the dominant challenge for the country for the rest of the century. As droughts become more frequent and severe, water supplies, biodiversity and agriculture are likely to suffer, with a simultaneous increase in floods posing a serious threat to water quality and a range of economic activities.

Agriculture is significant in both countries, but particularly critical in Uganda, where it employs 70 per cent of the working population and contributes over a quarter of its gross domestic product. Climate change could see a reduction in production of food crops such as cassava, maize, millet and groundnuts by the 2050s, with overall losses reaching up to US\$1.5 billion. Gulu is projected to be among the worst affected districts. Increased dry periods will be exacerbated by continued soil degradation, associated with unsustainable agricultural practices (see [Chapter 1](#)'s introduction of the Gulu case). Major export crops like coffee and tea could also see a reduction in yields leading to combined economic losses of about US\$1.4 billion in mid-century. In South Africa, the sector employs nearly 1 million people and contributes to export revenues. More importantly, it is fundamental to local livelihoods, as the Alice case highlights. Climate change is expected to have generally adverse impacts on cereal crop production, high-value export agricultural production and intensive animal husbandry practices. Subsistence, dry-land farmers are more vulnerable to climate change than commercial farmers.

The transport sector has seen massive growth over the past 50 years. In Uganda, new roads continue to be built, currently in the Hoima area, and vehicle use has increased hugely. While this growth has eased human and goods movement, it has also led to high levels of congestion, especially in Kampala, and a significant rise in emissions. Projected climate change trends are expected to have negative impacts on Uganda's road infrastructure and transport sector. In South Africa, emissions from the transport sector account for more than 10 per cent of the country's total greenhouse gas

emissions. In the context of our eThekweni case, it should be noted that maritime transport is a very small (recorded) contributor to transport sector emissions in South Africa, but this is due to maritime transport operating mainly beyond South African boundaries.

Energy is a major area of controversy in both countries. The World Bank country climate analysis makes no mention, for instance, of the likely effects of oil extraction in the Hoima region. In late 2021, protests flared along the Eastern Cape coast regarding oil and gas exploration. The Bank suggests that there is high potential for clean energy generation in Uganda. However, the country's legal framework and institutional capacities need to be improved. South African energy is highly dependent on the country's cheap and abundantly available coal, and it is one of the highest carbon emitters per capita in the world. At the 26th Conference of the Parties, the government secured international support for a move towards renewable energy. However, there has been growing trade union opposition to this move (after initial support), and there are clear internal tensions within the government on this policy (Mabasa, 2018; Swilling, 2021).

It is evident from the preceding discussion that findings emerging from the environmental and social-ecological system/earth system sciences have important implications for rethinking dominant development trajectories. Yet, there also remains a need for critical readings of environmental science (such as Forsyth, 2003). More broadly, a stronger link is required between political economy and political ecology discourses in and for rethinking education and training praxis (Rosenberg et al, 2020). In what follows, we mark out some implications of emerging connections between political economy and political ecology, recognizing that more local-level analyses are necessary for substantively connecting these deliberations to skills development praxis, contributing to our argument for investigating the potential of social ecosystem for skills development models as these may also offer better demand analysis for green skills or skills for just transitions (such as Rosenberg et al, 2020). We term this a political-economy-ecology lens, following Malm (2016).

Political-economy-ecology

Considerable work is emerging that provides historical and contemporary vantage points on the deep-seated connections between political economy and political ecology (such as Bond, 2002; Forsyth, 2003; Malm, 2016; Moore, 2016; Scoones, 2016; Satgar, 2018; see also earlier work by Gorz, 1989; Bookchin, 1990). Malm offers a substantive account of the link between carbon-centric development and capitalist accumulation. His work sheds light on early choices made to abandon waterpower in the interests of coal-fired steam power driving the machine age, which Malm attributes

to a history of more convenient control of labour than any limitation on availability of waterpower (indeed, waterpower was often cheaper). Coal-fired steam power also allowed the concentration of labour in towns as factory workers, with early carbon emissions leading to protests among workers to ‘stop the smoke’. Malm’s work shows that carbon emissions were linked to the entrenchment of capitalist social relations, hence the title of his political–economy–ecology work: ‘fossil capital’.

Since the early days of the industrial revolution, this story has ‘moved offshore’ as globally mobile capital continues the search for cheap labour and disciplined labour power by means of the mass consumption of fossil energy and other forms of extractivism (Malm, 2016; Tomaney, 2017). Malm’s argument points to some of the struggles that societies are having in reorienting away from fossil capital towards forms of energy that operate via ‘flows’ (such as water, solar and wind power) rather than ‘stocks’ (oil, coal and so on), as it is more difficult to develop the cooperation necessary for managing energy flows than it is to control the economy of energy ‘stocks’.

Commenting on Malm’s account, Tomaney (2017) notes that

[w]ith this evidence, Malm offers a reformulation of Marxist theory. The production of surplus value is still central to capital accumulation because labour power creates anthropogenic products, but the transformation of fossil fuels into carbon dioxide is intrinsically linked to capital accumulation. Malm extends Marx’s notion of a distinction between the formal and real subsumption of labour to the realm of nature to emphasise the way it is subordinated to the production of surplus value. This is a version of Marxism in which an analysis of the production of space is foregrounded, with Henri Lefebvre, Michael Storper and others mobilised in the argument. It is a productionist account which is dismissive of the role of mass consumption as the cause of carbon emissions.

Leff (2015: 33) explains that political ecology emerged as ‘a social response to the oblivion of nature by political economy’, with subsequent forms of eco-Marxism uncovering a ‘second contradiction of capital’, namely the ‘self destruction of the ecological conditions of sustainable production’. Reframing political economy to include ecology provides new challenges for the foundational narratives that drive VET emerging from this history, especially the now worn narrative of human capital theory, but also the political economy of skills discourse that left out the relation between power, economy, production and nature, turning nature into a resource to be mobilized into the productionist narrative (Moore, 2016). While the political economy of skills account has done much to surface problems with exploitation of labour power, the severity and implications of ongoing

ecological exploitation, extractivism and now earth system damage require a broadening of such discourses to include a stronger focus on political ecology (understood broadly as the relationship between politics and the environment). As [Leff \(2015: 33\)](#) states, ‘political ecology goes beyond the proposal for conservation of nature ... and policies of environmental management ... to inquire on the conditions for a sustainable life in the ecological stage of economic and technological hegemonic domination’. This needs to be done in ways that also proffer options and ways of moving towards alternative futures that are more inclusive, less exploitative and less damaging of the life-supporting systems that humans and other life forms require to live decent lives and indeed to sustain life in the face of mass extinction of biodiversity and destruction of lifegiving forces such as clean air and water. If they do any work at all, the sustainable development goals (SDGs) (given their largely economically driven environmental management roots, see [Martínez-Alier, 2003](#)) at the very least draw some attention to the need for a political–economy–ecology approach to VET.

[Burawoy \(2013\)](#) describes three ‘waves’ of Marxism, those of capital–labour (1795–1914), production–exchange (1914–73) and production–environment (1973–present), with the latter focusing on societal socialism, real utopias and a sociological–global form of Marxism that also signals shifting relations between theory and practice. For the sociological–global form of Marxism, there is a need to ‘search out real utopias that can galvanise the collective imagination but also interrogate them for their potential generalisability’ ([Burawoy, 2013: 48](#)). Any such generalization needs to be contingent and coconstructed with those most affected. Importantly for our argument in this book, Burawoy insists that this brings the role of civil society into focus, especially its role and contribution towards defending humanity against a growing ecological crisis that emerges from the commodification of nature, which takes the form of ‘privatisation of water, land or air’. To this, we add inclusivity of those excluded from mainstream notions of economy, work and VET. Relevant to our approach is [Burawoy’s \(2013: 47, 48\)](#) argument that this shift will emerge through the building of what [Wright \(2010\)](#) calls ‘real utopias’: ‘small-scale visions of alternatives such as co-operatives, participatory budgeting and universal income grants that challenge on the one hand, market tyranny and on the other, state regulation’. Such analysis, [Burawoy \(2013: 48\)](#) argues, should focus on ‘their conditions of existence, their internal contradictions, and thus their potential dissemination’, offering a means of keeping alive the possibilities of alternative capitalism, which he describes as not abolishing markets or states but ‘subjugates them to the collective self-organisation of society’.

[Raworth \(2017\)](#) applies similar arguments to a rethinking of the economy, suggesting that we need to include the home, market, state and the commons as four distinct realms. VET, in Africa and elsewhere, tends to only consider

the market and, to a declining extent over time, the state. Work that serves the commons and home-based or subsistence work for livelihoods is most often excluded from VET, an issue that we consider via the expanded social ecosystem model. In subsequent chapters, we will show this to be more inclusive of these different notions of work and more inclusive of the types of work in which young African people are actually engaged (see [Chapters 5 and 7](#)).

From an environmental perspective, the historical-materialist political–economy–ecology work of Martínez-Alier (1997, 2003; Guha and Martínez-Alier, 2013) on ‘environmentalism of the poor’ (see also Leff, 2015; Scheidel et al, 2018), which explores power relations that emerge from society–environment relations and materially grounded analyses of unsustainable forms of modern rationality, can be helpful for considering the contradictory and more complex implications of considering a political–economy–ecology perspective as framing for VET 4.0. This extends the perspective of Burawoy. Martínez-Alier, Guha and Leff’s work challenges the notion that environmental interest and action stem from affluent societies and their ‘post-material’ concerns. They draw attention to the significance of historically and structurally constituted ecological distribution conflicts as drivers of environmental concern. As stated by Tetrault, in the global south, such conflicts

prototypically pit subaltern groups (with their allies in civil society) against private companies and governmental actors. The latter promote capital-investment in the expansion of extractive activities, polluting industries, and environmentally destructive mega-development projects; while the former struggle to protect their territory, productive natural resources, recreational spaces, and cultural landscapes, all of which form the material and symbolic basis for sustaining livelihoods, healthy living environments, and cultural diversity. (Tetrault, 2017: 12)

Rereading the history of African VET

The VET history we outlined in [Chapter 2](#) needs to be read as part of a wider story of colonialism and ongoing neocolonialism. As we noted there, the modern VET system arose in tandem with, and in support of, the industrial revolution and neoliberal capitalist projects of extraction. Even the so-called fourth industrial revolution is not exempt from a significant carbon emissions impact due to the energy used to transfer data and produce the equipment used for such transfers, with claims that this impact is likely to equal that of air travel. By-and-large, VET systems globally have been largely oriented to producing skills for driving the fossil-fuelled industrial economy, with some recent shifts emerging around new value chains related

to green information and communication technology and the emergence of an alternative energy economy (mainly in the north). In African contexts, skills systems were developed, and largely remain defined, along extractivist, racist and exploitative lines in support of major industrial and infrastructure development projects of the colonial and postcolonial state and the continuing interests in offshore resource flow (such as oil). Political ecology emerged in the south out of a ‘politics of difference rooted in the ecological and cultural conditions of its peoples; from their emancipation strategies for decolonization of knowledge, reinvention of territories and re-appropriation of nature’ (Leff, 2015: 34). It has potential to provide a counternarrative to the dominating VET trajectories, but this should not be naively viewed or developed.

After independence, the hope was that African governments would be more accountable to local populations and would end the centuries of foreign domination of African economies and government policies (see VET Africa 1.0 account in [Chapter 2](#)). Cheru (2016) explains that this hope, represented and championed by some early liberation movement leaders, had the support of workers, trade unionists and the growing radical student movements, as this was also ‘essentially a strategy for more equitable appropriation of the productive forces under a democratic system of government’ (Cheru, 2016: 1271). There were important steps in this regard, particularly around health, education and communications infrastructure. However, as Cheru notes, nationalist leaders felt impelled to continue extractivism due to the need to fund development internally. This had the perverse effect of locking Africa into this model.

African development strategies were complicated by the Cold War and a series of military interventions that often linked back to Cold War actors. The 1980s saw the rise of neoliberalism, exported to Africa through structural adjustment at a time when African countries had major debt burdens linked to excessive borrowing fuelled by the 1970s global oil boom. The infrastructural and social development investments of the early independence period were systematically dismantled under a new development regime (Cheru, 2016). As noted in [Chapter 2](#), this led to a new ‘VET toolkit’ but also to a collapse of the jobs that VET was supposed to support. As Cheru (2016) notes:

[F]ew African countries have achieved credibly in terms of any of the indicators that measure real, sustainable development. Instead, most have moved backwards and experienced growing inequality, ecological degradation, de-industrialisation and poverty. Moreover, with the growing influence of external donors in domestic policy decisions, African governments have become more and more accountable to creditors rather than to their own citizens. Thus, policymaking, an

important aspect of sovereignty, was wrenched out of the hands of the African state – amounting to re-colonisation, not development. (Cheru, 2016: 1273)

Ferguson (2006) refers to the impact of this as a form of ‘neoliberal transnational governmentality’ that even reaches into sustainable development projects. He illuminates how under this trajectory, the needs of foreign capital – for instance in the oil, transport, green agricultural revolution and international conservation sectors – are placed ahead of the needs of African citizens and communities. In such a scenario, the national elite becomes a facilitator of transnational priorities, producing a form of ‘recolonisation by invitation’ (Cheru and Obi, 2011) as national governments claim ownership of natural resources such as oil and minerals and exploit them ostensibly ‘for the people’ but, in reality, to benefit political elites. These trends are found in the influence of industrial agriculture’s ‘green revolution’ strategies (Wise, 2020; Belay and Mugambe, 2021) as well as in sectors such as transport where transnational corporations control global movement and flow of resources, and in the minerals and energy sector where natural resources such as oil and coal remain high-value commodities to ‘extract and export’ (Cheru and Obi, 2011), despite the climate change impacts (Swilling, 2021). As noted earlier, the World Bank fails to mention oil exploration and development in Uganda in its ‘climate change risk’ reporting, while South African energy policy is contradictory, and the transport sector is failing to take account of maritime impacts as these are said to be ‘out of the boundary’.

These neoliberal, transnational political economy interests of elites in African countries also structure the nature of work in its formal sense, and thus also VET systems and their priorities. For example, agricultural education and training programmes are largely oriented towards industrial agricultural paradigms, despite most of Africa’s farmers being small-scale producers who could, it is argued, benefit more from advancing their practices through agroecological approaches (Pesanayi, 2019a; Wise, 2020). Additionally, climate-resilient agriculture remains largely absent from these training programmes (Van Staden, 2020). Education on water use in agricultural colleges tends to favour large-scale irrigation, despite impending water scarcity (Pesanayi, 2019a). Technology and engineering VET programmes favour productivism and extractivism and are still largely oriented towards advancing fossil capital imperatives, despite these being in decline the world over, reflecting overreliance on dominant interests still controlling ‘free market policies’. Here we note Standing’s (2016) critique of ‘free market’ economic policies as a fundamentally corrupt system that favours rentiers while depressing the incomes from labour, not only in Africa, but globally.

Such paradigms for skills development produce exclusions, most notably around VET for livelihoods, or are increasingly misdirected or impractical given people's current realities (see [Chapters 5 and 7](#)). In response, [Cheru \(2016\)](#) argues for three processes that could transform African political economies:

1. promote and sustain democratic governance with an emphasis on broad-based and inclusive governance;
2. improve the effectiveness of the state, including building the human capacity for inclusive economies and poverty reduction; and
3. construct viable social contracts that take seriously the need to reduce socioeconomic inequalities, which will also need to consider the implications of social-ecological risks and impacts.

Strikingly, a political ecology is absent from this. In contrast, [Moore \(2016\)](#) describes the emergence of the 'Capitalocene', resulting from dividing historical change and contemporary reality into 'nature' and 'society'. His argument is that, in fact, history reveals a more connective view of 'environment-making' in which the emergence of capitalism is, and always has been, joined at every step with the biosphere, as Marx also pointed out in his arguments about human control of nature and resource flows in the construction of capital. [Altvater \(2016: 145\)](#) argues that '[c]apitalism changed human existence; it has interpenetrated both earth systems and the mental worlds of each (social) individual', which has implications for our politics and practices as we seek to move out of the capitalist trap in which 'humanity – acting through capitalist imperatives – is organising nearly all its productive and consumptive activities by trapping and depleting the planet's energetic and mineral reserves'.

Thus, in arguing for Cheru's three points, we should see the role of the state not only as one that must build inclusive economies and poverty reduction, but also as being central to 'any realistic effort at climate mitigation and adaptation' ([Parenti, 2016: 174](#)). In this, the 'biophysical significance of the state's geography' must be brought into efforts to strengthen the effectiveness of the state. To fail to do this is to further 'free capital from the constraints of territory' and, thus, responsibility for ongoing environmental degradation and the climate and environmental injustices being perpetuated via globalized extractivism and offshore pollution production. This understanding led [Hardt and Negri \(2001: 297\)](#) to argue for the need for 'a theory that connects the role of nonhuman nature's use values to accumulation and the territory of the state', and for reframing the state's role as a responsible environment-making institution that better uses its legal frameworks of property as these are territorially fixed. [Parenti \(2016\)](#) argues that 'states still remain the crucial political

units of global capitalism’, noting that they are the only institutions that have power left to confront transnational capital institutions. Having said this, there is also a need to recognize the historical role and impact of transnational forms of power and globalization (for instance, IMF policies that focused on ‘rolling back the state’) and the emergence of new forms of governmentality that tend to ‘bypass states altogether’ (Ferguson, 2006: 100).

Turning back to our focus on oil and transport, Ferguson describes how transnational topographies of power ‘hop’ over whole sections of society, developing only those parts of the continent that are valuable for various reasons, a process that creates and sustains structured underdevelopment. He cites examples of transnational mining interests and conservation programmes that alike tend to create enclaves of power and control that fail to benefit larger society, or even the nation states where the natural resource or mineral wealth lies. We have seen this from the history of Africa’s oil states, for example. Ferguson (2006: 89) goes on to say that this transnational topography of power makes sustainable development of any kind exceedingly difficult. He argues for a ‘heightened level of reflexive scrutiny of our categories of analysis’. Hence, in this chapter, we are arguing for a political–economic–ecological vantage point for analysis of VET systems that can offer a more inclusive and less narrowly constituted foundation for VET in Africa. Here, Bond and Hallowes (2002) argue that mainstream sustainable development is an inadequate response to Africa’s development demands and to the environmental conflicts and stresses experienced by the poor. Bond and Hallowes, along with many in environmental justice movements, propose clear and explicit normative commitments to sufficiency, redistribution, equality and ‘real’ sustainability in development thinking (see also Lotz-Sisitka, 2011).

Cheru points out that even in the context of the inescapable realities of global development priorities and support for these (such as the SDGs), any such relations should ‘involve the right of countries to devise, discover and evolve policies that are suited to the local political and economic conditions’ (Cheru, 2016: 1279). As stated in earlier chapters, we propose that by giving attention to political economy and political ecology and an expanded notion of social ecosystems for skills, a VET 4.0 system may be developed that is more inclusive and suited to the local political, economic *and* ecological conditions in which the ecological impacts on the economic, and not just the other way round. This is consistent with Burawoy’s argument about localized ‘real utopias’. Our argument for a political–economy–ecology framing for VET 4.0 in Africa takes us to a consideration of skills development in relation to water, food, transportation and oil (Box 3.1). Very many of Africa’s people rely on rainfed agriculture, and all societies, including in Africa, rely on

Box 3.1: The need for a political–economy–ecology lens for VET: views of work, life and learning realities and skills development needs found in our cases

Case 1: Water for food – Alice. As described across the chapters, the driver of the development of a social ecosystem for skills was farmers given back land under the post-apartheid land reform policy, but this was coupled with a failure to provide adequate water. This catalysed a need for collaborative learning among multiple actors to implement locally possible solutions such as use of rainwater harvesting and conservation approaches to bolster smallholder farming production systems, seen to be viable in the water scarce region impacted by drought. Where it engaged with agriculture, the local VET system was privileging high water use irrigation and large-scale commercial agriculture, excluding Black smallholder farmers' aspirations towards economic empowerment and viable commercialization in local economies.

Case 2: Food and diversified livelihoods – Gulu. As described across our chapters, the driver for development of a social skills ecosystem model for skills development in the Gulu region was a history of conflict, exclusion and war. Post-recovery demands included development of more sustainable options for agricultural production based on more equitable distribution and use of land, and a wider range of viable local economic development options, and for further climate resilient development in the longer term for young people, other than those privileged in the existing VET system.

Case 3: Transport – eThekweni. As described across the chapters in the eThekweni case, development of the maritime industry under the centralized Structural Infrastructure Programme of government to develop the ocean economy created a range of VET programmes that were poorly aligned with actual jobs emerging in the sector, due partly to the failure of centralized 'sustainable' development programmes such as Operation Phakisa, which has also been contradictory from a political economy/political ecology perspective, as more recent oil and gas explorations along the coast are showing.

Case 4: Oil – Hoima. As described across the chapters in the Hoima case, the oil extraction in the area is driven by international oil and extractive multinational corporations (IOCs), which operate on principles of extractivism coupled with paternalism. This trajectory of exploitation, followed by strategic reactions to civil society and political pressure and the subsequent engagement in multi-actor partnerships (shaped by sustainable development discourse), is clearly apparent in the trajectory of IOC engagement in skills development initiatives in the Hoima setting. The Skills for Oil and Gas in Africa (SOGA) programme involving donors and IOCs controls skills systems, leaving little room for emergence of local alternatives.

available, clean water for life and economic activity. Equally, all societies, including in Africa, will in future require more sustainable forms of energy and transport for human flourishing, and thus VET systems need to move beyond a stance rooted in political economy in the fossil capital tradition. Rather, we need a political–economy–ecology account as part of a more sustainable and environmentally just society tradition for VET. Indeed, this seems to be a real demand in African societies, as shown, at least in part, by our case contexts here and throughout the book.

Just transitions and emerging skills trajectories

In seeking to reimagine VET, we need to engage with the analysis presented in this chapter rather than continuing to confine ourselves to economic and productivist thinking. Although mainstream VET research has been slow to respond to this challenge, several approaches are opening up debates here, including work in the education for sustainable development, green skills and just transitions traditions. All these draw attention to the need to include environmental concerns into mainstream development interventions via education, training and transformative social learning (Rosenberg et al, 2020). The green skills discourse, which involves a range of approaches such as greening existing occupations, as well as specialization in green occupations via education and occupational learning pathways in a diversity of sectors, is in itself a complex area of intervention in VET and skills development systems more broadly. However, it is as yet substantively underdeveloped within conventional formal VET programmes (Langthaler et al, 2021). Lotz-Sisitka and Ramsarup (2020) argue that there is a need to bring political economy and political ecology closer together for substantive policy coherence. In this process, new ‘demand streams’ for green and other adaptive skills become visible, and thus also the possibility for new jobs, reframed jobs or entirely different workstreams that may as yet not even exist. In earlier research, Ramsarup (2017) articulated a transitioning perspective for green skills advancement that indicated that green skills are, in practice, either demanded or neglected at niche levels in a variety of sectors, but for green skills research to ‘take hold’ and expand, there is a need for regime level shifts in green skills policy and practice instruments. These, in turn, are shaped by landscape level shifts that are ontologically shaped by issues such as climate change and environmental degradation, as well as new sociotechnical innovations such as solar energy advancements. These, as shown by Ramsarup, ultimately make up the ‘system of transitioning’, which, to be just, must include a sophisticated and consistently reflexive engagement with skills and skills system reorientation processes, along with the political–economy–ecology orientation to education and training praxis argued for earlier.

Since 2010, the discourse of sociotechnical transitions to a decarbonized future in the global south has developed into a just transitions discourse (Swilling and Anneke, 2012). This is being taken up in policy and at national government level, as the implications of transitioning away from a fossil capital foundation in the global economy become more apparent. For example, the Presidential Climate Change Commission in South Africa argues for increased mitigation of carbon emissions as part of a just transition, here meaning a commitment to rapid decarbonization, while at the same time addressing social justice and vulnerability challenges in society:

A ‘just transition’ has typically been understood in relation to worker vulnerability to economic shifts from rapid decarbonisation, but it is important to emphasize that social justice is equally important in climate adaptation. Lack of access to productive land, water, energy and safe housing means that poor communities have lower adaptive capacities and are particularly vulnerable. Vulnerability is the propensity to be adversely affected, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (DEFF, 2019). Vulnerable groups can be identified by factors such as gender, age, disabilities, household income and reliance on public-sector services. Social and economic development including access to basic services are the starting point for strengthening adaptive capacity and resilience. If planned and implemented effectively, increasing adaptive capacities can in turn unlock socio-economic development, create jobs and enterprises, and stimulate local sustainable production and consumption. (PCCC, 2021: 11)

This gains significance for the VET sector when it is understood that decarbonization is likely to lead to a demand for reskilling of existing workers within whole value chains and types of industries (such as the coal and oil industries) (PCCC, 2021). The range of adaptation trajectories are likewise going to demand reskilling of existing workers and communities (for instance, farmers and water users), especially since there is strong evidence – in South Africa at least – that adaptation action is as yet poorly constituted and engaged across society and in all sectors (PCCC, 2021), which is a factor affecting all African countries, as well as countries around the world as societies are really only just beginning to grapple with the full implications of a 2°C+ world order. Beyond sectoral planning (such as energy sector transitions) and important for longer-term planning, mitigation and adaptation scenarios is the understanding that skills for just transitions are not reduced to existing sectors only, but are more widely needed in society, which opens the space for considering alternative models for VET provisioning, a point that we open up for scrutiny in this book.

While perspectives on sector-based transformations are essential for specific VET planning, care should be taken not to reduce ‘just transitions’ to value chains in transitioning economic sectors such as energy and agriculture. [Cock \(2019: 862\)](#) cautions against ‘shallow’ green transitions or ‘social dialogue’ approaches. She argues instead for real transformative change and a ‘social power approach’ that can embed the ‘anti-coal struggle in a social movement for an alternative development path to challenge deepening poverty and inequality’ (2019: 872). Just transitions, when interpreted with a depth of understanding of the full extent of policy contradictions and colonial modernity’s impact on life, work and living, need to consider the way in which ‘[t]he real abstractions of Nature/Society penetrated everyday life, reflected in new family forms, new forms of slavery (modern slavery), and the urbanization of rural life through the widespread use of European-style towns’ ([Moore, 2017: 32](#)). Moore argues that just transitions should reach into the very bowel of life and return to a core point (missed for most of the 20th century) made by Marx that ‘value is a specific crystallisation of the original sources of all wealth: human and extra-human work’. In just transitions, both nature fundamentalism and labour fundamentalism need to be deconstructed for their limitations in framing a political–economy–ecology of skills because retaining these fundamentalisms leads to the false conflict between ‘jobs’ and ‘environment’. As also pointed out by [Cock \(2019\)](#) and Africa’s young people in [Oinas et al \(2018\)](#), a radical politics of work and life is needed that reaches beyond economism and deep forms of epistemic exclusion ([Santos, 2014](#), see also [Chapter 5](#) and [7](#)). Such a politics of work and life require a fundamental reorientation of education, skills and VET logics as pointed to in [Chapters 1](#) and [2](#), but more urgently, new imaginaries and applied praxis that can generatively cocreate alternatives that can realize such a radical politics of education, work and life. The chapters in this book show that this is possible via emerging possibilities at the intersections of place, context and history, formal, nonformal, informal and social learning and their respective modes of operation and structuring. As Moore claims (2017: 24): ‘Reimagining work in capitalism – beyond labor fundamentalism – provides a way forward in today’s unpleasant reality.’

Skills development for just transitions within an expanded skills ecosystem approach

Swilling’s work extends just transitions discourse (2020: 29), arguing that ultimately just transitions need to be deepened to include consideration of the ‘asynchronous interaction between four long-wave transitions: sociometabolic transitions, sociotechnical transitions, technoindustrial transitions and long-term development cycles’. This gives rise to a discourse beyond the technologies of skills and work, and points to new ways of learning and

working to construct new cultural forms, such as ecocultures, new urban visions, sustainability-oriented developmental states and so on (Swilling, 2020: iii). This takes us back to the notion of emergence and Wright's (2010) concept of concrete or real utopias (see also Burawoy, 2013). Our research has shown that these *can* emerge in the cocreation of networked social skills ecosystems (Lotz-Sisitka et al, 2021). As will be shown in later chapters, this surfaces the need to give more attention to relational agency, as well as knowledge and its dissemination in VET. In broadening the notion of work to be inclusive of living and learning considerations, there is a need not only for high-quality knowledge resources and structured learning processes and pedagogies, but also for coengaged approaches to knowledge sharing around practical demonstrations that matter to people. For example, in agriculture, the 'International Assessment of Agricultural Science, Knowledge and Technology for Development' (McIntyre et al, 2009: 7) states that there is need for 'public investments in agricultural knowledge systems to promote interactive knowledge networks (farmers, scientists, industry and actors in other knowledge areas) ... and improving life-long learning opportunities along the food system'. McIntyre et al (2009: 10) state further that 'the resolution of natural resource challenges will demand new and creative approaches by stakeholders with diverse backgrounds, skills and priorities. Capabilities for working together at multiple scales and across different social and physical environments are not well developed.' Approaches that integrate sectors and skills system actors have been largely excluded from the modernist, structuralist social imaginary and institutional support systems.

One form of response to just transitions that addresses the political–economy–ecology perspectives is to develop national or internationally standardized types of VET programmes for new value chains, such as specialized VET programmes for building photovoltaic panels for solar energy generation, or specialized VET colleges for wind or hydrogen economy value chains. Even when such standardized programmes are on offer, there is still a need for locating the VET programmes in local ecologies and economies. For example, the East London Industrial Development Zone in South Africa is oriented towards green economy development and hosts a VET programme on site so that students are engaged in the production of photovoltaic panels within a wider value chain. This is a good example of a formalized local skills ecosystem that draws on universally relevant science and technology knowledge.

However, for a vast range of adaptation responses, and for dealing with more complex issues such as those affecting coal mining communities, smallholder farmers and unemployed youth, as well as the more radically and deeply situated just transitions framed earlier, there is a need to consider VET more contextually and situationally. This means at district or local economy level where ecological conditions, such as availability of water, intersect with

historical inequalities and exclusions (such as inadequate access to land and poor-quality education) and have an impact on the type of VET programmes most needed. It is here that the expanded skills ecosystem approach may be most helpful for VET system development. This is not just a contextualization or regionalization argument, but an argument for producing new generative alternatives that are more inclusive of the intersections of work, living and learning in Africa, as we point out across the book. Our analysis of the four cases needs to be seen as pointing towards such emerging new economies and indicative of some of the thinking about VET that will be necessary to support these.

Conclusion

In [Chapter 1](#), we highlighted the need to go beyond the existing VET literature in confronting more explicitly the interconnected need to analyse what is wrong with VET, and why, and the urgency and possibility of imagining alternative VETs. In this chapter, we have introduced a political–economy–ecology frame into VET discussions, an important innovation that we consider necessary to deepen the more conventional critique of [Chapter 2](#). However, [Chapter 3](#) does not only point us backwards into VET’s underpinnings and complicity in fossil capitalism. It also begins to point us forward to the challenges and possibilities of a VET reimagining that can be part of a wider move to just transitions. In [Chapter 4](#), we narrow our focus down to substantive VET theory and explore the social ecosystems approach, which shows more of a sustainability sensibility than most rival approaches.