Review

Anarchy, war, or revolt? Radical perspectives for climate protection, insurgency and civil disobedience in a low-carbon era

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ABSTRACT

What radical tactics might those seeking transformational action on climate or environmental sustainability undertake? What options are capable of stopping actors and institutions who already realize their actions and behavior may harm millions, degrade the biosphere, and contaminate the climate, but continue to do so, despite the scientific or moral reasons not to? This paper explores efforts that can vigorously confront apathy and inaction and potentially subvert power relations currently perpetuating climate catastrophe and environmental destruction. We examine the tactics employed over time from civil disobedience and (strict) nonviolence, antiauthoritarian strategies and self-defense as well as guerrilla warfare perspectives, and distill from them options for potential climate action. In doing so, we offer a comprehensive inventory of 20 distinct direct action tactics that, while unsavory in some contexts, offer a chance of creating social change. In doing so, we also draw from the wealth of knowledge regarding protests, social movements, self-organization, and an array of different struggles and strategies.

1. Introduction

If we have any true hope of reducing climate catastrophe and protecting or restoring ecosystems, research needs to examine why and under which conditions transformative change can occur, and which policies, institutional practices, governance structures, and legal regimes can facilitate it [1–3]. Fig. 1, as one example, showcases different "leverage points" often discussed within the field of sustainability. These leverage points can be utilized to promote sustainability across various sociotechnical systems, points that range from changing paradigms and values (near the bottom of the scale) to changing stocks and flows or parameters such as taxes (near the top of the scale). Such a framework has been influential at steering both research and practice towards trying to promote systems-wide change and transform social parameters, feedback loops, the design of infrastructure and the articulated or latent intent in individual or even collective behaviour and actions. It also seeks to differentiate more incremental acts (shallow points) from more structural and transformative acts (deep points) arranged on a spectrum of increasing effectiveness.

Other work has explored the general tactics deployed by those forcing change by opposing different forms of energy infrastructure, often via grassroots efforts or sustained social movements, even in the face of violence. The term "tactics" is meant to capture forms of action that are deliberately undertaken with the aim of influencing or coercing opponents, the general public, and fellow movement activists [5]. In his classic volumes looking at nonviolent action, Sharpe catalogued 198 different tactics and grouped them into the three broad categories of protest and persuasion, nonoperation, and direct intervention [6–8]. Del Bene and colleagues more recently looked at patterns of resistance to large dams, and noted an array of "mobilization forms" including protests, strikes, complaints, and lawsuits (See Fig. 2) [9]. They noted that some of these tactics are employed from the bottom up (e.g. farmers, fishers, local organisations) as well as from larger-scale organizations (e.g., trade unions, political parties, religious groups). Temper and colleagues systematically mapped more than 600 cases of resistance movements to energy projects using a "place-based" approach to examine how local acts of social resistance have forced projects to be delayed, temporarily suspended, or permanently cancelled [10]. Common tactics here involved "spaces of resistance" such as protests and blockades but also direct action in terms of sabotage or physical disruption. Sovacool and colleagues similarly inventoried the tactics used by opponents of energy infrastructure and catalogued eight core

archetypes, including rallies and protests, litigation, petitions and acts of suppression and/or violence [11].

Violent acts can be particularly heinous but also recurrent, with civil society groups reporting that 200 to 300 environmental activists or "defenders" are murdered each year in an attempt to stop their activism related to logging, mining, large-scale agribusiness, hydroelectric dams and other infrastructure [12,13]. In the Guangdong province of China alone, police allegedly shot and killed as many as twenty people for protesting against lack of compensation for wind energy development [14]. In the Philippines, military and state forces have been accused of assassinating both foreign and indigenous environmental defenders seeking to oppose the construction of new hydroelectric dams [15].

As comprehensive as such a diverse mélange of leverage points or tactics may seem, the inventory above is both incomplete—failing to adequately capture all options available—and insufficient, given that some options can be used to reinforce the status quo as much as challenge or transform it. Taking an anti-authoritarian and anti-capitalist perspective, Peter Gelderloos reviewed [26] uprisings from the 1990 "Oka Crisis" to the more recent "Occupy Movement" [2]. Gelderloos [2,19] challenges the dominate institutional narrative of nonviolence [16,17], demonstrating the importance of a "diversity of tactics" and judging a movements ability to (1) seize spaces for new social relations and (2) spread awareness and struggle, as well as whether it (3) had elite support (e.g. insulating movements from police and military repression) and (4) achieved concrete gains by improving people's lives.

While Gelderloos and others open up this conversation around direct action and movement building, we recognize the need to continue and widen examination to look at a multitude of options capable of stopping institutions and actors whose efforts are already harming millions, degrading the biosphere, and contaminating the climate, despite all the scientific or moral reasons against doing so. We need options that can vigorously oppose such action; that confront inequality and injustice; and that can subvert power relations currently perpetuating environmental destitution and driving climate change. The situation demands that we consider what Galvin calls "daring, obstinate actions … needed to halt this rush to destruction," actions that enable "people of goodwill … to increase their power so as to work actively to wrest power from those who control social structure for their own gain at the expense of

others and the climate" [18]. Policy action alone seems woefully insufficient to tackle such a wicked problem.

This paper asks: what would a more complete toolbox of leverage points and political actions entail, one that takes on board a broader litany of strategies and tactics for actors? Given the deteriorating state of our climate and our interconnected ecosystems, we might need to consider public policy changes alongside a diversity of direct action tactics, some of them even violent and highly disruptive [2]. Taking in account criticisms of "non-violence" [2,19], we offer here three general, yet overlapping categories, of tactics and strategies (see Table 1): civil disobedience, anti-authoritarian resistance, and militant, insurgent, and guerilla action. In doing so, we offer a more comprehensive inventory of direct action tactics that offer a chance of creating social change, drawing from diverse "disciplinary groundings," or families of academic perspectives most likely unfamiliar to most energy studies and climate policy scholars.

In approaching our Review, we situate our politics within an anti-authoritarian ethos related to anarchism and total liberation ecology. This is reinforced by classifying particular actions and tactics. These categories, we fully realize, blur, reinforce and cut across each other (as Table 1 shows). All three literatures discuss tactics such as demonstrations and protests, all involve different degrees of collective action or self-organizing (falling broadly into the category of a "social movement," which we mention in all three sections), all also pay attention to the potential use, and misuse, of violent acts. We place literatures here into distinct boxes only for ease of identification, clustering them where they fit the *best* within a category of literature. To use an analogy, they can be thought of as mutually interlinking families of perspectives (all related to each other in some way) rather than separate, distinct species of animal.

Although we present an array of different options throughout the Review, we do not necessarily endorse them. For example, it is flat out irresponsible to advocate assassination and terrorism, even if they can be viewed as effective in numerous moments for population control (e.g. authoritarian control) and regime change. This, however, has a different meaning in ecological struggles. We to leave this reading and choices up to people to decide if such life threatening activity is worthwhile or morally justified.
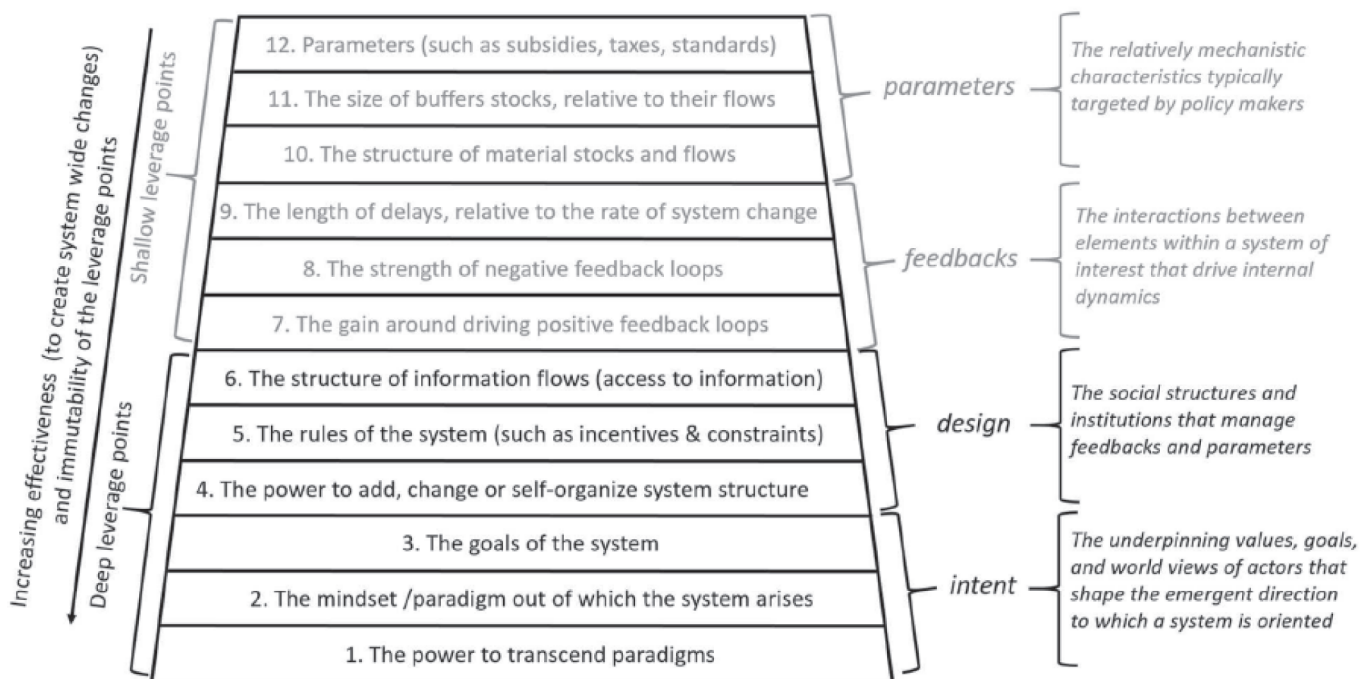

Fig. 1. Twelve intervention or leverage points and four systems characteristics Source: [4], based on original work from Donna Meadows.

2. Grappling with key terms: anarchism, social movements, and violence

Before we get started, it is useful to define or at least contextualize some key terms and phrases we use throughout the review, especially those relating to anarchism, direct action, resistance, social movements, and violence. This grounds the review within different literatures. As indicated above, the review maintains an anti-capitalist positionality and direction, because extracting and profiteering from ecosystems and environmental destruction across liberal and state capitalist economies has been instrumental in cultivating the current ecological crisis. This does not completely deny the often theoretical possibilities of some varieties of capitalism organizing healthy socio-ecological systems, yet this appears unlikely and equally as impossible of any sort of revolutionary transformation. The same critique applies to the state. While one can easily envision the state as facilitating socio-ecological transformation in theory (and some practice) [20], progressive state action across multiple environmental policy domains seems unlikely given the failures of the 1970s and the clearly insufficient climate change mitigation pathways currently being supported by the United Nations Framework Convention on Climate Change [21–25]. Our review is about struggle and direct action, so it is from this perspective that we examine the strategies and tactics available outside of capitalism and its markets and the state. Public policy continues to dominate discussions but somehow fails to address the root causes of ecological emergency and climate catastrophe. We therefore prefer to cultivate anarchist anti-capitalist visions that challenge the roots ecological destruction.

"Anarchy" at its most basic level refers to a dismissal of authority or

Table 1
Summarizing three literatures on direct action tactics and strategies.

| Literature	Disciplinary groundings	Predominant focus	Common tactics
Civil disobedience and strict non violence	Liberalism, Peace studies, social movements, history, protest studies, sociology	Protesting and taking direct action against injustice or inequality, strict non-violence	Demonstrations, social movements, mass arrests, occupations and sit-ins, boycotts, labor strikes, hunger strikes, trespassing, blockades, sabotage, hacktivism
Anti-authoritarian strategies of resistance and self defense	Political geography, political ecology, neo-Marxism, eco-socialism, libertarianism, anarchism	Resisting authoritarian hierarchies and/or the state, expansive non-violence	Witnessing and watching, delegitimation, vandalism, sabotage, arson, rioting, looting, social movements, permanent resistance
Militant action, guerilla warfare and insurgency	Security studies, Marxist-Leninism, Maoism, anarchism, military strategy, political science, history	Disrupting and destroying hegemonic structures, violence	Bombings, terrorism, assassination, robbery, paramilitary action, social movements

Source: Authors.
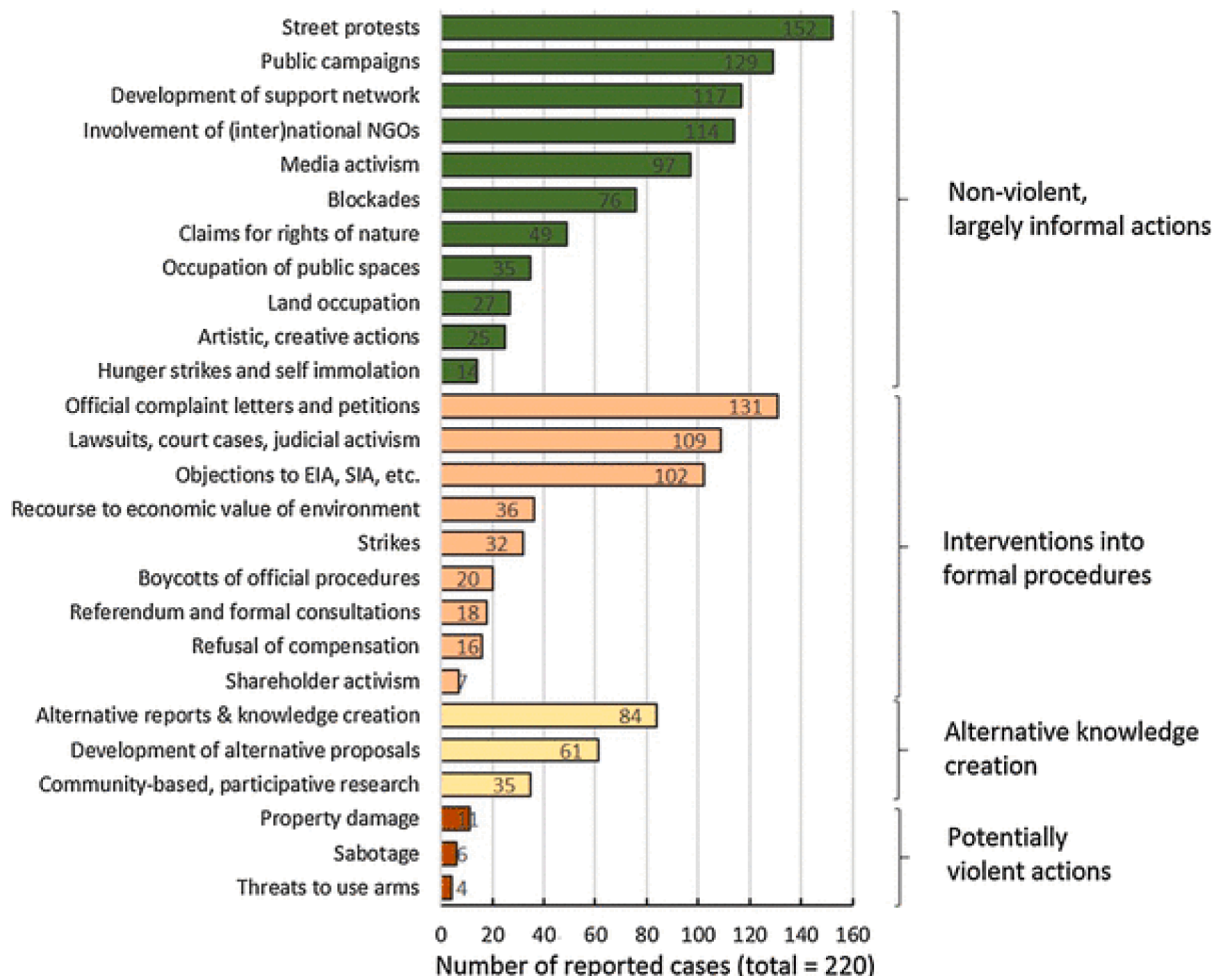
Fig. 2. Tactics of mobilization used to protest against large dams. Source: [9].

control. What most separates anarchist thinking from other critical approaches is its inherent rejection of hierarchy, especially those that are oppressive, that create elites or leaders, that divide labor, or that subvert people to the forces of capital [26,27]. Given these proclivities against centralization and authority, anarchist thinking strongly criticizes the role of the state and other institutions that create obstacles to progressive action, liberation or social justice, especially when structures of the state themselves serve as instruments of organized violence, coercive power, or systematic oppression [28]. Such aspects need not be direct or physical, they can also be spatial, slow, structural, exceptional, and symbolic uses of force [27]. According to anarchist thinking, the history of state formation can be reinterpreted as politically hegemonic, economically inequitable, and ecologically destructive [29,30]. Authorities and public policy must remediate the existing harms causing socio-ecological degradation—if not irreparable destruction—to people and their ecosystems. These harms accumulate collectively, though experienced disproportionately, though climate change, extinction and trajectories towards a true Necrocene, a "new era of death" via mass extinctions and die-offs [31].

Ecological and green anarchism emerges as an important political tendency seeking to combat ecological degradation and, implicitly, climate change. Green anarchists approach systems from the perspective of "totality" [32], an attempt at examining the "total" intersection of oppressions. For this perspective, democratic actions and democracies themselves are recognized as (re)producing colonial-state dynamics, including the reinforcement of centralized economic systems (capitalist markets) or political structures (governments), or overly technocratic decision-making processes [33]. As Dunlap warns: "The concern to consider moving forward is whether democracy is overemphasizing the means over the ends, creating bureaucratic controls unresponsive to local needs, and together creates a system that always discriminates against the nonhuman and specific humans racialized and classed within techno-capitalist society" [34].

Complementing green anarchism is anarchist political ecology [35]. Responding to "liberation ecologies" [36], anarchist political ecology replies with "total liberation ecology", stressing the need to challenge anthropocentric prejudices and to understand the organizational and infrastructural impacts of capitalism on nonhumans as well [37]. Anarchist political ecology endorses a research agenda seeking to understand (and consequently counter) state violence and environmental conflicts by dissecting the mechanisms of state hegemony within academic and political imaginations. This includes rethinking the relationships between state action and extraction, forms of political resistance, and genocidal and ecocidal processes. As a remedy, anarchism generally supports other forms of autonomist, voluntary, or cooperative action, some of which entails unmediated self-defense.

In doing so, an anarchist approach simultaneously achieves epistemic, analytical, and intersectional goals. Epistemically, it acknowledges that states and governments are socially co-constructed, reinforce prejudice (e.g. patriarchy, racism, sexism, speciesism) and are ecologically degrading [38]. Analytically, it suggests not taking over existing means of social relations or modes of production, but instead rejecting entirely capitalism and modern governmentality. As mentioned already, the focus on "totality" recognizes the intersectional nature of economic, political, psychological, ideological, military, and other forms of oppression, this requiring "total decolonization" [39]. Included in this frame of totality is how other patterns of hegemony including patriarchy (challenged by eco-feminism) or racism (challenged by critical race theories and critiques of whiteness) coalesce with state and market structures.

More pragmatically, green anarchism places ecological issues at its core, including land defense, animal liberation (anti-speciesism, veganism) and appreciation for Indigenous cultures and knowledge. Appreciation, of course, does not mean one must uncritically adopt Indigenous perspectives, especially given that some can be hierarchal, patriarchal, or environmentally destructive themselves. One must also

be careful not to recolonize Indigenous peoples by coopting them to one's worldviews without engaging them, or to elevate their culture to some level of sublimity where Indigenous cultures are eroticized, fetishized, or considered omnipotent [40].

Fully noting that there is an exhaustive amount of positions, theories, and disagreements between anarchist tendencies [28], three of its themes are most relevant to climate change and decarbonization: voluntary cooperation, mutual aid, and direct action. Anarchism in general, but green anarchism with its ecological focus in particular, supports *voluntary cooperation*, encouraging that individuals determine their own levels of commitment and struggle, their own degrees of resistance to coercive authority. Green anarchism supports an expansive (human and nonhuman) *mutual aid*, the reciprocal and often elective exchange of resources and services for mutual benefit. This includes recognizing the way mutual aid transcends species, operating on various levels across ecosystems and how industrial humans need to strengthen their connection with nonhumans (e.g. animals, rivers, trees and nonhuman life) [35]. Green anarchists support *direct action*, unmediated attempts through self-organization that attack structures of domination damaging human and nonhuman life. Such direct action tactics may fall on a spectrum of being "non-violent," but differ from dialogue or discussion in that they do not rely solely on persuading an opponent, nor do they assume that all actors in a struggle are inherently motivated by achieving "good" [6]. "Resistance" is another closely aligned term, and it implies reaction, while "attack" can be more preemptive and takes initiative and is self-determined [33].

A related body of research frames collective action and discusses the dynamics of "social movements," defined by Tarrow as "collective challenges [to authority], based on common purposes and social solidarities, in sustained interaction with elites, opponents, and authorities" [41]. Social movements distinguish themselves from other forms of collective behavior because they are organized, involving numerous individuals; they are deliberate, with careful planning and strategizing; and they are enduring, often lasting for years or even decades [42]. Such movements often utilize "repertoires of contention" to emphasize a fluidity and dynamism to tactics. Protests are similar to a piece of music or a dance, with some degree of structure or agreement reached beforehand (i.e., preparation and training) but also a fair degree of improvision (i.e., reacting to things on the ground as they unfold) [43]. The social movements literature often connects to previous organized efforts including the abolition of slavery [44], civil rights [45,46], reproductive rights and family planning [47], and even temperance (the prohibition of alcohol) [48]. Social movement tactics may also need to evolve in response to countermovement tactics undertaken by the police or the state, creating a coevolution of tactics and counter-tactics [5]. Tarrow termed such tactics "modular" to highlight the way in which they can be transferred across different movements, but also in that most tactics fall across a spectrum of modularity of conventional, disruptive, or violent [49].

This brings us to our final theme of violence. To be clear, violence is morally loaded and selective term and our categorization attempts to reflect these complexities [2,50]. To some, even owning property can be perceived as a form of domination and violence. Following Springer, we do not consider "self-defense a form of violence, as there is no impetus for coercion or domination but rather a desire for self-preservation" and, in the matter of land defense, protecting habitats and ecosystems. "Violence," then, refers to unequal power relations—often dependent on anthropocentrism, racism, classism and a myriad of other discriminations—that involves some element of coercion and/or domination over living creatures that either cause direct and immediately visible physical injury or indirect and slow forms of harm [51]. This categorization of violence makes a distinction between property and sentient life, self-defense and tactical and strategic deployment of coercive action.

3. Civil disobedience and (strict) non-violence

Our first body of literature on direct action tactics refers to civil disobedience and non-violence. This literature bears some resemblance to anarchist thought, especially around notions of direct action and resistance, but it has a different historical trajectory. Civil disobedience refers most generally to "a public, nonviolent, conscientious yet political act, contrary to law, carried out to communicate opposition to law and policy of government" [52]. Acts of civil disobedience can both seek to enhance and support, or at times subvert and undermine, the underlying principles of democracy and governance. This led the philosopher Jürgen Habermas to classify those acting for civil disobedience as "ambivalent dissidents" [53], even though he also defended civil disobedience as a "guardian of legitimacy" in democratic societies [54]. Martin Luther King won the Nobel Peace Prize in 1964 precisely for his use of civil disobedience in the form of "nonviolent direct action." As King himself noted, "in any nonviolent campaign there are four basic steps: collection of the facts to determine whether injustices exist; negotiation; self-purification; and direct action" [55]. These steps, King believed, enabled protestors to negotiate better concessions, demonstrate via boycotts, protest via marches, and resist, even with their physical bodies, in a nonviolent way. Sharpe also believed (in his theorizing on direct nonviolent action) that such efforts were attuned to achieving the conversion of opponents, the accommodation of demands, or the exhaustion of resources of opponents [8].

In North America, civil disobedience has a strong connection to the 18th century poet, philosopher, and essayist Henry David Thoreau, who delivered a famous lecture entitled "resistance to civil government" when he refused to pay a poll tax to express his opposition to a war against Mexico being fought by the United States [56]. Since that time, civil disobedience tactics have become woven into a broader fabric of acts of dissent designed to both increase participation in civil society and protest the actions of government. Civil disobedience was an "important and widespread tactic" used by those opposing the Vietnam War in the 1960s, with one particular event in 1968 leading to the 20,000 people marching on Washington, DC to interfere with automobile traffic, resulting in massive congestion and the "largest mass arrest" in the history of the country when 14,000 of the protesters were jailed [57].

The first tactic is indeed *demonstrations* and *rallies,* terms that refer to the organization of large public gatherings of people, most frequently in a rally, a walk, a protest, or a march. This relates to a strict understanding of non-violence (that is, not even involving sabotage), but it can quickly surpass it. Demonstrations can be organized for one day or over hundreds of days, ranging from climate camps and counter-demonstrations to elite meetings (or even more permanent forms of resistance discussed elsewhere in this Review). Examples of effective, large-scale rallies in the past include those related to the anti-apartheid movements of the 1980s, which helped to convince universities and other organizations to sever ties with firms that invested in South Africa. The anti-sweatshop movement in the 1990s is another instance, which put pressure on clothing manufacturers to assume responsibility for working conditions by generating negative publicity for firms. Another classic example is the women's suffrage movement at the turn of the last century, which employed mass rallies and marches—alongside other tactics—to persuade the public that denying women's right to vote was inconsistent with democratic principles [58].

In each case, these rallies demonstrated mass support behind the idea for social change, disrupting normal operations to the point of generating symbolically charged appeals that forced society to acknowledge the issues being raised. Demonstrations have been instrumental to highlight issues of patriarchy, white supremacy, and structural and political violence. The anti/alter-Globalization Movement is a manifestation of organizing mass demonstrations with strict non-violence intent, demonstrations that "shut down" large international conferences by elites (e.g. the World Trade Organization, International Monetary Fund, the Group of Seven [G7], or the Group of 20 [G20]) [59]. This extends to anti-war organizing in 2003, but more recently the Youth Climate marches inspired by Greta Thunberg.

Challenging the strict non-violence ethos of these examples, however, is acknowledging the wider context of political struggle that in many of these cases included action groups, acts of sabotage and vandalism [2]. More still, while demonstrations are a nonviolent tactic, they can quickly—depending on the actions of authorities—turn to widespread vandalism, rioting and looting [60]. The latter often occurred related to civil rights, racial discrimination, police violence and challenging the structure of white supremacy. This shows how demonstrations often combine or begin with civil disobedience actions (more on these is presented in Section 3) but can spread or escalate to include property damage against corporate property or self-defense against police that turn into riots (more on these in Section 4).

Recently, nonviolence and civil disobedience tactics been applied to environmental and climate issues with the rise of *new social movements.* These new social movements tend to be more recurrent than a single demonstration or event, and recent examples include Extinction Rebellion, the young people's movement Fridays for the Future, and the youth led Sunrise Movement in the United States, some of which are featured in Fig. 3. These actors often deploy the tactic of demonstrations and protests, just over a more sustained period of time [61,62]. Nevertheless, the commitment and potency of these younger movements are still yet to be fully demonstrated.

While sometimes an aftereffect of demonstrations or civil disobedience actions, *mass arrests* can be identified as a second tactic. During the North American civil rights protests of the 1960s, such mass arrests were a popular tactic used with the intention of being financially and legally burdensome for racist cities and state governments [63]. Indeed, the specific numbers of some of these mass arrests of this era are exceptional: the Birmingham confrontation resulted in the arrest of at least 14,700 protestors; more than 2,600 demonstrators were jailed at the Selma protests [64]. This extends to Black Liberationists expressing an ecological conscious, such as MOVE (and others) seeking autonomy and self-sufficiency [65,66]. Other examples include civil disobedience campaigns against the Gulf War of the 1990s, various abortion clinics across the country, and contemporary immigrant rights activists in the 2010s, all which resulted in arrests [2,67]. The anti-nuclear movement also saw large arrests of its members at the Seabrook Nuclear Power Plant in New Hampshire (see Fig. 4) and the Nuclear Test Site near Las Vegas, Nevada. The arrests at Seabrook occurred even though the protestors were non-violent and only sought to obstruct entry to the site by construction crew; they were still attacked by state police and members of the national guard. Their protests were still successful in delaying the project and costing the nuclear power operator $750,000 [68]. A more recent example would be the arrest of 77 protesters in the United Kingdom who were jailed for blocking motorways with their bodies, causing widespread traffic jams and disruption throughout England in 2021 [69]. These protestors were all part of a movement called "Insulate Britain," motivated to call attention to the perceived inadequacy of government efforts to promote energy efficiency in buildings or retrofit and insulate social housing blocks.

A third, closely overlapping tactic is *occupation* or *sit-ins*, physically interfering with or inhabiting a space such as a building, train station, shopping center, square, event or park as an act of protest [70,71]. Many of these tactics became famous during the 1960s civil rights movement in the United States, which utilized sit-ins, freedom rides, freedom songs, and voter registration drives to convince policymakers to enact the Civil Rights Act of 1964 and numerous other civil rights measures that granted protections, halted desegregation, and even legalized interracial marriages by 1967 [72–74]. The sit-in—when activists enter a public space or business and remain seated until they are evicted by force (like mass arrests) or until their conditions are met—became world famous as a collective action technique [41]. XR and Direct Action Everywhere, which conduct mass raiding of factory farms, serve as recent and extended examples of these techniques. Martin Luther King

Fig. 3. Contours of public protest and demonstrations for climate change action via new social movements in Chile, Sweden, the United Kingdom and Germany. A). Fridays for the Future Protest in Santiago, Chile, 2019, B). Fridays for the Future protest in Sapmi, Sweden, June 2021, C). Extinction Rebellion poster near Balham Station, London, 2020 D). Extinction Rebellion Poster in Potsdam, Germany 2019, E). Fridays for the Future climate protests outside Westminster, London, 2019, F). A Sunrise Movement demonstration in Washington, DC, United States, 2019, Source: All photographs compiled by the authors.
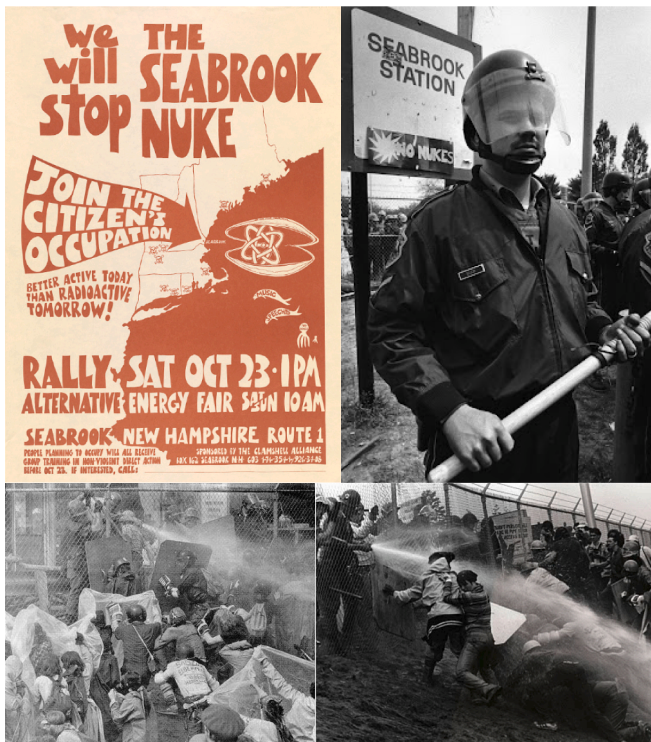
Fig. 4. Members of the Clamshell Alliance and Red Clams organized a rally only to be attacked by hoses, mace, pepper gas and dogs before being arrested at the Seabrook Nuclear Power Plant, 1980, Source: Compiled by the authors, U.S. Department of Energy Photographic Archive.

Jr. justified the use of these tactics, as compared to traditional negotiation and debate, by arguing that "nonviolent direct action seeks to create such a crisis and foster such a tension that a community which has constantly refused to negotiate is forced to confront the issue. It seeks so to dramatize the issue that it can no longer be ignored" [55]. Occupations or sit-ins can be applied to other settings offices, homes of investors or even forests. In the 1970s and 1980s various social movements undertook acts of occupation or sit-ins, including Earth First! protecting old-growth forests or, in the 1980s and 1990s, groups such as ACT-UP and the AIDS movement interrupting live news casts to emphasize the urgency of that crisis.

A fourth, closely linked technique is for a group to physically *block* or *"lock-on,"* with their bodies, to office entrances, facilities, buildings or equipment. Chaining oneself to vehicles, equipment or lying on the road with "lock-ons" is a foundational ecological civil disobedience practice, which extends to climbing on equipment, "tree-sitting" (e.g. chaining yourself to trees) and blocking access roads to create a situation in which protesters face high personal risk if construction or work proceeds. Just as military occupation is intended to subdue or conquer a foreign country, a protest occupation is meant to resist the status quo physically or symbolically and to press for change in policy. Earth First! has been employing lock-ons, tree sitting and blockades in defense of forests across the United States [75]. The Stop Huntingdon Animal Cruelty (SHAC) campaign was effective employing acts of disruption and occupation of corporate offices and the houses of shareholders (e.g. "house demos"), which combined with property damage and acts of sabotage [76]. Climate camps by groups like Ende Gelände and Code Rood have organized mass demonstrations against coal mining plants and hydrocarbon industries, which block with their bodies and "lock-on" with chains and locks to coal mining equipment. More still, we are seeing blockades, lock-ons and tree-sitting taking place around the Line 3 oil pipeline coming from the Alberta tar sands and across the state of Minnesota in the United States [77].

A fifth tactic is *boycotts*, where consumers voluntary abstain or refuse to use, purchase, or deal with an organization or a product. It was the Montgomery Bus Boycott (led by Rosa Parks in December 1, 1955) that famously led to the Supreme Court declaring segregated busing in Alabama unconstitutional in 1956 in the United States. This boycott in particular showed that large numbers of African Americans could be mobilized to protest racial inequality, and that boycotts could be sustained (it lasted more than a year) [64]. The idea was that the political power structure would respond to threats and challenges to the economic power structure in ways that would benefit the movement. Boycotts today can involve consumers deciding not to purchase some collection of products—with a recent example being supermarket shoppers in the United Kingdom boycotting brands that they associated with harsh working conditions, environmental pollution and the overuse of packaging [78]. Farmers have also boycotted particular fueling stations in an act of protest against increases in taxes on the price of petrol/gasoline [79]. In North America, more than 1,500 restaurants organized a boycott of unsustainable sources of fish coming from the Southern Ocean near Antarctica, resulting in a 40% drop in demand for Patagonian Toothfish/Chilean Sea Bass in one year [80]. The furniture company Harvey Norman was also boycotted over their links to logging and deforestation (see Fig. 5). Boycotts have been called a "crucial weapon" of civil disobedience because when well organized they can be highly effective at hurting private sector actors and also inducing effective change, with prominent examples over the past decade including the prevention, or slowing, of deforestation, changes in practices among timber, oil palm, soy, and seafood corporations, and successful landmark peace deals with indigenous peoples [81].

A sixth tactic is *hacktivism* or *electronic civil disobedience,* the use of computers or "computerized activism" to attack digital or cyber infrastructure. One survey identified a surprising variety of actions in this space ranging from grassroots infowar (spreading knowledge or propaganda on the internet), politicized hacking or net politics (adding political messages to government or official websites), and virtual blockades or sit-ins (preventing an organization from using information and communications technology or the internet) [82]. Doxing or doxxing has also emerged as a more recent tool for publicly revealing previously private personal information about an individual or organization, usually on the Internet.

Hacktivism has its roots in the early 1990s when the world wide web was gaining prominence, with a general theory even espoused by the Critical Art Ensemble (CAE). Drawing on the work of critical scholars such as Hakim Bey, Gilles Deleuze, and Felix Guattari [83,84], the CAE argued that just as hyper-capitalism has become more mobile, dispersed, and electronic, so too must resistance via digital and electronic means. This can include the clogging or actual rupture of fiber optic lines or internet servers, massive anonymous email assaults, and interference with websites [57]. Actors championing these tactics to achieve sustainability outcomes (such as more sustainable farming practices, or low-carbon infrastructures) have included the Anonymous Digital Coalition, Electronic Disturbance Theater, and FloodNet.

A seventh tactic is *strikes*, commonly associated with labour strikes or the organized refusal to work. While having ancient precursors, labour strikes emerged as a recognizable political tactic around the time of the industrial revolution when industry depended on large amounts of people to operate machinery. Refusing to work and ceasing operations directly impacts economic and capitalist productivity, becoming a formidable method of addressing exploitive labor conditions [85]. Yet strikes take many forms. They can be highly organized through union leadership to negotiate pay, rights and benefits. "Wild Cat" strikes are those taken up independently of union leadership by workers, adopting a more autonomous—uncontrollable—quality, which can be generalized across sectors (e.g. General Strikes). Wild Cat strikes, and the attempts to break them by police and hired personnel, can germinate into larger theatres of class conflict, extending to self-defence activities (which we will explore more in Section 4) [86]. Strikes can even extend

Fig. 5. A protest of the Harvey Norman furniture retailer led to both boycott of their stores in the United States and changes in their corporate practices Source: [81].

past conventionally conceived labour to under acknowledged household and reproductive labour, such as feminist refusals to have their bodies treated as commodities and factories to produce workers and soldiers for industry and war [87]. "Human strikes," inspired by feminist struggles, are perhaps the most radical form of this tactic, as it embodies striking within every facet of life in favour of articulating joy and freedom [88].

The human strike, taken to one of its extreme facets, is the older *hunger strike*. This tactic employs starving oneself—refusing food and sometimes water—to demonstrate rejection of an issue or achieve a policy goal. This tactic demonstrates resolve and determination, but ultimately relies on the conscience and guilt of offending individuals or institutions. Hunger strikes are a reoccurring tactic in prison, representing one of the few means there to protest treatment, police or government policies, and/or to exercise rights. Many guerrilla fighters in prison engage in hunger strikes, among other activities, to advance a particular struggle, issue or immediate situation [89]. The Provisional Irish Republican Army's (IRA) Bobby Sands is a famous example of this, which eventually ended in his death [90]. Hunger strikes can take the form of public protest as well. People, likewise, can organize hunger strikes publicly in front of government buildings, take for example in Peru were people engage in hunger strikes against mines [91] or Sami hunger strikes against dams [92] in Norway. Hunger strikes can also extend to "dirty protests," exemplified by IRA prisoners who protested poor treatment, refusing to take showers, wash their hands and eventually would defecate by their doors and poor urine into the prison hallways [93].

As the tactics above illustrate, civil disobedience and non-violent protest tactics all seek to demonstrate commitment and distress as a means for authorities and people to change their minds. Many of these tactics, however, rely on basic human rights and care taken by authorities. These tactics can still be applied in numerous ways and in different situations, yet this overview offers a strong precursor to examine other forms of non-violet action and self-defence in the next section.

4. Anti-authoritarian strategies of resistance and self defense

Our second body of evidence on tactics comes from the emergent literature on anti-authoritarian struggles. While various political tendencies (e.g. anarchist, Marxist, liberal and conservative) have employed the tactics below, we chose to emphasize anarchism to stress the anti-authoritarian and horizontal forms employed within these tactics referenced [26]. Indigenous, anti-state and other uses of autonomist Marxism are equally prevalent in the struggles mentioned. Likewise, much of this work comes from scholarship on semi-autonomous zones blocking megaprojects or pipelines [94], or indigenous groups and *campesinos* defending their lands against extractive encroachment [91,95,96]. There, Indigenous (decolonial) and anarchist objectives—such as terminating socio-ecologically destructive projects and self-determination— require a diversity of tactics, and an appreciation for non-native and non-white experiences [97,98]. As Gelderloos reminds us, "the most effective social uprisings since the end of the Cold War can be characterized as using a diversity of methods, whereas the exclusively peaceful moments have resulted in disappointment," at least by anarchist standards [99].

We utilize the term "self-defense" to describe actions taken by people to defend themselves against immediate individual threats, but also institutional and systemic threats. The latter can result in attempts to protect livelihoods, ecosystems, social fabrics and cultural practices against state, infrastructural and police-military impositions. "Infrastructural imposition" refers to forms of organization, technologies and megaproject schemes that seek to enclose lands and forests branded as "conservation" [100]. This results in a more expansive understanding of non-violence, recognizing the validity of vandalism, sabotage and property destruction. As Springer reminds us, "a nonviolent position does not forego resistance and self-defense" [101]. Human and nonhuman life is thereby valued over property and destructive business practices.

The first tactic, *witnessing and watching*, exhibits how non-violence

and self-defense overlap. This technique involves observing, often passively and even surreptitiously, acts of violence or domination [102]. As Fig. 6 depicts, such acts (in the green circle) entail visual practices that can monitor and protect green spaces, witness instances of brutality, disseminate images to counter hegemonic practices, or represent alternate visions for social change. The idea is that such passive observation can inspire direct action in others, or at least document acts of injustice or destruction by placing them in the historical record. This tactic bears some similarity to that of the Black Panther Party, founded in 1966, which employed armed citizens patrols to watch the police ("cop-watching") and monitor the behavior of authorities [103]. Since then, Cop Watching has spread, becoming an intentional and practiced pastime in many major cities across the United States, if not many other parts of the world. Such acts could be extended to "Forest Watching" or even "Carbon Emissions Watching."

The second tactic is *delegitimation*, which Gordon refers to as "anarchist interventions in public discourse, verbal or symbolic, whose message is to deny the basic legitimacy of dominant social institutions and eat away at the premises of representative politics, class society, patriarchy and so on" [104]. Acts of delegitimation are unlike acts of protest, which tend to be directed at specific policies or people, and instead target the very existence of those institutions in the first place. Acts of delegitimation aim to undercut the legitimacy of state institutions with information that may reveal inconsistency or hypocrisy, harmful effects, or severe tradeoffs with commitments to welfare, education, or health. Delegitimation can also utilize counter-expertise to shape populist or political coalitions, with the Keystone XL and Dakota Access pipelines in the Great Plains region of North America demonstrating how environmentalists, landowners, and grassroots organizers can position themselves as experts [105]. Delegitimation can lastly employ "brandalism" or "subvertising," where activists subvert, alter, or spoof corporate icons or advertising campaigns to their own end [106,107]. Subvertising permits a rebellion "against the visual assault of media giants and advertising moguls who have a stranglehold over messages and meaning in our public spaces," and it can rely on parodies and other message-changing or obscuring alterations to convey messages [108].

Advertising remains a mechanism to enforce socio-ecological catastrophe, which is why Brandalism [109], ahead of the United Nations COP21, installed over 600 posters in bus stops across Paris protesting consumerism, fossil fuel dependency and climate change.

Building from the discussion of demonstrations in Section 3, we might, thirdly, highlight the importance of *unpermitted demonstrations* or marches. Nonviolent protests, depending on the context, often collaborate with authorities by registering to obtain a permit and/or permission from cities to hold large-scale demonstrations. As mentioned above, these demonstrations can still turn riotous. Unpermitted demonstrations, on the other hand, can be either spontaneous or organized, but both consciously reject state legitimacy and control of demonstrations. According to this view, filing permits and announcing demonstrations not only reinforces state power, but also allows police advanced warning and preparation time to manage disruptions. Unpermitted demonstrations are self-organized and, consequently, often dubbed as "illegal" marches that usually result in confrontations with police, vandalism and looting. Anarchists are known for organizing these types of marches, as was common in the western United States anti-police organizing [2]. This activity, however, is in no way restricted to anarchists but are common responses to injustice, most notably police brutality and murder. From the 1992 Los Angeles riots, *banlieues* uprisings in France (2005), the 2008 Greek Insurrection, the 2011 English Riots, Yellow Vest (*gilets jaunes*, 2018–2020) riots in France and the anti-police uprisings in the United States in Ferguson (2014), Baltimore (2015) and George Floyd uprisings (2020), all have been unpermitted demonstrations that expressed built up social discontent [60,110]. This list is by no means exhaustive, and remains Euro-American-centric, yet injustice and spontaneous and combative community action are a common global response to contested mining and infrastructure projects. Important, however, is how unpermitted demonstrations can be organized or spontaneous, and take on various intensities, which have frequently turned into widespread social upheaval.

A fourth set of tactics are *trespassing, blockading, eco-sabotage* or *ecotage* (or "Monkey Wrenching"), where protestors intrude upon a particular space with the intent of destroying harmful operations,
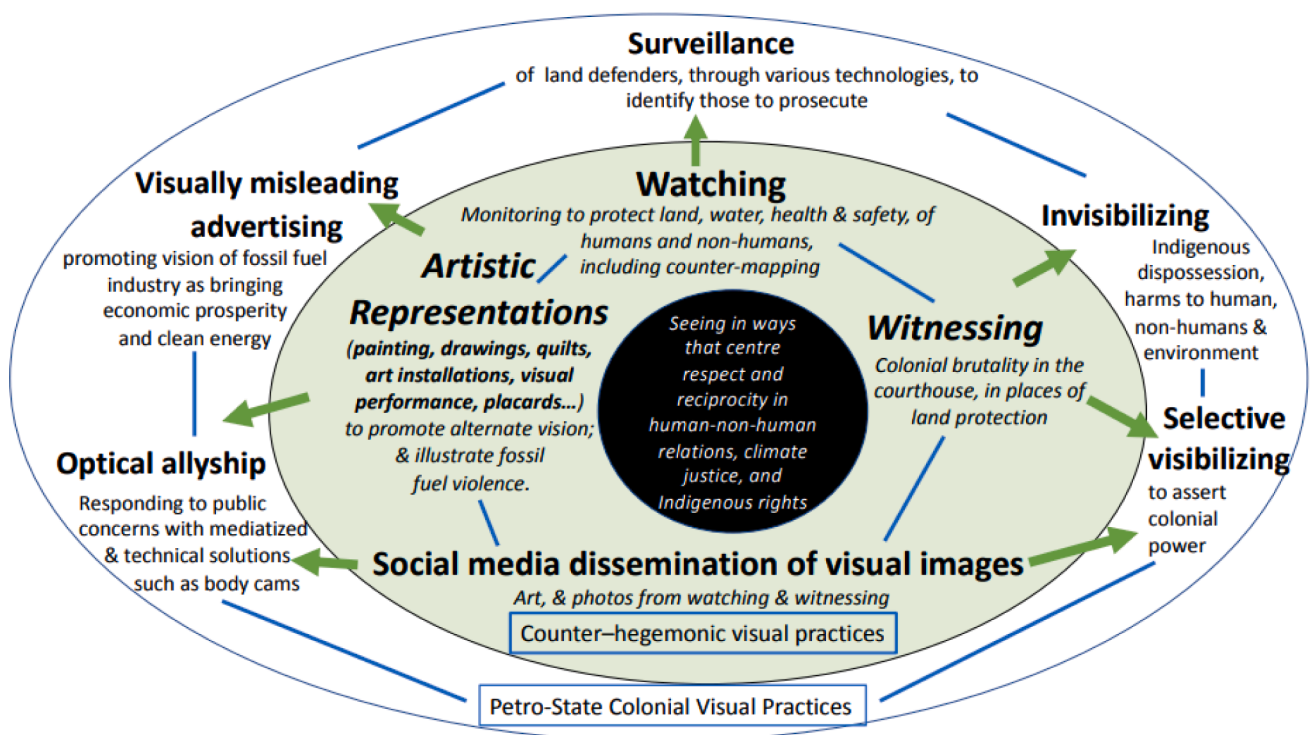

Fig. 6. Witnessing and watching as acts of resistance against hegemonic power, Source: [102].

practices, or technologies. Malm terms this "intelligent sabotage" [111] and writes about how "the strategic acceptance of property destruction … has been the only route for revolutionary change." Examples include protestors trespassing into construction zones to destroy bulldozers or buildings being perceived as unsustainable; blocking roads or traffic on highways or around controversial sites; breaking into power plants to disrupt and destroy fossil-fuelled generators or transformers; or trespassing into automobile dealerships to destroy or vandalize Suburban Utility Vehicles (SUVs) with low fuel-economy. These tactics also encompass interfering with logging practices by destroying camps, machinery–such as log loaders and trucks—or spiking trees and even removing fuel for chainsaws [112]. The anti-nuclear movement in Europe resorted to a diversity of tactics such as occupying and vandalizing construction sites, mass demonstrations with property damage and arson [113]. In Germany alone, 150 high-tension power towers were knocked down [114], and a comparable number of high-tension power lines were sabotaged in Italy as an act against nuclear power and other destructive industries in the 1980s [115]. In the Philippines, Communist New People's Army rebels raided a state-owned plantation used for the manufacturing of biofuels from jatropha on Negros Island, where they torched equipment and stopped workers from hauling lumber [14].

The collective benefits of blockades are extolled in the literature, given that they can simultaneously physically block an operation, directly slowing or stopping harm; increase cost and resources, given that they create expense and inconvenience for the actors involved; and provide a visual focus for media coverage. There are even manuals giving instructions on how to blockade (see Fig. 7) including Earth First!'s *Direct Action Manual* in the United States [116], Road Alerts' *Top Tips for Wrecking Roadbuilding* [117] and the North East Forest Alliance's *Intercontinental Deluxe Guide to Blockading* in Australia [118]. The earlier *Eco-Defense Manual* (also in Fig. 7) describes how to carry out acts of sabotage such as disabling trucks, billboards, tree spiking, roads, power lines, and so on. The challenge with blockades, or at least long-term (as opposed to "hit and run") blockades, is holding off state invasion, arrest and remaining anonymous. The July 1990 Mohawk blockade on Kanesatake territory in Oka, Quebec, remains a famous example, which lasted 78 days with repeated confrontations with police and the military [2].

McIntyre has compiled an extensive timeline of environmental blockading covering 25 years and countries as diverse as Australia, Brazil, Canada, Colombia, Ecuador, Peru, India, Malaysia, Nicaragua, Solomon Islands, the United Kingdom and United States [119]. Examples include:

- Logging: groups that occupy trees, hug trees, or tree-sit to prevent deforestation or the degradation of forest habitats;
- Digging: creating trenches, pits, or other earthen obstacles that interfere with the construction of roads or buildings;
- Flooding: diverting rivers, waters, streams, or even drinking water to interfere with proposed projects or infrastructure;
- Removing: stealing or removing fuel, equipment, or materials (e.g. survey stakes) to hinder project planning or construction;
- Disrupting roads: using vehicles, large objects, or even bicycles to interfere with traffic and/or make roads impassable.

The actions in this list include setting up protest camps to disrupt logging, clearing, and mining; the use of barricades, minor sabotage and self-defensive violence; and even the destruction of mining and logging encampments, roads, and bridges, and armed removals and physical attacks on workers.

Some of these subversive tactics are already employed and imagined in the space of climate action. As just a single example (among many we could have chosen), in the United Kingdom, a saboteur in 2008 breached the most heavily guarded power station in the country (the Kingsnorth station in Kent) when they ruined one of the plant's 500 MW turbines and left a homemade poster protesting coal [120]. That single act forced the coal- and oil-fired facility to suspend electricity generation for four hours and caused greenhouse gas emissions over the entire country to temporarily drop by two percent.

Fiction has been instrumental in cultivating imaginations and articulating critique against ecological destruction. Edward Abby's 1975 *The Money Wrench Gang* gave way to ideas of "monkey wrenching" or ecotage, inspiring individual action, Earth First! and, later, Earth Liberation Front groups. The novel even inspired some 27,100 recorded incidents of ecotage, Micheal Loadenthal documented, over a 38-year period, whereby "98 percent of attacks target property (i.e., not human beings), and 99.7 percent cause no injury" [121]. Notably, such individual ecotage need not always harm individuals or utilize violent tactics.

The fifth tactic is the building of *permanent resistance,* which (as the name implies) is more lasting, and in many ways most similar to the tactic of sustained social movements introduced in Section 3. The "permanent" aspect of resistance indicates a relational determination that is noticeable within Indigenous, autonomist and anarchist subjectivities. Permanent resistance may differ from a social movement whenever there is further individual or collective escalation into a more sustained, durable conflict with an institution, project or political
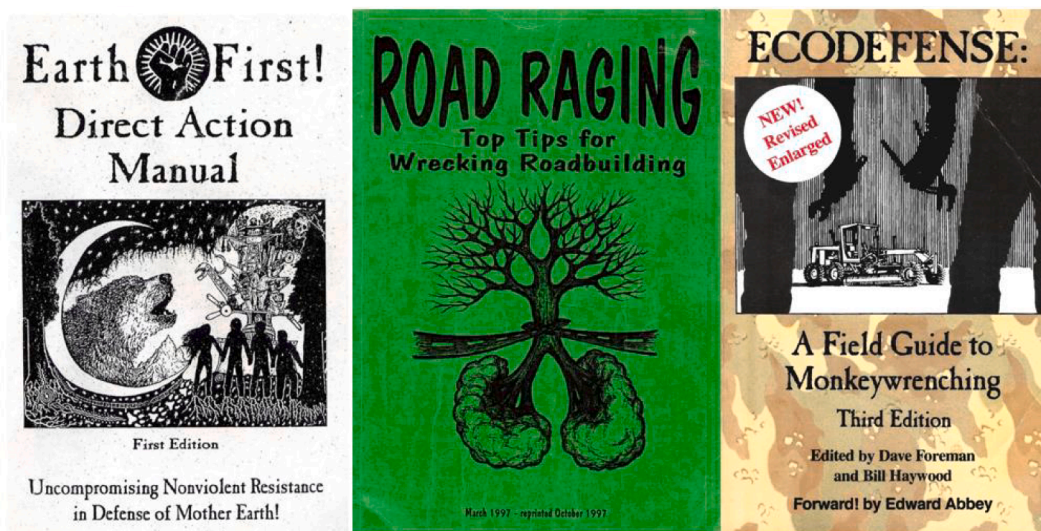

Fig. 7. Prominent manuals for "eco-sabotage" and "environmental blockading", Source: Authors.

system. Permanent conflict, Alfredo Bonanno reminds us, can involve "groups with the characteristic of attacking the reality in which they find themselves without waiting for orders from anywhere else" [122]. Permanent conflict is rooted firmly in autonomist action and aspirations, rejecting unmediated action by political parties and unions, and instead is focused on attacking and stopping said industry, infrastructure and/or institutions. Individually this might take the form of sabotage actions, artistic vandalism or property destruction and various modalities of "attack." Attacks can also expand to collective "affinity groups" who remain either nameless or identify as a group only, such as the Animal Liberation Front, Earth Liberation Front or Informal Anarchist Federation action groups [123].

Permanent conflict, it is important to remember, arose from a reaction to armed specialists, such as the Red Army Faction (RAF), Basque Homeland and Liberty (ETA) and Red Brigades, but to avoid dogmatic (Marxian) ideologies, to resist a hierarchical organization (or habits of the solider) and to embrace a tactical impasse to create spaces for wider militant participation [124,125]. This distinguishes (1) hierarchical militant organizations and action groups (e.g. RAF, RB, ETA); from (2) merely anti-authoritarian groups (e.g., Revolutionary Cell (RZ) and feminist Rota Zora groups in Germany) [113]; and (3) a final category of militant mass action efforts such as Black Bloc tactics (e.g. dressing anonymously in all black to vandalize objects of protest) which take place at demonstrations and uprisings [125]. Between these varying protest tactics and categories of action groups there are different intensities of commitment. What makes these actions anarchist and autonomist are strenuous efforts not to harm human and nonhuman life, unless being attacked or threated, which includes combating police, military and mercenary attacks. Although these acts all fall under the category of permanent resistance, the particular participation of various elements such as anarchists, autonomists, hippies, ravers, drug dealers, and so on varies considerably [126].

There are numerous ways to articulate long-term, committed and concerted permanent resistance. Already mentioned were action groups like the Revolutionary Cell (RZ), Earth Liberation Front and the Informal Anarchist Federation (FAI), but more collective and movement oriented examples are autonomist land occupations inspired by Indigenous anti-colonial actions such as the Zapatistas [127] and hundreds of other Indigenous and *campesino* groups documented in the Environmental Justice Atlas [128].

Three European examples are the NoTAV (No to the High-Speed Train), The Anti-High-Tensions (Molt Alta Tensió, MAT) and ZAD (Zone-to-Defend) Movements in Italy, Spain and France [129]. Going on since the mid-1990s, NoTAV has created multiple protest sites (*presidi*) and large-scale demonstrations across the Susa Valley that celebrate anti-capitalist communality, offer alternatives, and support local sustainable trades and modes of transport [130]. Similarly, the Anti-High-Tensions (Molt Alta Tensió, MAT) Power Line struggle in Catalonia, Spain, represents a diverse collection of actors including various civil-society groups, supportive politicians and community members who have been protesting against the domination of Catalonia by Spanish energy monopolies and their infrastructures for almost two decades now. This movement also included mass demonstrations, forest occupations to block power lines, civil disobedience and countless sabotage actions [131]. In France, ZADs (Zones to Defend) refer to inhabited areas designed to blockade forthcoming development projects. Notre-Dames-Des-Landes (NDDL) represents a ZAD that has been fighting a new mega-airport outside Nantes for over a decade. The ZAD movement articulates communal ways of living with their ecosystems, meanwhile organizing to defend them against police-military and company incursions. Despite internal turmoil, the NDDL ZAD eventually defeated the airport project in 2019 and, equally important, the ZAD concept has spread all over France as a way of living in permanent resistance against destructive growth-oriented development projects [127].

These three examples employed a diverse range of tactics, reflecting cultural specificities and, implicitly, joining the global struggle to defend

land and territory for coercive infrastructural takeover and expansion. Autonomist land defense often combines the diversity of tactics of social movements, but become practical and lived collective forces of permanent resistance.

5. Militant action, guerilla warfare and insurgency

A final class of techniques, the most controversial, involve the use of violence, terrorist tactics or guerilla techniques for climate protection. These draw from historical experiences such as the Revolutionary War in the United States (April 1775 to September 1783), the birth of guerrilla warfare in Europe, the Chinese Communist Revolution (1945 to 1949), and anti-colonial warfare over the previous half century [132]. Indeed, some social movements scholars have argued that violent social movements are "more likely to achieve their goals" than nonviolent ones [58]. Gamson studied American social movements in the 19th and 20th centuries, and found that those using violence were able to draw more attention to their goals, impose greater costs on incumbent actors, and ultimately reach their objectives more quickly compared to movements using only non-violent tactics [133]. Displacement and group factionalism are also major predictors of a protest group's success [134]. McAdam hypothesized that the tactics of resistance often *evolve* from violent acts to non-violent ones [135]. This may not surprise readers already aware of the way police, military, paramilitary and mercenary institutions organize, operate and employ counterinsurgency "soft" and "hard" strategies and tactics [27,136–138].

Voicing discontent, challenging established laws, printing pamphlets and newspaper articles, and organizing mass protests are similar to some of the tactics already described in the sections on resistance, or self-defense and disobedience (see Sections 3 and 4). However, these can escalate into mass meetings, petition signings, tea protests, customs and tax evasion, boycotts, and committees of correspondence to more overt acts of dissidence [139]. The military, in fact, recognize insurgency as beginning with movement organizing and non-violence before becoming violent. General Brigadier Kitson conceived insurgency in three stages: "The Preparatory Period," "Non-Violence" and "Insurgency" [140].

Many guerilla or insurgent tactics overlap with earlier protest tactics but may differ in their form of organization, and intensity of the damage inflicted. The American Revolution offers a useful taxonomy of tactics, including:

- The *destruction of merchandise or property* via bonfires, physical sabotage, arson, or theft (especially the famous "Tea Parties" across Boston, New York, Philadelphia, and Charleston, where English tea was destroyed or dumped), or the burning of homes where British tax collectors or governors resided;
- The strategic use of crowds and *organized* or *mass riots,* massive outdoor gatherings organized to incite military-civilian violence that then furthered the cause and tarnished the reputation of the British (the sheer number of these are staggering, including the Knowles Riot of 1747, Stamp Act Riots of 1765, the *Liberty* riot of 1768, the Boston Massacre of 1770 and the Boston Tea Party of 1773);
- The creation of *terrorist/freedom fighting cells* such as the Sons of Liberty (1765–1776), who carried out distributed acts of resistance or sabotage, including shaming British supporters by denouncing them publicly in newspapers (haranguing) or even through the use of tar and feathering [139].

Collectively, these acts of organized militias, action groups and guerrilla armies resulted in an urban mobilization that ended up challenging British authority and military rule at the time. To be fair, they also resulted in a horrendous civil war that, although arguably righteous in their view, took an immense toll in terms of lives lost and damage (with some calling it "one of the bloodiest in American history," with many non-combatants dying from disease or starvation) [141]. This

reminds readers, perhaps uncomfortably, that terrorism has been a constant and driving force in American history, even when the American Revolution was birthed itself [142].

A few decades later, Spanish peasants seeking to resist the rule of Napoleon Bonaparte's imperialism (1808 to 1813) in Europe are documented with one of the first known instances of "guerilla warfare" (because *guerilla* means "small war" in Spanish) when they used hit-and-run tactics, as well as reliance on the local population for resources and support, on the Iberian Peninsula to slow down advancing troops and disrupt supply lines [143]. The Italian radical Carlo Bianco is credited with being the first to formally establish a link between guerrilla warfare and radical politics in 1828–1829, when he noted that Italy could not be freed by a conventional, modern war given the mobilization of large armies would be impossible without discovery [144]. Instead guerilla warfare was seen as a way to weaken invading and occupying armies or, later, the state by deploying small bands of irregular fighters inferior in numbers but superior in terms of knowing the local context and flexible in organization and action compared to existing political authorities. Such tactics became widely used across Europe and beyond over the following centuries, with guerilla operations resisting foreign invasion and military occupation, attaining concessions from incumbent regimes, overthrowing unpopular governments, and even leading to wars of liberation or decolonization that result in new political entities [143]. The idea of counterinsurgency was created to counter guerilla warfare tactics and insurgency in general [137].

Guerrilla warfare was also an important element in Mao Zedong's Communist Revolution in China (1946 to 1949). There, the military responsibilities of guerrillas were to chip away at enemy forces and harass or weaken larger forces, as well as to attack lines of communication. It included the establishment of military bases that could support independent activities to flank the enemy, or force the enemy to disperse its strength [144].

Che Guevara and Régis Debray built on these ideas to promote a Latin American variation of guerrilla warfare theory that saw the guerrilla forces itself as an important fusion of military and political authority. It was responsible for ushering in an era of urban guerrilla warfare that emerged as a dominant strategy among Latin American revolutionaries in the late 1960s. This included:

- *Attacks on or the sabotage of critical infrastructure* such as police stations, banks, government buildings, and stores (examples related to energy or climate change would be Maoist insurgents attacking hydropower dams in Nepal [145], or members of the Basque separatist group ETA attacking nuclear power plants in Spain [146]);
- *The assassination* of political leaders or other prominent stakeholders, to eliminate threats and also spread fear (an energy related example here would be Alexander Berkman's attempted assassination of the Pittsburg industrialist Henry Frick, who had previously been partially responsible for the Johnstown Flood, and was responsible for large coal and coke production) [147];
- Taking armed or bombing actions during *social upheavals* (e.g. *general strikes, riots*), to support and intensify social tensions (e.g. Tupamaros, IRA, George Jackson Brigade) [148,149].
- The strategic use of *bank robbery* as a form of expropriation from industries and industrialists (Chase Bank, Wells Fargo, Citibank and Bank of America could be targets, given their continued investments in fossil fuels and their hidden role in accelerating climate change) [150];
- Targeted *bombings* to destroy infrastructure and/or spread fear [151] (some bombings have already taken place closer to major summits like the G8 or United Nations Climate Change Conferences, in attempts to shape public debate [152], and both mail and pipe bombs were sent to President Donald Trump over, in part, his stance on climate change [153]);
- The *kidnapping* of foreigners or business leaders, both to raise money and also generate media publicity (indeed, it was the brief

kidnapping and taking hostage of Environmental Protection Agency officials by the Love Canal Homeowners Association in 1980 that led in part to the federal government taking action via Superfund legislation [154]).

A theory of urban guerrilla warfare enveloping many of these tactics was further developed by Carlos Marighela, who wrote a Handbook on it [155]. This Handbook envisioned urban areas and cities not only as targets to undertake political action, but also as offering safe havens where insurgents could hide. Taking after Lenin, Marighela suggested that urban guerrilla operations be carried out by a small elite group of dedicated revolutionaries organized in cells, forming a complex underground chain of command.

Reflecting these violent tactics and arising from the anarchist milieu in Mexico is the eco-extremist tendency. This is tendency employs violence and terrorists tactics in a war against (ecologically destructive) civilization. Influenced by the "Unabomber" Ted Kaczynski [156], the group *Individualistas Tendiendo a lo Salvaje* (ITS, Individuals Tending Towards the Wild) propose an "indiscriminate attack" against civilization and technological domination, which began in 2011 in Mexico by sending postal bombs to robotics, biotechnology and nanotechnology professors [157]. Eco-extremist groups are few in number, but more groups are appearing in numerous countries (e.g. Chile, Argentina, Greece) carrying out attacks against mining companies, electrical infrastructure, equipment and specialized workers involved industries harming or manipulating ecosystem [158]. Their actions have been controversial and divisive, resulting in condemnation and rejection of eco-extremist tendency by anarchists action groups and the public at large.

To be clear, there is another lineage of right wing authoritarianism and/or fascist violence that we intentionally eschew (and sidestep in this review) related to celebrating imperial domination, espousing racial prejudice, mass killing and terrorism. Elements of left authoritarianism related to Lenin, Mao and Marxist-Leninist ideology can also invoke similar concerns [159]. Nevertheless, we focus on these tendencies on the left, rather than on the fascist right, as they have innovated revolutionary tactics and espoused, at least in word, their anti-capitalist, egalitarian and self-determined aspirations. Terrorism, at least initially, was a tactic "from below," not a method of rule. Understanding the aspirations, ideology and realities of revolutions is insightful in the context of energy and climate action because state terrorism tends to be a prerequisite of state power. State and market institutions, according to this logic, are instrumental to ecological to climate catastrophe.

Furthermore, we are not demanding direct violence or military action on behalf of the environment or climate—each reader will need to determine their personal threshold for violence vs. non-violence themselves. The use of armed struggle, assassination, kidnapping, and terrorist tactics (e.g. attacking civilians) is morally repugnant in many situations and is often justified only in extreme circumstances (e.g. authoritarian occupation). Moreover, such acts like bombings need to take care not to result in killing people or indiscriminate collateral damage. For example, in the early 1900s the Galleanists and other Italian anarchists relied on mail bombs to business and government officials with the intent of changing labor policy. Many argue that these actions did more harm than good. Their bombs were indiscriminate—often failing to hit the key capitalists, police, or judges they were targeting—and instead resulted in casualties among bystanders and themselves [160]. The Marxist-Leninist Weather Underground had a similar early experience, which led them to conduct bombings in a way that would not resulting in killing people [161].

State terrorism and fascist violence depend on harming human and nonhuman life, indiscriminately killing and employing terrorism to control populations. These tactics, and all they represent, are standard operating procedures of conventional and "dirty" warfare. Military and paramilitary actions do continue to occur around the world every year with an entire spectrum of options presented in Fig. 8, which is drawn
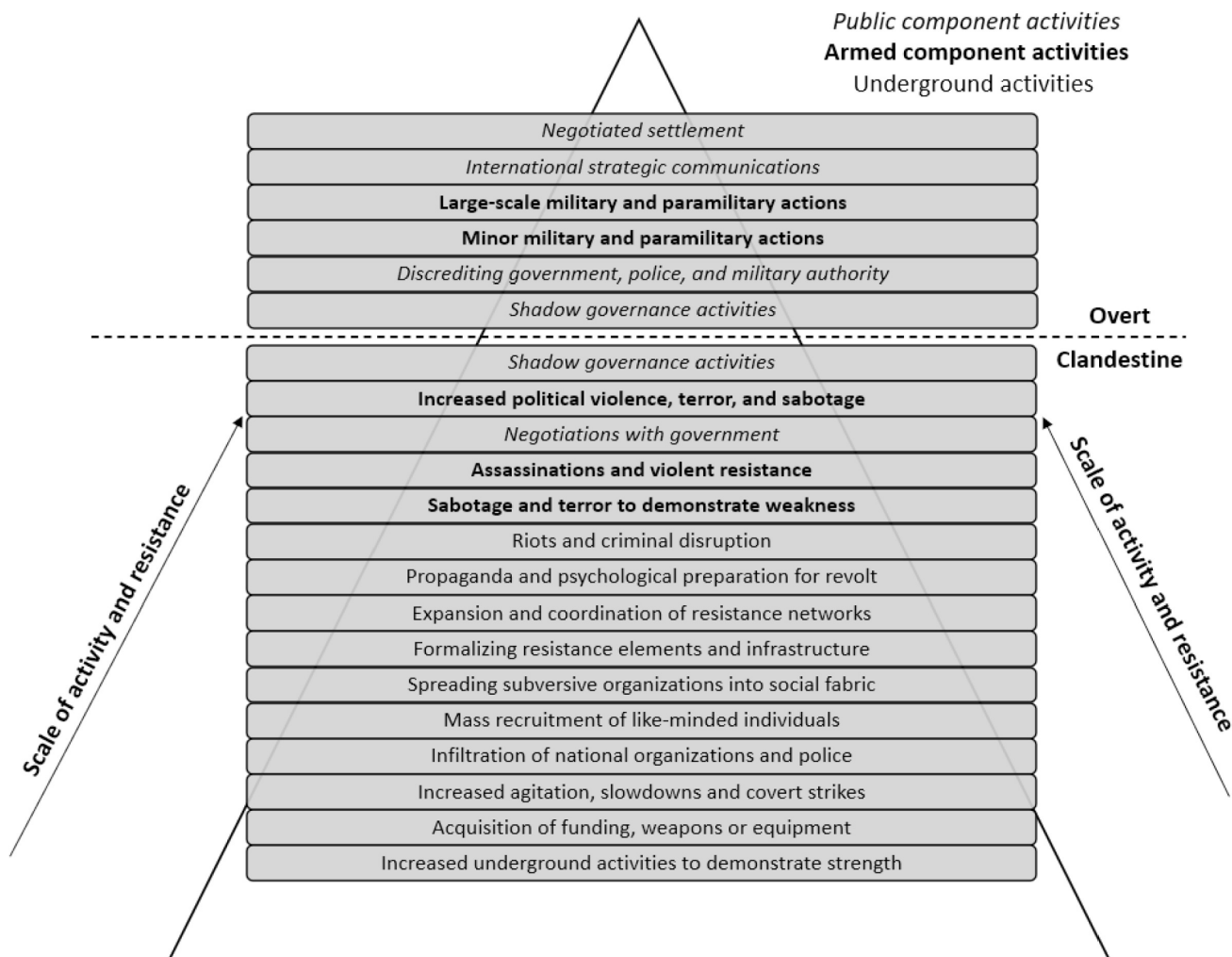
Public component activities
Armed component activities
Underground activities

| Negotiated settlement |
| International strategic communications |
| **Large-scale military and paramilitary actions** |
| **Minor military and paramilitary actions** |
| Discrediting government, police, and military authority |
| Shadow governance activities |

Overt

- -

| Shadow governance activities |
| **Increased political violence, terror, and sabotage** |
| Negotiations with government |
| **Assassinations and violent resistance** |
| **Sabotage and terror to demonstrate weakness** |
| Riots and criminal disruption |
| Propaganda and psychological preparation for revolt |
| Expansion and coordination of resistance networks |
| Formalizing resistance elements and infrastructure |
| Spreading subversive organizations into social fabric |
| Mass recruitment of like-minded individuals |
| Infiltration of national organizations and police |
| Increased agitation, slowdowns and covert strikes |
| Acquisition of funding, weapons or equipment |
| Increased underground activities to demonstrate strength |

Clandestine

Scale of activity and resistance

Scale of activity and resistance

Fig. 8. A spectrum of tactics for revolution, resistance and insurgency Source: Modified substantially from [162].

from a review of the literature dealing with civil conflict and military history. Complicating matters, some environmental defenders rely on similar tactics in response [12]. As Fig. 8 also reveals, the general idea behind most campaigns for revolution, resistance and insurgency is to not eschew violence but to strategically harness it. Insurgency and guerilla tactics are not to be shrouded in secrecy forever, but to move from covert acts upward to publicly visible overt acts. While many actions begin and remain in the underground (in normal text in the diagram), they also move upward to capture armed actors (in bold) but also the public (in italics). Moreover, the actions are arranged in a hierarchy that sees many of the base actions at a smaller scale of activity coalesce into broader actions at greater scales.

Notably, some actions, such as those in bold, involve armed incursion or violence, but these options are meant to only serve a purpose towards the nonviolent actions (such as settlement or governance) at the top of the pyramid. Violence is not an end itself, but a means to achieve nonviolent ends. This raises the question, and historical reflection, over how one ought to confront armed violence or provoke action from unresponsive institutions in the face of socio-ecological crisis? The doctrines of reciprocity and proportionality may indicate that violence be met with counter-violence.

To help readers imagine how such tactics may be used in practice to promote climate action, Kim Stanley Robinson's novel *Ministry for the Future* mentions the potential effectiveness of acts of "environmental terrorism" such as industrial sabotage, kidnapping, and the assassination of those emitting large amounts of carbon into the atmosphere, such

as those owing private jets or operating luxurious yachts, or the executives of fossil fuel companies [163]. The fictional activists even make the use of drone-terrorism to shoot down commercial aircraft using carbon-intensive fuels, or torpedo ships that run on diesel. In the book, these coordinated acts are undertaken by a fictitious group known as the *Children of Kali*. Some even interpret these actors as the unspoken "hero" of the book, for it is through their actions that climate change is presented in a light where humanity faces the uncomfortable question as to whether it would be worth killing small numbers of high-carbon-emitting elites in order to save millions of other innocent people [164]. The book implies that true climate action may occur only after the fear of death is put into the hearts of the powerful, so that they begin to meaningfully cut emissions and look for alternatives. In the book this even involves the repeated bombing of refineries, coalmines, gas pipelines, and fossil fueled powerplants, all in the name of protecting the planet. The important message here centers on opening our tactical and strategic imaginations about how to effectively respond to the ultimate risk of socio-ecological catastrophe. Because whether our bank accounts agree or not, all life on the planet has a stake in stopping ecological and climate catastrophe and genuinely repairing our habitats.

6. Conclusion

Multiple conclusions arise from our analysis and review of tactics. First, although controversial and provocative, leverage points and direct action tactics for potentially transformative climate action do exist well

outside the comfortable, formal, and accepted domains of crafting local policy, contributing to national policy and debate, or changing business practices. Our review of the three approaches of civil disobedience, anti-authoritarian strategies and guerilla warfare offers an array of at least 20 overlapping tactics summarized in Fig. 9. Many of these tactics are common across literatures and political spectrums, transcending specific places (geographic context) and time periods (temporality). Some of these tactics are extreme, violent, and of questionable moral status. Others are more non-threatening, such as delegitimation, sit-ins and permitted demonstrations. Some of the tactics are strictly non-violent, e. g. watching and witnessing, boycotting, or resistance; some are more violent, e.g. sabotage, kidnapping, or physical attack and destruction. Some tactics are transient, i.e. shutting down a coal-plant for a few days or boycotting products for a few months, whereas others result in more permanent change, i.e. campaigns of permanent resistance spanning years, enacting regulations that shut down coal plants or permanent state and federal legislation (e.g. the Civil Rights Act of 1964). The movements and groups able to deploy a diversity of tactics, supporting an expansive non-violence category and not succumbing to perfidious infighting (often related to positionality and politics), will likely have higher levels of success.

Second, and already hinted at when introducing Fig. 9, is that while our tactics come from different political approaches and literatures spanning anarchy and Marxian political theory, civil disobedience and history, and military studies and insurgency, many of them cut across categories, especially those such as demonstrations, movements, boycotts, occupations, ecotage and permanent resistance. Despite their diverse and different roots, such tactics do interconnect in many salient ways. All envision very active roles on the part of individuals. Indeed, an important feature of our three perspectives is that each is infused with revolutionary principles that see the involvement of people as central in carrying out sustained acts of struggle and resistance. They also entail a mix of overt and covert actions, legal and illegal acts, legitimate and illegitimate practices, and violent and nonviolent tactics. This diversity of tactics even challenges the notion of what it means to participate in democracy or what constitutes a political act of climate protection—these tactics demand active and sustained involvement in ways very distinct from more passive roles such as consuming, voting, or investing. It also forces us to consider what socially just, ecologically sustainable, or democratically legitimate options *are* for people and communities when people are themselves deprived of any choice in technological development or the environmental destruction facing them. Direct action can be interpreted as an expression of democratic participation, especially when the issues that matter are off the political "menu."

Third, some if not many of our tactics can become "learned" or "stale," that is they can lose their efficacy over time as opponents anticipate and learn to preempt them [5]. For example, one survey of the civil rights movement noted that sit-ins and Freedom Rides initially put the supporters of segregation on the defensive, but this tactical innovation was quickly followed by adaptation which neutralized the temporary advantages gained by the movement [135]. Demonstrations can result in effective social change, but they can also be countered or coopted by incumbents. In Nigeria, for example, the disarming of Movement for the Emancipation of the Niger Delta (MEND) in 2012, which had organized mass protests against unpopular energy policies, succeeding not in meaningful change, but in encouraging subsidy reformers to develop more tactical approaches to introducing reforms – timing or policing them so as to avoid or defuse protests [165]. Fuel protests in Mozambique in 2008 and 2010 similarly taught the state to deploy extreme violence against protestors to weaken their opposition [165]. Moreover, during the anti-Vietnam war movement in the 1960s and 1970s, there was the worry that the destruction of property and calls for armed engagement were instigated by paid provocateurs in an attempt by government agencies to discredit movements in the eyes of the public, not activists themselves [166,167]. These themes of tactic and counter-tactic, and legitimacy and provocation, are certainly worthy of additional academic scrutiny.

Fourth, we do not endorse all of the options we survey. Some of them are indeed objectionable and questionable, and involve murky morality concerning the loss of life. When contemplating this inventory of tactics, there is a distinction made within the literature about degrees of acceptable sabotage or rioting, and at what point acts of civil disobedience can justify violence or intentionally provoke incumbents to violence, an infamous tactic of Martin Luther King Jr [72]. For instance, rioting and black bloc tactics are important to anarchists. Autonomist

Witnessing and watching	• Documenting injustices or unsustainable practices
Delegitimation	• Challenging the veracity of accepted information
Demonstrations and mass arrests	• Making visible discontent and dissatisfaction, even with possible incarceration
Social movements	• Creating a sustained effort at calling for change
Permanent resistance	• Interfering with unsustainable practices for a long period of time
Occupation and sit-ins	• Interrupting the normal order and business as usual
Boycotts	• Disrupting markets and profits for private sector firms
Labor strikes	• Mass refusal of employees to work until demands are met
Hunger strikes	• Refusing to eat food until demands are met (often undertaken by prisoners)
Trespassing	• Challenging property rights and attacking media attention
Blockades	• Physically stopping access to a project or location
Sabotage	• Destroying or tampering with unjust structures
Hacktivism	• Using the internet, computers, or software to challenge hegemony
Destruction of merchandise or property	• Destroying products or other valuable assets
Mass riots or looting	• Organizing massive public demonstrations to incite overreactions or enable looting
Terrorism	• Perpetrating low intensity conflict and acts of violence
Assassination and kidnapping	• Undertaking targeted, ruthless acts of murder or violence
Bank robbery	• Expropriating money or financial resources from industrialists
Military and paramilitary action	• Implementing sustained armed campaigns
Bombing	• Detonating incendiary devices to injure or kill or destroy property

Fig. 9. An inventory of anarchist, civil disobedience, and guerilla tactics for climate protection Source: Authors.

action is important to actions groups like Revolutionary Cells, which are horizontal, decentralized and open to anyone to take action, which is revived through the Animal Liberation Front (ALF), Earth Liberation Front (ELF) and the Informal Anarchist Federation (FAI). The ALF and ELF have a strict policy of not killing people or harming animals, but sabotaging via any means [168]. Each group negotiates their own line between what is ethically acceptable and what is prohibited.

Admittedly, each of us will individually oscillate on the spectrum with which perspective we endorse, and some, or even many, may reject all three perspectives or all twenty tactics. We nevertheless believe it is important to begin the discussion about a range of options for protecting our ecosystems and climate. Regardless of which tactics they agree with, everyone should work to create space in their respective places to encourage energy autonomy, pursue degrowth or more sustainable lifestyles, and seek to remedy, or challenge, existing extractive supply chains.

Fifth, and lastly, our inventory of tactics represents an opportunity not only to change practices but also challenge our thinking about what practices are even possible or desirable. As Noam Chomsky wrote, anarchism constitutes "an unending struggle, since progress in achieving a more just society will lead to new insight and understanding of forms of oppression that may be concealed in traditional practice and consciousness" [169]. Given all that is at stake, we must begin to imagine what a no holds barred approach to social change would entail. The insurrection or decolonizing of energy research necessitates not only questioning—and deconstructing—research, but also creating openings and spaces for direct action. The activist and academic Vandana Shiva argued that the first step towards challenging a dominant or destructive technology begins not with physical destruction or action, but with thinking, with challenging *monocultures of the mind* [170]. In this unending struggle, we need to not only decarbonize our technology, but decolonize our thinking about what is possible, proportional, and desirable.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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