

Metabolic Politics: Industrial Relations as if Nature Mattered

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ABSTRACT

Work is at the centre of the social metabolism with nature. This means that industrial relations (IR) are always also environmental politics. This article reviews core contributions to IR literature, showing that they do not systematically address this role of nature and separate the politics of work from their ecological basis. Drawing on historical case studies of the processing of three core products of capitalist modernity (fossil fuels, meat and concrete), the article presents the heuristic of metabolic politics in which nonhuman nature is conceptualised as an autonomous force in IR rather than a mere context of it. This approach allows analysis to systematically take into account the effects of IR on nonhuman nature as well as nature's own shaping of IR. Such an interdisciplinary approach is necessary to understand the entanglement of IR with climate change and the broader ecological crisis.

KEYWORDS

Climate change, construction, environment, fossil fuels, history, meat processing, work

Introduction

There is little doubt that “green transitions” affect industrial relations (IR) – for instance, through deindustrialisation or transition of jobs to renewable energies and the “green” economy (Clarke and Sahin-Dikmen, 2020; Goods, 2017; ILO, 2018; Lipsig-Mummé and McBride, 2015). Yet, before such transitions are even discussed, dramatic impacts of the ecological crisis¹ itself on IR are recorded as it undermines the biophysical basis of the labour process. While all work depends on natural resources, around 40 per cent of current global employment is in industries which rely heavily on natural processes and which are disrupted by climate change. The effects of climate change, such as heat waves, reduce productivity and working hours through the deterioration of the health of employees themselves and of care work at home (ILO, 2019). One recent study projects that a scenario of 3.0°C warming would reduce global total labour in the low-exposure sectors by 18 per cent and 24.8 per cent in the high-exposure sectors (Dasgupta et al., 2021). Such impacts are very likely to trigger new labour conflicts over the adaptation to the new ecological and economic realities. These conflicts have the potential to undermine established institutions of IR through new ecological conflicts (Mikulewicz, 2021; Schaupp, 2021).

Despite the increasing impact of ecological crises on the world of work, there is very little systematic attention to the role of the natural environment in IR. The major handbooks on IR (Blyton et al., 2008) and the sociology of work (Edgell et al., 2015) do not mention the natural

¹“Ecological crisis” refers to the interconnected anthropogenic processes that threaten human life on earth, prime among them climate change, the sixth mass extinction, soil erosion and zoonotic pandemics.

environment at all. Yet several emerging subfields of IR do engage with the role of environmental policy. The second section of the this article reviews the central approaches of these subfields and outlines the conceptual challenges of the ecological crisis for IR. It shows that central conceptions of IR – such as its focus on institutionalised collective bargaining around narrowly defined employment issues – are an obstacle to systematically addressing environmental issues in IR. Concepts of the “environment” or “external factors”, originally developed mainly for analysing the institutional contexts of IR, could potentially now be used for assessing the role of the natural environment. Yet the ecological crisis throws into question the customary separation of IR from other policy fields, especially environmental policy. Therefore, this article suggests an interdisciplinary approach for conceptualising the role of nature in IR, combining IR studies with political ecology as well as environmental and labour history.

Such an approach goes beyond identifying environmental issues in IR with transformation conflicts to take into account the role of the natural environment itself. The term “nature” here does not refer to landscapes and species untouched by human intervention. Such a nature does not exist anymore, as even the remotest places in Antarctica and the deepest oceans contain traces of plastics and other artefacts (McKibben, 2006). Instead, nature can be defined negatively as that which exists and persists independent of human intention and control. As most things are both given and made, including our own bodies, the boundary between nature and artefact does not run between the objects, like the natural tree on the one hand and the artificial car on the other. Instead, “nature” refers to *properties and processes* of movement of matter and energy that are not controlled by humans. This includes the specific material properties of resources such as coal but also processes such as climate change, which exist because of human intervention but demonstrate the impossibility of complete control over nature (Soper, 1995). Only a negative definition makes it possible to subsume these enormously heterogeneous elements under a common term and to speak of “nature” in the singular at all. This is not to homogenise nonhuman nature, but to underline the fact that the fundamental uncontrollability of the different segments of nature has important impacts on society and on IR more specifically (Malm, 2018). In this sense, the article will show how the properties and processes of nonhuman nature can be better understood as autonomous forces in the history of IR than as a static context.

The first section of the article reviews the role the natural environment plays in IR literature. While classical IR did not take into account environmental questions, the subfield of environmental labour studies puts questions of a just transition at the centre. The present article builds on this literature to argue for a conceptual renewal in IR that would enable an understanding of the more fundamental role of nonhuman nature beyond the current ecological crisis. Therefore, sections below present short historical case studies of IR in the processing of fossil fuels, meat and concrete. These cases show that nonhuman nature has *always* been an important factor in shaping the institutions and outcomes of IR. On this basis, the next section argues that IR should be understood as “metabolic politics”, as they not only negotiate issues of employment but also regulate the societal metabolism with nature. This perspective understands nature as an autonomous force in IR rather than merely its context. The article concludes by elaborating on the potential ramifications of the suggested approach for IR scholarship and practice.

The natural environment in IR

Classical approaches to IR emphasised the central role of trade unions in the Western countries in which their analyses were situated, but they also acknowledged the potential historical and regional variability of forms of labour organisation (Dunlop, 1993; Hyman, 1975; Ross, 1966). Along with

a growing institutionalisation of the field, IR developed increasingly narrow conceptions of worker agency. The mainstream of IR theory is strongly focused on trade union activity (for overviews see Heery et al., 2012; Nowak, 2021). Such a viewpoint was consonant with the assessment of organised strikes led by trade unions, then seen as the “mature” form of industrial action, as opposed to “immature” and “unorganised” spontaneous workplace actions – a distinction stemming from Ross (1954). Heery and Frege (2006: 601) report that a focus on trade unions and their activities is incorporated into the discipline to such an extent that referees of IR journals question the relevance of articles that do not focus on unions. This focus on trade union policy is likewise present in “environmental labour studies” (ELS), the most prominent field of research combining the study of IR and environmental politics. The main proponents of this sub-field define its objective as “studying the environmental politics of trade unions” (Räthzel et al., 2021: 2). Thus, they mainly try to establish unions as a central actor in the “just transition” toward a green economy (Clarke and Lipsig-Mummé, 2020; Hampton, 2015; Räthzel and Uzzell, 2011; Silverman, 2006; Tomassetti, 2020). Such approaches mainly demonstrate the ways in which environmental issues are or can be included in collective bargaining.

From the 1990s onwards, core contributions to IR were struggling with the continuous decline of union power in the early-industrialised countries and focused on identifying conditions for a “revitalisation” of trade unions in the near future (Frege and Kelly, 2004; Voss and Sherman, 2000). Most scholars of the revitalisation paradigm acknowledge that unions need to adapt to the new economic realities in order to enable such a revitalisation. In this, the central paradigm is that of “social movement unionism”, which argues for including those movements and civil society organisations which are manifestations of labour agency in the study of IR (Heery et al., 2012; Moody, 1997; Webster, 1988). Therefore, this may be termed the *social movement unionism* current in IR.

The bulk of ELS literature is conceptually close to this current. Indicative is the shared demand to study the environmental policies of trade unions, a deviation from the narrow focus on employment relations which is characteristic of traditional IR. Like the social movement unionism literature, ELS’ literature largely argues that unions should and do transcend a narrow focus in order to adapt to changing political-economic conditions. A central topic for ELS is the cooperation between unions and environmental movements (see Mayer, 2009; Silverman, 2004; Soder et al., 2018). Thus a large part of ELS is in line with the social movement unionists’ call to open up to topics and organisations beyond a narrow understanding of collective bargaining, yet they also undertake broader conceptualisation of the relationship between labour and nature (for example, Barth and Littig, 2021; Stevis et al., 2018), which is where this article seeks to contribute.

Labour process theory emphasised early on that the power relations between employers and workers are strongly influenced by the concrete organisation of work itself. Braverman (1974) famously demonstrated how technical and organisational deskilling disempowered workers. Labour process theory then conceptualised the workplace itself as contested terrain (Edwards, 1979) and emphasised the connection between micropolitics in the workplace and broader IR (Burawoy, 1985; Thompson, 1983). In ELS, this *workplace* current is quite small when compared to the plethora of studies on environmental trade union policies. Most of them focus on workers’ environmental orientations, especially in high-emission sectors, which are most affected by climate mitigation policies. This scholarship has identified the complex and contradictory position of employees in these sectors, most of whom are aware of the ecological crisis but have limited trust in governmental strategies of a green transition and resist being cast in the role of the “climate villain” (Allan and Robinson, 2022; Houeland and Jordhus-Lier, 2022; Newman and Humphrys, 2020). Still, there remains a lack of research on environmental issues at the workplace level from

the perspective of micro-politics or labour process theory.

While the currents described above suggest additions to the IR focus on trade unions, another current – namely, the *Global South* current – opposes this focus on more fundamental terms. It argues that such a focus results directly from the alleged Eurocentrism of IR. Early on, Hyman (1989a) acknowledged the far-reaching conceptual problems presented by Eurocentrism. He argued that the organisational form of the trade union and the political articulation of the strike as a routinised activity, institutionally segregated from broader social conflicts, is in fact atypical on a global scale. Nevertheless, this model has formed the basis of IR. Thus, IR has taken as a norm what is in fact a historical and regional exception. Braga (2020) describes institutionalised trade unions and ritualised collective bargaining as the “Fordist labour agitation pattern,” and argues that the focus on this pattern has made it difficult to identify alternative forms of worker mobilisation, especially in the Global South. Silver’s (2003) concept of “labour unrest” remains the most important theoretical concept for integrating global variations of worker agency into a general IR theoretical framework. This term, she argues, is more adequate to the broad variation of collective worker voice than the IR concepts of “industrial action” or “collective bargaining”, which only represent the specific institutionalised forms of the Global North. She then distinguishes between “Marxian” and “Polanyian” types of labour unrest. The first refers to employment-related conflicts, which are also central to IR, while the second refers to struggles against the commodification of the means of subsistence, which, for her, are equally important expressions of labour unrest.

In ELS, the Global South current has its most prominent expression in the concept of the “environmentalism of the poor” (Martínez-Alier, 2003). This term refers to the struggles of rural communities across the Global South over their means of subsistence, such as access to clean water – largely beyond the workplace. In Silver’s terms, such struggles can be categorised as Polanyian types of labour unrest. This is because, as Rätzl et al. (2021: 3) remind us, “‘the poor’ are workers and ‘workers’ are often poor. Both need to fight for global environmental justice to survive”. These struggles challenge the Eurocentric conceptual apparatus of IR so fundamentally that some have concluded that the traditional IR approach must be abandoned altogether (Nowak, 2021). Such judgments resonate with earlier calls from the field itself that “from a materialist perspective [...] the task [...] is not to re-interpret but to transcend the very idea of industrial relations” (Hyman, 1989b: xi).

The final current of dissident IR begins from a critique similar to that of the Global South current, but builds on a broader politico-economic theory. Thus, Breman and van der Linden (2014) argue that the IR conceptualisation of workers’ collective action and especially of trade unionism is based on the “standard employment relationship” that has been dominant in core countries for a few decades. Under neoliberalism, they maintain, the “rest” is not becoming like the “West”; rather, the obverse is true. This means that the precarious forms of employment which have been the norm in most of the world throughout the history of capitalism have now also become dominant in core countries. “Traditional” Western forms of collective action are gradually losing their impact and new forms of collective action are emerging. Others have advanced the critique that IR often implicitly conceptualises trade union policy as the direct articulation of workers’ interests. This presents labour as a monolithic block represented by unions and thereby conceals conflicts within unions, or between them and other segments of the working class (Atzeni, 2021; Gallas, 2018). Nowak (2021: 1339), for example, argues that:

trade unions should not be analysed as the exclusive or best-practice representative body for workers, but rather as apparatuses within capitalism that might have very different political orientations and effects on class power, depending on their mode of political integration within a social formation and the specific political conjuncture.

Such a critique resonates strongly with pessimistic research on the capability of trade unions

to become drivers of a socio-ecological transformation. The viewpoint is expressed most prominently in the “treadmill of production” theory (Schnaiberg, 1980; Buttel, 2004; Gould et al., 2015). This theory argues that the Fordist class compromise from which the traditional institutions of IR emerged resulted directly from an environmentally destructive boost in economic growth after the Second World War. Major industrial trade unions in core countries focused on preserving jobs and securing high wages for their clientele and thereby contributed to environmentally destructive productivism (Goodstein, 1999; Obach, 2004; Thomas and Doerflinger, 2020). The argument thereby emphasises the potential opposition between trade union policy based on narrowly defined interests of their membership and a wider working-class interest in preserving a liveable environment. There is also a branch of ELS that follows the politico-economic current, basing itself on a class heuristic instead of a classical IR framework. This current therefore connects workplace issues to wider social and political struggles (Huber, 2022; Silverman, 2004; Stevis et al., 2018). It also contributes to class theory by emphasising the experience of environmental pollution and destruction as a central commonality for the global working class (Barca, 2012).

This review shows that, while classical IR did not take environmental questions into account, the emerging tradition of ELS puts these at the centre. But the claim of this article goes beyond the observation that climate is a relevant development for IR. The argument is that it was *always* wrong to neglect the central role of nonhuman nature in IR. To underline this, the following sections present short historical case studies of the development of IR in the processing of three of the central products of capitalist modernity: fossil fuels, meat and concrete.²

Fossil fuels

In the 19th century, all major coal-producing economies experienced large miners’ strikes, which led to the founding or solidification of both trade unions and employer associations (Plowman, 1985). It is no coincidence that the institutions of IR emerged together with the fossil economy. For the first time in history, coal put into the hands of the workers a powerful lever that they used all over the globe to assert democratic rights. On one hand, the miners’ strikes paralyzed not only their own operations but also the entire fossil-fuelled industry that they supplied. On the other hand, the geological characteristics of the coal deposits meant that the movement of coal followed a tree structure: at their ends, the supply chains were quite branched, but they usually started from a single main channel. This led to potential bottlenecks in several nodes which workers could easily block, and in so doing could exert force on companies as well as entire governments. Consequently, the emergence of legal regulation of IR was partly due to states’ recognition of the central place of coal in the social metabolism with nature. Such recognition led early-industrialised states to shift their stance toward organised miners from one of violent repression toward pacification (Mitchell, 2013). Germany, for example, reacted to revolutionary coal miners’ uprisings by introducing the Works Council Act, which institutionalised works councils as an official form of codetermination within capitalist firms to drive workers away from revolutionary organisations. The process was extended and broadened after WWII. In 1951, the Coal and Steel Codetermination Act, introduced on behalf of the German mining industry, guaranteed parity between shareholder and works council representatives on mining firms’ supervisory boards (Müller-Jentsch, 2021). Even today, despite a general decline, 81 per cent of miners are still represented by a works council, making this sector a pioneer of codetermination (Destatis, 2022).

This strong entanglement of the institutions of social partnership with fossil fuels was continued or even exacerbated after the demise of coal. As the extraction of coal was very labour-

² For further details on the cases, see Schaupp (2024a).

intensive, a large share of its price was constituted by wages. Therefore, the cost of coal rose with overall economic growth, which always preserved an incentive to save energy. This changed with the advent of oil, which much less labour-intensive to extract. Therefore, in the 1950s, wasting energy became economically viable (Pfister, 2010). This was the material basis of Fordism as a new model of capital accumulation based on high productivity and mass consumption. Higher productivity meant that wages declined as a share of total corporate costs while real wages of workers increased. In addition, the reduction in the price of industrial products increased the purchasing power of workers. Employment was able to grow overall because the total volume of capital increased more than the number of workers who were laid off due to productivity gains. States profited from this situation and used their growing tax revenues to expand their social systems, which guaranteed a minimum standard of living even for those who did not participate in the labour market. Thus, the welfare state emerged as an important institutional framework for IR (Burawoy, 1985). This constellation made it possible to replace open class conflict with institutionalised struggles for participation in economic growth, which found its central expression in the institutions of IR (Büchs and Koch, 2017; Jessop, 1991).

Thus, the class compromise after the Second World War relied on a rapid increase in the use of fossil fuels (Huber, 2013) and the subsequent generalisation of mass consumption (Aglietta, 2000; Brand and Wissen, 2021). Therefore, this constellation can be described as a “fossil class compromise”, symbolised above all by the car as the eponymous product of Fordism (Schaupp, 2021). From the perspective of workers, it is only a slight exaggeration to describe Fordism as a bargain of strict obedience to factory discipline in exchange for a car.

While global labour studies already criticised the institutions of IR being specific to the historically and geographically limited regime of Fordism (see review above), these considerations add another problem to their generalisation: the material basis of the emergence of the institutions of IR were the very fossil fuels that are the major cause of climate change. This entanglement makes it harder for the institutions of IR to cope with demands for decarbonisation. Flanagan and Goods (2022) refer to this problem as the “fossil capitalist inertia” of IR.

Meat

While the introduction of the assembly line is commonly associated with Ford’s automobile factories, its origins lie in the meat packing factories of Chicago, emerging in the 1870s (Braverman, 1974). The fact that dead animals decay quickly had posed an immanent limit on the industrialisation of butchery because it meant that butchering very many animals without immediately processing them would necessarily produce piles of rotting meat. Thus, beyond reducing labour costs, the introduction of the (dis)assembly line also reacted to the properties of the specific segment of nature the industry was processing: it prevented the decay of the slaughtered animals (Pacyga, 2015).

This process of decay provided a small power lever to the meatpacking workers, who possessed very little bargaining power. Among other factors, the assembly line made it very easy to replace them and there was always an oversupply of migrant workers seeking employment. Yet workers were able to inflict massive economic damage even with very short unannounced strike action because this would mean that slaughtered animals were not processed and doomed to rot within a few hours. Thus, the impossibility for capital to completely control the segment of nature it was processing helped strengthen Chicago’s labour movement. Subsequently, the movement became the centre of the national campaign for an eight-hour day. While labour had previously been divided along lines of race and craft, this campaign united skilled and unskilled workers of all nationalities and brought together trade unionists, anarchists and the Knights of Labour (Brecher,

2014; Halpern, 1992). The ability to overcome divisions and the vulnerability of the industry to interruptions due to the nature of their product enabled a series of successful struggles, which in turn contributed to a rising degree of unionisation in the industry. In 1960, outside the Southern states, 95 per cent of workers were unionised and wages in meat factories were more than a quarter higher than in the rest of the consumer goods industry. After this peak, several politico-economic shifts, as well as the development of cooling technologies, weakened the power of organised labour in meatpacking (Brueggemann and Brown, 2003).

Concrete

What the assembly line is to manufacturing, reinforced concrete is to construction. It was patented in 1892 by François Hennebique, giving him a virtual monopoly on the construction of concrete buildings throughout Europe for decades. Reinforced concrete allowed construction companies to cut labour costs because it largely erased the traditional crafts of stonemason and bricklayer. Walls were now simply cast in moulds. Yet reinforced concrete also has dramatic environmental impacts. It is the major reason that sand is today by far the most widely extracted resource on earth. As only sand from rivers and lakes can be used for construction, its sourcing and manufacture causes massive degradation of ecosystems. The production of cement accounts for eight per cent of global CO₂ emissions – more than four times the emissions of air travel (Jappe, 2023).

Construction is not only a major polluter but also among the industries most strongly affected by climate change. Currently, adverse weather delays 45 per cent of construction projects globally. Climate change is expected to significantly increase the frequency and intensity of weather conditions that cause these delays (Schuldt et al., 2021). Temperatures above 24–26°C are associated with reduced labour productivity. At 33–34°C, a worker operating at moderate work intensity loses 50 per cent of their work capacity and is exposed to increased health risks. This turns organisational safety and health into an increasingly central object of contention within IR (Oppermann et al., 2018).

While in 1995, construction accounted for only six per cent of the hours lost to heat stress, this figure is projected to rise to 19 per cent by 2030. In North America, Western Europe, Northern and Southern Europe and the Arab states, the absolute majority of productivity loss due to climate change will be attributable to the construction sector (ILO, 2019).

At some point, this necessarily affects labour relations: will companies decrease wages or extend working hours in order to compensate for the losses? Or will labour enforce paid leave and additional breaks in the case of extreme weather? These issues will be of growing importance for a labour politics of the future, yet LPT has not systematically addressed them so far. While events such as heatwaves are much less frequent in the temperate climate of Europe than in other parts of the world, even there, they are turning into an object of industrial contention. The 2022 renegotiation of the Landesmantelvertrag (LMV), the national collective bargaining agreement of the Swiss construction sector, presents an opportunity to study such conflicts.

The Baumeisterverband (BMV), which is the sectoral trade and employers' association, demanded raising the maximum weekly working hours to 58 in order to counteract the productivity loss caused by climate change. This led to a major national protest by trade unions, which thousands of workers joined. In the end, the new collective bargaining agreement largely kept the old regulations for working hours. Beyond the LMV, climate policy is one of four policy fields that the BMV focusses on. For example, it lobbied against additional taxes on fossil fuels, against mandatory emissions reductions and for replacing energy-inefficient buildings with new buildings instead of renovating them (Schaupp, 2024b). Other studies have also noted how climate policy becomes ever more important to employer associations. Some relate this to a relative decrease in the importance

of collective bargaining in the face of shrinking union membership (Flanagan and Goods, 2022; Goods and Ellem, 2022).

Metabolic Politics

These exemplary cases underline that the properties and processes understood as “nature” did not just become relevant for IR in times of climate change but have influenced IR since its emergence. Marx (1976) famously argued that the labour process is fundamentally a social metabolism with nature. In it, nature acts back onto itself through the human body. If this is taken seriously, then all politics of production are also environmental politics because they necessarily affect the human relation to nature. Therefore, IR are fundamentally “metabolic politics”. This term is to highlight the importance of nature in politics of production, not just in the sense that production transforms nature but also the reverse: the above cases demonstrate that nonhuman nature played a central role in various important dynamics of IR.

Classical approaches to IR from systems theory and institutionalism (Dunlop, 1993; Kochan et al., 1986) do provide a place for nature in their heuristics. They distinguish between the system of IR on the one side and its “environment” or “external factors” on the other. The latter was spelled out mainly regarding the institutional and politico-economic environment of IR. Yet this designation could also include the natural environment. In fact, some of the IR studies reviewed above do implicitly proceed in this way when they keep up the focus on narrowly defined employment relations against the “background” or “context” of climate change (for an overview see Goods, 2017). However, already the original versions of the concept of a separate IR “system” received relevant criticism. For example, Heery et al. (2012) point out that even in the countries of the Global North, the boundaries of the IR system have eroded and that the field increasingly overlaps with politics, law, consumption, welfare and the domestic sphere. The research on the Global South reviewed above shows that such clear boundaries of an IR system in fact never existed in most regions of the world.

Such critiques are even more relevant for the current period. The very nature of climate change fundamentally challenges the separation of a “system” of IR from other spheres of politics, specifically environmental politics. Climate change is to a large extent the result of decisions within the realm of production and of IR. Yet it affects all spheres of global society. Conversely, most attempts at regulating the ecological crisis do not originate in the realm of IR, but do strongly affect its core concerns, such as workers’ purchasing power or the availability of jobs (Mikulewicz, 2021). This means that within IR, environmental issues are increasingly imposing themselves on the “context” of narrowly defined employment relations and indeed often become the object of negotiations themselves. These developments are witnessed at all levels of IR: from politics at the level of the labour process to collective bargaining agreements to employer association policy and legal regulation (Goods, 2017; Hampton, 2015; Goods and Ellem, 2022).

Does this mean that nature is to be considered an *actor* instead of a context? Bellemare (2000) has developed a formal test for evaluating if a given entity can be considered an actor in IR. This has been developed further by Legault and Bellemare (2008) and by Heery et al. (2012) so that four criteria can be distinguished: (1) The continuity of the actor in shaping the field of IR; (2) The ubiquity of the actor in the sense of its presence at different levels of IR; (3) The extent of the actor’s interaction with capital, labour and the state; (4) The impact of the actor in transforming the system and outcomes of IR.

The dramatic formative impacts of nature in metabolic politics, spelled out above, suggest that it would pass this test. In terms of continuity, nature shaped the institutions of IR as well as the

outcomes of negotiations from its beginning to the present. Nature's presence is ubiquitous at all levels of IR. This is illustrated by the role of decaying animals in the introduction of the assembly line or the role of coal in early labour market regulations. In terms of interaction with the established parties of IR, labour, capital and the state all interact with nature in their specific ways. Finally, nature also dramatically influences the outcomes and has triggered several transformations of IR, the latest being the rise in the importance of climate policy relative to collective bargaining, as evidenced, for instance, by the case of the Swiss construction industry.

All of this indicates that nonhuman nature was not just context in the development of metabolic politics but possessed a certain autonomy. This term does not describe a "separation" of nature from society, but rather the historical efficacy of nature, similar to Tronti's (2019 [1966]) autonomy of labour. The latter is never fully subsumed under capital but structurally remains a relative autonomy that allows it to be historically efficacious. Nature as well is continuously subsumed under capital to make it usable for value production (Burkett, 1999). But similarly to labour, its subsumption is never complete. On the contrary, it is exactly the increasing subsumption of nature by capital that brings to the fore the former's autonomy in ecological crises. Pandemics, floods, soil degradation, heatwaves and superstorms indicate that the more profoundly humans shape nature, the more nature affects the world of work (Beck, 1992). The obvious difference between nature and labour is that nature does not act according to any intention or strategy. For Tronti, it is precisely the strategic action of labour that holds emancipatory potential. The autonomy of nature holds no such potential. It manifests mainly in "natural disasters" that arguably hurt most those who are least responsible for the ecological crisis. Thus, Malm (2018) suggests ascribing to nature autonomy without agency. Yet, if nature has no agency, it cannot be an actor despite its dramatic impact on metabolic politics. Instead, it can be described as an autonomous force, with autonomy referring to its historical efficacy. This manifests in nature's influence on the human parties to IR who are already and will be increasingly adapting their strategies to perceived and expected natural dynamics. This means that these dynamics do not develop their historical efficacy on their own but are always mediated through social institutions and human interpretations – as is the case with the politics of the human parties to IR.

Conclusion

Since climate change took a central place in global politics, at the latest, it has become evident that environmental issues are of enormous importance to IR. Against this background, this article has reviewed IR approaches to the natural environment and specifically with respect to climate change. It identified severe problems of core IR concepts for analysing the regulation of work and employment under the pressures of the ecological crisis. Climate change fundamentally challenges the traditional assumptions about the actors in IR and more generally the strict separation of a system of IR from other spheres of politics. The subfield of ELS shows that the concept of worker agency must include union-movement coalitions and even forms of worker organisation that do not include unions at all. Furthermore, a lot of research has shown how the dramatic impact of the ecological crisis fundamentally challenges the distinction between IR and environmental policy.

While climate change makes IR's lacking account of environmental issues increasingly apparent, the considerations above have implications not only for the future of the field but also for its history. They suggest that nature is not only becoming relevant to IR because of the current ecological crisis but that IR have *always* been "metabolic politics". This concept seeks to take seriously the Marxian insight that labour constitutes a social metabolism with nature. This means that the regulation of work is necessarily connected to environmental questions. Thus, in terms of

political forms, analysis of metabolic politics must widen its scope beyond traditional collective bargaining and include those forms of environmental politics affecting the regulation of work. This includes climate mitigation policies but may also take the form of technological fixes such as new methods of resource extraction.

Yet, labour not only acts upon a passive nature. Instead, we have seen here that various segments of nature have emerged as autonomous forces in the history of IR. This can be seen in the foundational role of coal in the institutionalisation of IR or in the labour conflicts that are triggered by productivity losses due to climate change. These factors influence IR in dynamic ways and can therefore not be conceptualised as static “context”. The systematic inclusion of the autonomy of nature advocated by the framework of metabolic politics could potentially be integrated into IR frameworks. However, it challenges the very notion of a “system” of IR that is separate from other fields of politics as well as from the natural environment. This speaks to the criticism of IR articulated by global labour studies (reviewed above), which calls for transcending the framework of IR altogether. With their emphasis on the global nature of the current division of labour as well as on the embeddedness of politics of production in wider social power structures, global labour studies are in principle well-equipped to address the environmental dimension of labour. This is evidenced by fruitful research in ELS, which often operates at the intersection of the two paradigms. A sensitising device for “mainstreaming” attention to the natural environment within global labour studies beyond the subfield of ELS could be the category of the “planetary”. Chakrabarty (2019) posits this category explicitly as an extension of the “global” that puts stronger emphasis on the historical efficacy of nature. Yet a “planetary labour studies” cannot concur with Chakrabarty’s recent explicit ignorance of social institutions of domination.

The considerations of this article have two core implications for the theory and practice of IR: firstly, all evaluations of IR policies need to take into account their environmental effects. Historically, most compromises between capital and labour came at the expense of nonhuman nature, specifically in the form of energy intensive mass consumption (Brandt and Wissen, 2021). In the future, modes of redistribution will have to be found that do not deepen the ecological crisis by accelerating the “treadmill” of production and consumption. Secondly, IR will need to take seriously nature as an autonomous force in its history and present. The most dramatic case is probably the constitutive role that coal played in the emergence of industrial democracy. This raises the question whether there are alternatives to “carbon democracy” (Mitchell, 2013). Which levers of power can workers use in “green economies”, where centralised fossil energy is replaced by renewables? In the future, nature’s autonomy will increasingly manifest in the form of ecological crises, which are likely to trigger intense conflicts. For instance, we have seen here how employers in the Swiss construction industry sought to compensate for the productivity loss induced by climate change by raising working hours, which led to a large strike. IR needs to identify such practices of maladaptation, which can be expected to be much more frequent and significant than the much-discussed employment effects of “green transitions”. Last but not least, future research needs to investigate under which organisational and political circumstances workers become capable of defending not only their narrowly defined occupational interests but also the broader interest of a liveable planet. The political urgency of these questions underlines the importance of conceptual renewal.

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