

Marx on the Reciprocal Interconnections between the Soil and the Human Body: Ireland and Its Colonialised Metabolic Rifts

Eamonn Slater

Department of Sociology, Maynooth University, Maynooth, Co. Kildare, Ireland;
eamonn.slater@mu.ie; <https://www.irishmetabolicrifts.com>

Eoin Flaherty 

Department of Sociology, Maynooth University, Maynooth, Co. Kildare, Ireland;
eoin.flaherty@mu.ie

Abstract: Marx's writings on Ireland are widely known, but less appreciated is their centrality to the formation of his ecological thought. We show how Marx's understanding of metabolic rift evolved in line with his writings on colonial Ireland, revealing a concept more holistic than the "classic" metabolic rift of the soil. We recover and extend this concept to the *corporeal* metabolic rift, showing how both are inherent in Marx's various writings on Ireland. Whilst the rift of the soil concerns the extraction and consumption of organic soil constituents, the corporeal rift describes processes of depopulation, and their effects on demography and family formation. These "rifted" processes are interconnected such that depleted soil impacts on the health of those who consume food grown on those "rifted" soils. We argue that the presence of these rifts substantiates Ireland's inability to sustain itself both economically and organically, which determined its persistent post-Famine underdevelopment.

Keywords: Marx, metabolic rift, corporeal metabolic rift, colonialism, Ireland, double form, underdevelopment

Introduction

In the following discussion, we detail how the conditions of underdevelopment in post-Famine Ireland can only be understood through an expanded "dual form" of the metabolic rift. This expanded form incorporates degradation of both the reproductive capacities of the soil, and of the human populations it sustained. As per the "classic" formulation of the metabolic rift (Foster 1999), Ireland's ecological base was degraded through centuries of induced agricultural export under the colonial rental system. This was a system that undermined not only the productive capacity of the land, but in so doing, it undermined the reproductive capacities of its population, both physically and socially. By "rifting" the organic bases of the Irish social formation in this way, the conditions were set for persistent underdevelopment of the Irish economy long after the end of the Great Famine

of 1845–1852. Ultimately, we argue that such an appreciation of the undermining of the organic bases of production and reproduction was inherent in Marx's writings on Ireland, and central to understanding his mode of analysis as one emphasising socioecological totality (organic totality). Thus, we contribute not only to a renewed understanding of post-Famine underdevelopment in Ireland, but to the ongoing recovery and interpretation of Marx's thought on questions of ecology. In so doing, we show how the case of Ireland was central to his efforts.

It is this "extended" form of the metabolic rift, as evidenced in the case of Ireland that we develop in this paper in dialogue with Marx's original writings. In doing so, we offer several contributions: (1) we develop the concept of a "corporeal metabolic rift", where we connect processes of soil exhaustion under the "classic" metabolic rift to its effects on population and the human body; (2) we outline how the corporeal metabolic rift unfolded in the context of post-Famine Ireland, assessing its impact on soil fertility, productive capacity, and the ability of the peasantry to socially and physically reproduce; (3) we locate the effectiveness of the concept of the double form in analysing these metabolic rifts; and, finally, (4) in dialogue with Marx's original writings on Ireland throughout, we suggest that this offers new insights into Marx's thinking on the complex nature of social-ecological metabolisms, and a new approach to understanding the causes of socioeconomic underdevelopment under colonialism.

Marx, Marxism, and the Metabolic Rift

The concept of metabolic rift was reintroduced to the sociological canon by J.B. Foster (1999, 2000), based on his extensive review of Marx's writings on environment and ecology. Marx's ecological insights are located by Foster within three related processes: a rift between human production and its natural conditions, material estrangement of human beings in capitalist society from the conditions of their existence, and the growth of an antagonistic division between town and country (Foster 1999, 2000). Central to his reading of the concept of "metabolic rift" is the cycling of nutrients within the agricultural production process. It was known for some time before Marx that the fertility of land was not solely a natural endowment, yet the dominant theories of rent in classical political economy held that rent was primarily a product of "natural fertility"—those lands most expensive being those brought into cultivation earliest. Marx was thus able to confront theories of rent from classical political economy such as those of David Ricardo, by examining how "property relations and legal obligation rather than resource endowments" played a key role in determining land fertility (Marx, cited in Foster 1999:375).

Accordingly, under the "classic" formulation (Foster 1999) metabolic rift is seen as a condition of disruption in nutrient cycles engendered in the transition to capitalist agricultural production, where foodstuffs are removed from their local sites of production and consumed in urban centres. The result is a permanent loss to local ecosystems of recycled waste arising from food consumption, and degradation of soil fertility. Reflected in the science of the time, where 19th century

agricultural chemist Justus von Liebig referred to capitalist agriculture as a “spoliation system in which the conditions of reproduction of the soil were undermined” (Foster 2000:153), it formed the basis of Marx’s later critiques of capitalistic agriculture. It thus represents an evolution in Marx’s thinking on ecology from the humanistic centrality of the “separation of human beings from the soil” in his earlier thought, toward a more analytical emphasis on social-ecological metabolisms, and the urban-rural antagonisms engendered in the transition to capitalism. The concept of metabolic rift has proven hugely influential in environmental sociology since the 1990s, with applications to understanding industrialisation, carbon cycles, famine, urban agriculture, food sovereignty, food security, and social movements (Burkett 2006; Clark and York 2005; Clausen 2007; Clausen and Clark 2005; Mancus 2007; McClintock 2010; Schneider and McMichael 2010; Slater and Flaherty 2009; Wittman 2009; York et al. 2003).

Nevertheless, with regard to understanding the political ecology of 19th century colonial Ireland, and the concept of the metabolic rift more generally, there has been much intensive theoretical work, but proceeding largely as separate research projects. With regard to the ecology of colonial Ireland the most innovative has centred on the Famine period (Crowley et al. 2012; Lloyd 2007; Nally 2011; Nally and Kearns 2020). In a similar way, there has been much progress in developing applications of the concept of the metabolic rift (Foster and Clark 2020; Napoletano et al. 2019) such as the cases of the Dust Bowl (Holleman 2018), climate change (Stuart et al. 2020), and urban agriculture (McClintock 2010). “Metabolism”, with regard to its use in critical social theory, is now recognised as a multilevel process operating not only at the ecological and social, but also at the bodily level. Others have addressed the impact of capitalism on human reproduction by considering the dependence of labour on bodily integrity (Orzeck 2007), the historical disruption by capital of reproductive capacity (Rioux 2015), and the historically specific and situated ways in which the “body as infrastructure” has internalised these conditions (Andeuzza et al. 2021). The task of uncovering the relation of human reproduction to conditions of production addresses Fraser’s (2014) call for greater consideration of how the economic and non-economic realms are historically co-constituted. Whilst the contradiction between capital accumulation and conditions of social reproduction (such as affective labour, food-provision, and unwaged household work) is seen as central to life under capital, our work emphasises how such contradictions manifested in colonial contexts in the “transition” to capitalism. Pursuing such an historical situation of reproduction emphasises how bodies as “infrastructure” also invoke processes of metabolism in their maintenance (Andeuzza et al. 2021), and how interferences via processes of “ripping” should be understood at both the reproductive, as well as the socio-ecological level. Like Marx on colonial Ireland, there is a recognition that food is the essential connection of the material body to the material world (Andeuzza et al. 2021:808), but Marx tends to concentrate on mostly population reproduction. We expand on this approach to investigate sexual reproduction and the corporeal metabolism through marriage patterns.

What has become clear in the years since Foster’s seminal publication, however, is the centrality of Ireland to Marx and Engels’ thought on ecology, imperialism,

and colonialism. Ireland was a consistent feature for over 50 years in their writing, with published work amounting to over 500 pages (Hazelkorn 1981). This includes 100 pages of Engels' draft *History of Ireland*, 80 pages of notes by Marx on Irish history from 1776 to 1801, 54 newspaper articles, and a draft with recorded notes of a speech on Ireland to the German Workers' Educational Association in London, 1867 (Slater and McDonough 2008:158). Together, these works offer a systematic treatment of Ireland (Foster and Clark 2020), and analysis of an "extended or more severe form" of the metabolic rift that operated under capitalism in general (Slater 2018). It is in these original writings that we uncover an approach to the metabolic conceptualisation of society that moves beyond that of the simple circulation of nutrients from rural fields of cultivation to urban centres, to incorporate the body, and reproductive capacities of the population. It was through his analysis of Ireland that Marx articulated not only the "classic" cycle of nutrient depletion via town-city, but what we refer to as the "corporeal" metabolic rift, making population and its reproduction central to his wider understanding of colonialism and underdevelopment. Ireland is thus a crucial "proving ground" in our understanding of Marx's thought on ecology. However, no work to date has fully understood the extent of Marx's theoretical engagement with the metabolic rifts in the context of colonial Ireland, and we hope to fill this lacuna in our work here.

Uncovering the Corporeal Metabolic Rift in "Marx on Ireland"

Marx's notes on Ireland as a "special case" of capitalist accumulation are well-documented (Anderson 2016). Less appreciated is the extent of attention devoted by Marx—but especially Engels—to the specific ecology of Ireland. In his unfinished and ultimately unpublished *History of Ireland*, we find the only detailed analysis conducted by either Marx or Engels of a specific ecological bioregion (Slater 2021). We are here reminded that the specific ecological conditions of Ireland are crucial to understanding the unfolding of Marx's ecological thought. We now detail how, through re-interrogation of Marx's notes on Ireland, we find evidence of his tentative incorporation of population and its reproduction into the general process characterised as the "metabolic rift". He does this by contextualising Ireland's reproductive demography and population health, within the determining colonial processes of eviction and enforced emigration. Thus in Ireland, we find a coming together of his thought on agricultural production, not only with respect to the interrupted circulation of nutrients, but to the stunted reproductive capacities of populations within the rift cycle. Ireland reveals how underdevelopment under the metabolic rift was understood by Marx as not just about the cycle of nutrients, but about the role and place of population within this process. We uncover this through consideration of Marx's notes on the dynamics of population in Ireland pre and post the demographic watershed of the Great Irish Famine of 1845–1852.

Estimates of the direct death toll from the Irish Famine of 1845–1852 suggest that approximately one million Irish people died, whilst the resultant drop in

fertility led to the loss of a projected 300,000 births (Boyle and Ó Gráda 1986:555). Irish demography of the 19th century is characterised by trends in two key variables (see Figure 1): rapidly increasing population pre-Famine and falling population post-Famine, and high emigration. Unlike comparable global famines, the effect of intra- and post-Famine migration in Ireland was permanent, inducing a long-lasting out-migration and demographic decline (Ó Gráda and O'Rourke 1997). We find elements of this discussion in Marx's contemporary notes. At the end of a speech on the Irish Question, delivered on 16 December 1867, Marx makes several notes on the complex interconnections between emigration and Irish population. Running to one-and-a-half pages, the notes remark both on its quantitative decline, and its physical deterioration (Marx 1971:136–138). On the decline of population from 8.2 million in 1841 to 5.8 million in 1861, he remarks that "If the trend continues, there will be 5,300,000 in 1871, that is, less than in 1801 ... the population will be lower still in 1871, even though the emigration rate remains constant" (Marx 1971:136).

In the following section on emigration, he notes that although it accounts for part of the decrease (approximately 2,000,000), it cannot alone account for the decrease of population since 1847 despite the rate of emigration being higher than the rate of population increase. It could be argued that the remainder of the decline in population was caused by Famine mortality removing those unable to emigrate, and certainly the modest excess of emigration over mortality rates

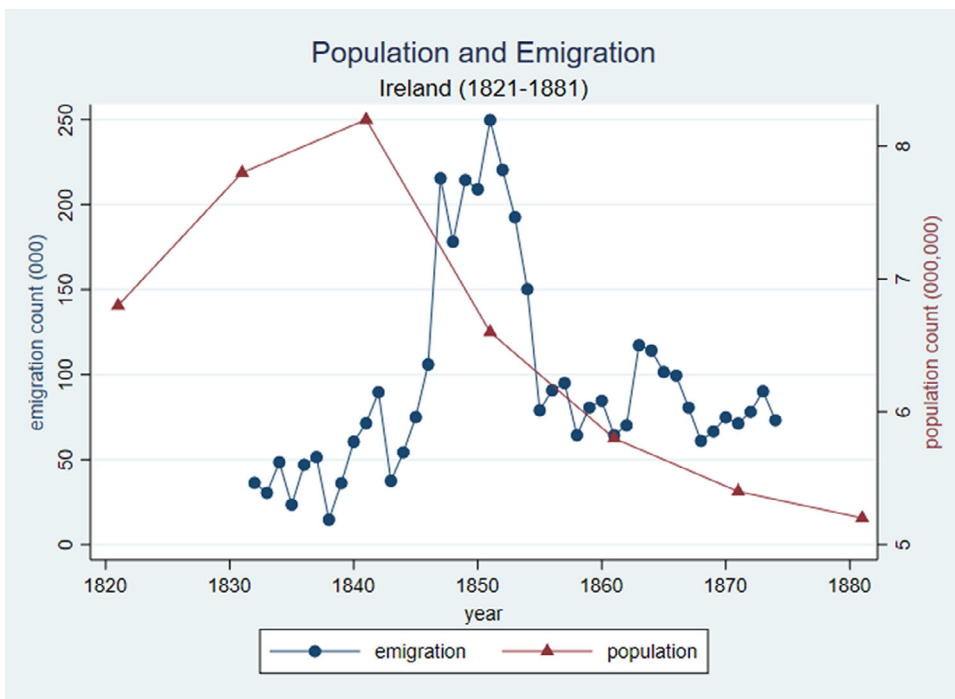


Figure 1: Population and Emigration, Ireland (1821–1881)

(albeit with strong provincial variation) bears this out (Ó Gráda and O'Rourke 1997:14). In his notes, Marx contends that there was a further variable that needs to be taken into account that went beyond the duration of the Famine however. In a section titled "Decrease of the National Annual Accretion of the Population", Marx proposed that a decrease in "natural population growth" must account for the factors of population loss during and after the Famine:

This is borne out by the *decade of 1851–61*. No Famine. The population decreased from 6,515,794 to 5,764,543. Absolute decrease: 751,251. Yet emigration in this period claimed over 1,210,000. Hence there was an accretion (increase) of nearly 460,000 during the ten years ... Emigration claimed almost triple the accretion (increase) ... The explanation is very simple. The increase of a population by births must principally depend on the proportion which those between 20 and 35 bear to the rest of the community. Now the proportion of persons between the ages of 20 and 35 in the population of the United Kingdom is ... 25.06 per cent, while their proportion in the emigration even of the present day is about ... 52.76 per cent. And probably still greater in Ireland. (Marx 1971:137)

Therefore, the decline in the ability of the Irish population to reproduce itself was not just determined by the total amount of Irish people lost through emigration from 1851 to 1861, but also within the potential child-bearing group of those between 20 and 35 years. Hence those that normally produce the next generation through their reproductive capabilities, were also lost. The children of this 20–35 age group were not born in Ireland, becoming instead the first generation of immigrants in those countries to which their parents emigrated. Thus if a sizeable proportion of those sexually productive beings were in fact removed from the homeland population, the ability of Irish society to sustain itself demographically was severely depleted. In *Capital* Marx suggested that such emigration induced depopulation was not a one-off event but a systematic process occurring every year: "Finally, it is a systematic process, which does not simply make a passing gap in the population, but sucks out of it every year more people than are replaced by the births, so that the absolute level of population falls year by year" (Marx 1976:862).

Marx's analysis here shows us how the relationship between emigration, depopulation, and demographic decline should be perceived as a "double-form" of metabolic rift—one simultaneously social and organic. Here, the rift is extended to the Irish population, where the process of population growth was thwarted by the social process of enforced emigration. Accordingly, by extracting a substantial amount of the potentially sexually reproducing population out of Irish society, this eliminated the naturally occurring offspring from a population of reproductive age. Therefore, this corporeal metabolic rift demonstrates the inherent conditions of a double form, where its respective organic processes are opposed by its distinctive changing social forms and all of these moments within this particular metabolic rift were constantly changing their reciprocal interconnections. However, this "human" metabolic rift only becomes apparent when we are able to "aggregate up" the activities of reproductive and migratory experiences of individual members of Irish society. Only then do the dialectical interconnections

between these social and organic processes become apparent. This form of the metabolic rift operates as a systematic process in the context of Irish population as a whole, thwarting the natural growth of that population. In order to specify the conditions of existence for this form of the metabolic rift, we thus identify it as the *corporeal* metabolic rift. Foster and Clark have recently conceptualised the corporeal metabolic rift from their interpretation of Marx on the corporeal metabolic system and the metabolic rift, which “affects the human metabolism itself, the bodily existence of human beings” (Foster and Clark 2020:23). Marx’s clearest rendition of this bodily system is best expressed in the following:

[M]an is a *corporeal*, living real, sensuous, objective being ... equipped with *natural powers*, with *vital powers*, he is an *active* natural being; these powers exist in him as dispositions and capacities, as *drives* [*Triebe*]. (Marx, quoted by Foster and Clark 2020:138)

However, it is Marx and Engels’ conceptualisation of the sexual reproduction of the corporeal body in which the double form of the organic and social aspects are highlighted in the following:

The production of life, both of one’s own in labour and of fresh life in procreation, now appears as a double relationship: on the one hand as a natural, on the other as a social relationship. By social we understand the co-operation of several individuals, no matter under what conditions, in what manner and to what end. (Marx and Engels 2004:50)

In the double form of the corporeal metabolic rift, it is the population of the island which was “robbed” of critical elements of its fertility necessary for its reproduction. This “aggregated” corporeal form of the metabolic rift was determined by not only the spatial movement of these organic forces of sexual reproduction, embodied in those departing emigrants, but that movement itself was determined by a colonial process of enforced emigration which Marx called “Clearing the Estate of Ireland”. In previous sections of this speech document, Marx characterised this colonial phase of clearing of the estate of Ireland by identifying it with the process of eviction: “*Eviction* of farmers partly by friendly agreement terminating tenure. But much more *eviction en masse* (forcibly by *crowbar* brigades, beginning with the destruction of roofs), forcible ejection. (Also used as political retribution.) This has continued since 1847 to this day” (Marx 1971:135). The colonial aspect of this “deliberate and systematic” process of “Clearing the Estate of Ireland” comes to the fore in Marx’s proposition that British “foreign rule” allowed Irish landlords not only to “forcibly” evict their “surplus” tenantry, but also to use the state as an instrument of “direct expropriation of the stock population” (Marx 1971:135).

Marx quotes from a Galway newspaper to highlight the collusion between the state and the landlord’s crowbar brigade in evicting the Irish tenantry: “Land agents direct the operation. The work is done by a large force of police and soldiery. Under the protection of the latter, the ‘crowbar brigade’ advances to the devoted township, takes possession of the houses ... The sun that rose on a village sets on a desert (*Galway Paper, 1852*)” (Marx 1971:135). Thus, estate

evictions and the subsequent forcible emigration were politicised in the actual institutional setting of the eviction process highlighted by Marx when he stated that the “state is only the tool of the landlords” (Marx 1971:123). Marx declared the intra- and post-Famine periods as a new phase in the evolution of the Irish colonial process (1846–1867) in which the colonial form of estate clearances dominated not only the overall structure of Ireland, but where it became the essential determinant of the process of depopulation. However, within this systematic process of depopulation, both the corporeal and soil metabolic rifts were determined. We have here tentatively accounted for the massified corporeal metabolic rift, but the *soil’s* metabolic rift must be detailed, and its relation to this process of depopulation outlined.

How Depopulation Determined the Emergence of the Soil’s Metabolic Rift

The Great Famine wrought profound change on the production and circulation of food within rural Ireland. Before the mass circulation of commodity foods, the majority of food consumed in rural Ireland was cultivated from local soils. Despite Ireland’s integration into global networks of capitalism via food exports, it remained very much a mixed commodity/subsistence economy throughout much of the 19th century. The Irish peasantry subsisted on a limited diet consisting mostly of staple foods (potatoes and oats), and since these subsistence crops were rotated with their commodity crops, they often grew both from the same soils. Under the “classic” metabolic rift, those commodity agricultural products were sold and consumed within foreign markets (mostly Britain) to pay rent, depriving their sites of production of repatriated nutrients. As this impacted both commodity and subsistence production soils, depletion could not be avoided unless conscious efforts were made to replace the lost elements of the soil. In the pre-Famine period the “cottier” class attempted to do so, but with their expulsion and exile, the soils of post-Famine Ireland were generally left to resuscitate their fertility alone. To understand the unique nature of the metabolic rift in Ireland, we must therefore understand how commodity production coexisted with subsistence, and how depopulation in the post-Famine period in turn conditioned a decline in the viability of agricultural production. The use of the “double form” of analysis of the organic and corporeal metabolic rift is again necessary, and implicit in Marx’s writings on Ireland.

Despite its outward appearance as a subsistence economy, commodity production was predominant in pre-Famine Ireland. The estate system instituted through various phases of Irish colonisation meant the majority of Irish peasants were required to pay rent. Indeed the net value of Irish rentals rose from £800,000 in 1670 out of a total national income of £4,000,000, to £5,293,000 by 1779 (Crotty 1966:294). A complex system of subletting and intermediary subtenancies resulted in a “rapid growth in Ireland of leasehold tenure to an extent never experienced in England” (Wylie 1975:24). An absence of tenurial security meant that investment in permanent modifications such as drainage systems was often impossible, lest the benefit of such works be lost on threat of eviction. The rental

system, in tandem with insecurity of tenure created a system of incentives where maximising yield was imperative. In the pre-Famine period, the cottier class were central to maintaining soil fertility through their manuring practices. Under the “conacre” system of subletting, the cottier class leased subsistence plots of around one acre from smallholders, often for nominal rents or labour services (Hoppen 1977). Numbering over three million by 1840, they were targeted especially for eviction to make way for consolidated grazing farms, or improvements to estate demesnes (Reilly 2017:10). As a result, the number of cottiers declined by 40% from 1845 to 1851 (Hoppen 1977:63).

According to Marx, this colonial strategy of estate clearance was directed at the elimination of the lower peasant classes, particularly the cottier class: “The landlords of Ireland are confederated for a fiendish war of extermination against the cott[i]ers; or as they call it, they combine for the economical experiment of clearing the land of useless mouths. The small native tenants are disposed of with no more ado than vermin is by the housemaid” (Marx 1971:90). Yet the mass eviction of the cottiers was critical for the emergence of the soil’s metabolic rift because prior to their forced departure, the cottiers were the main restorers of soil fertility through their manuring practices: “Since the exodus [the Famine], the land has been underfed and overworked, partly by the injudicious consolidation of farms, and partly because under corn-acre the farmer in a great measure trusted to his labourers [cottiers] to manure the land for them” (Marx 1971:122). What Marx is referring to here is that the nutrients of the soil that are lost in agricultural production, especially in the production of commodities, are not replaced by nature itself. The mass enforced removal of the cottier class in the post-Famine period was of profound consequence for agricultural productivity.

From an earlier version of his speech document, Marx identified the appearance of soil exhaustion in Irish agriculture in the post-Famine period. He suggests between 1861 and 1866, there was a dramatic decrease in cultivated land, with cereal crops declining by 470,917 acres, and green crops by 128,061 acres. Also noted is a decrease of yield per acre of every crop between 1847 and 1865. Oats decreased by 16.8%, flax by 47.9%, turnips by 36.1%, and the potato crop by 50%. In 1851, the estimated average potato yield per statute acre was 5.1 tons, which dropped to 2.9 tons in 1866 (Marx 1971:122). Revisiting the post-Famine agricultural census figures corroborates this interpretation. Figure 2 shows annual movement in crop yield from 1849 to 1862 (note the difference in units between crops), with consistently declining yield from 1855. Under the metabolic rift, lost nutrients have to be physically put back into the soil in order to restore the “natural” fertility through various types of manuring processes. The cottiers and the small tenants replaced these “lost” soil constituents by manuring the land, but with their exodus this necessary process of fertilisation was stopped, depriving the Irish soil of its ability to sustain its productive fertility: “So result: gradual expulsion of the natives, gradual deterioration and exhaustion of the source of life, the soil” (Marx 1971:123).

In one of his more provocative assessments, Marx claimed that this impacted not only on the integrity of the soil, but on the corporeal bodies of consumers. Rifted soils can only under-nourish the plants cultivated which in turn can only

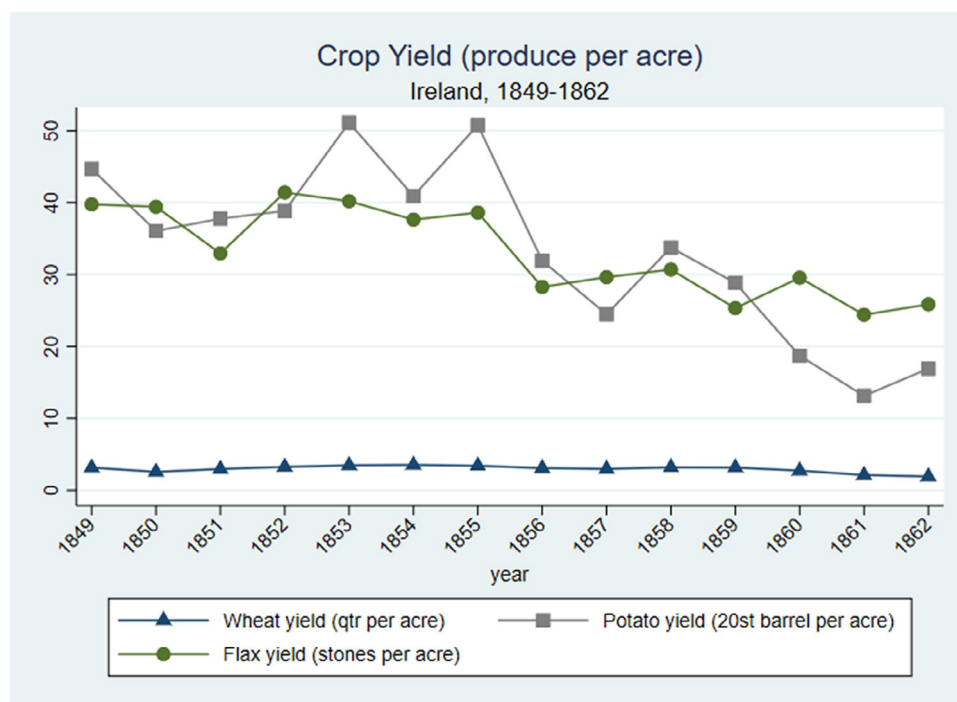


Figure 2: Crop Yield, Ireland (1849–1862)

produce a food deficient in the amount and quality of “elemental forces and chemical materials” needed to support a human body. And according to Marx, this human body is comparable to the soil as a metabolic system: “Considering that the most fundamental of these production processes is that through which the body reproduces its necessary metabolism, i.e. creates the necessities of life in the physiological sense” (Marx 1973:640). Aside from urban pollution due to the excessive presence of human excrement, it was the presence of nutrient deficient food from impoverished soils that impacted on the health of the urban consumers, as Marx suggests in the following: “...hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil. Thus it destroys at the same time the physical health of the urban worker” (Marx 1976:637–638). Similar processes were taking place in industrial Britain, where the mass consumption of inadequate, industrially-processed foods with excessive additives gave rise to physical deterioration (Rioux 2015). So, the metabolic rift—the continuing loss of the “constituent elements” (nutrients) does not just impact on the health of the producing soil but also on the health of the human population in both urban and rural locations. But in Marx’s discussion of the effects of the presence of the metabolic rift within Irish soil, he alludes also to its impact on the physical and intellectual health of the Irish population: “With the exhaustion of the soil, the population has deteriorated physically (and mentally). There has been an absolute increase in the number of lame, deaf and dumb, and insane in the decreasing

population” (Marx 1971:141). Revisiting tables of the classification of sick from the decennial census tentatively bears out this change in the relative share of the sick, as shown in Figure 3. Caution is needed as it is not certain whether these changes are attributable to detection, or continuation of a secular trend preceding the first wave of data collection. Yet it does suggest a connection between the metabolic rift within the Irish soil and the corporeal metabolism of the Irish peasantry, where nutrient and mineral deficient food impacted on population health.

In such ways the integrity of the Irish peasant’s “bodily infrastructure” was threatened, as these disruptions unfolded both inside the body, as well as with the body’s relation to its environment (Andueza et al. 2021). Accordingly, the soil’s metabolic rift in Ireland was not just a one-off occurrence but an endemic aspect of cultivation. It was determined by the continuous need for the Irish peasantry to cultivate the same ground, with the possibility of declining soil fertility intensifying with each harvest. Over the *longue durée* of colonisation and the institution of the estate system, it became a “socio-organic” process in which the metabolic rift was simultaneously the point of extraction and departure for the movement of the soil’s constituents within the commodity life cycle (Marx 1973:534). It is the plant’s ability to “assimilate” and “utilise” the soil’s nutrients and minerals that furnish the organic content of the product prior to it

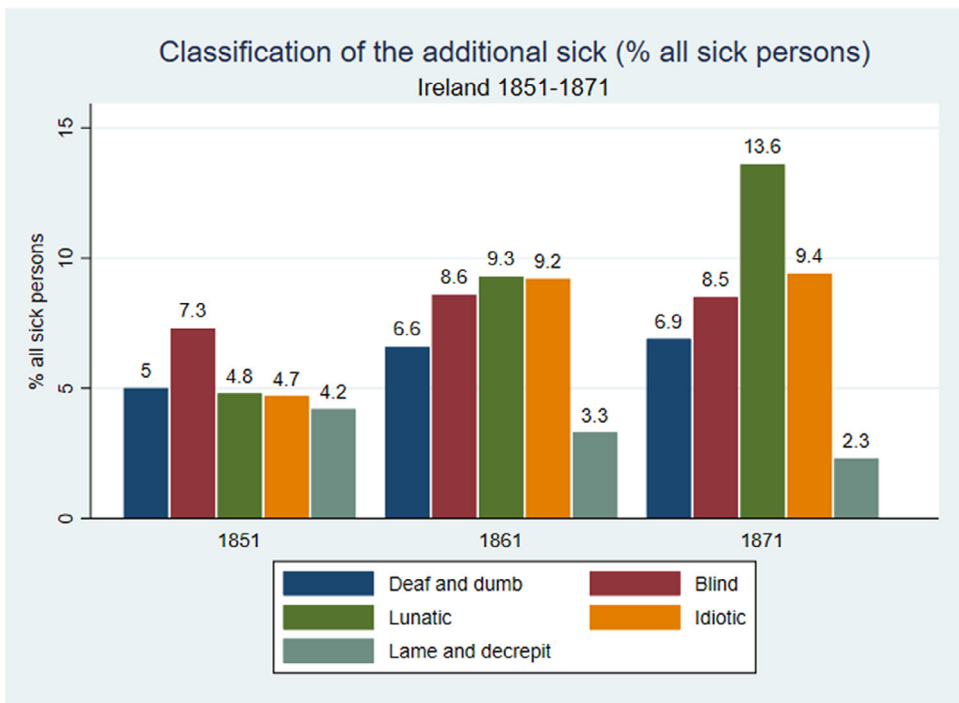


Figure 3: Classification of the Additional Sick, Ireland (1851–1871). The category terms are original and do not reflect those appropriate to contemporary use

becoming a commodity. When that plant is socially cultivated, its extracted contents become “socialised” in the form of a use-value product. The metabolic rift thus conditions the extraction of nutrients from the ground, and then embeds them into a social form of a use-value product, as the harvested crop becomes a market commodity.

At the same time, the metabolic rift conditions the remaining soil fertility as cultivation must return to the same “rifted” soil in order to continue to produce crops. “Rifting”, therefore, was not a one-off event but an ever-present aspect of Irish agricultural cultivation, one of both organic and social forms. A critical mass of “underclass” cottiers, key to maintaining the viability of this system, was near-eradicated by the depopulation that attended the Great Famine. Thus, Marx has unearthed the determining interconnectedness of depopulation and the soil’s metabolic rift. This process only becomes apparent when observed through the lens of both the corporeal body and the soil’s metabolic rift. So, the cottiers in their “expulsion” carry within them the potential seeds of the next generation and the potential capabilities of overcoming the “exhaustion of the source of life, the soil”. All of this is indicative of how complex the essential workings of the metabolic rift can be and especially considering that both forms of the metabolic rift were determined by the same process, a form of depopulation, which itself was determined by the colonial process of Irish estate clearances. In the following sections, we detail how this process bore far-reaching consequences for Irish demographic trends, and how this in turn set the conditions for lasting underdevelopment of Irish agriculture and economy.

Depopulation, Reproduction, and “Permanent” Celibacy

Emigration throughout the 19th century remained one of the defining features of Irish demography, and its enduring cultural impact should not be understated. To give an indication of the colossal nature of Irish emigration, consider that in the late 19th and early 20th centuries, “approximately three out of four Irishmen and women born in that period” emigrated (Miller 1990:91). No other European country contributed as many emigrants per capita to the “New World” during the so-called “age of mass migration” between the mid-19th century and the start of the First World War as Ireland. In his estimates of the components of population change, Marx cited a loss of 1,210,000 persons to emigration from 1851 to 1861 (Marx 1971:137). The context to this, as discussed above, was the forced removal of the Irish peasantry under the colonial process of estate clearances. Indeed it is estimated that 16,400 houses were levelled from 1846 to 1849 alone (Orser 2006:180). Yet this systematic process of the clearance of surplus population had one more “sting in its tail”, as the depopulation process became embedded in the structure of family formation for the remaining Irish population.

Emigration under the colonial process of clearances assumed a specific form in Ireland. In removing a substantial amount of human “content” from the Irish population, it changed the metabolic process of reproduction of the remaining population. Estate clearances were essentially concerned with increasing surplus

production, by lowering the volume of necessary production given over to the physical subsistence of direct producers. What emerged was a struggle between the colonising and the colonised, manifested in the tension between the share of land that was cultivated either for “the means of subsistence for cattle and for men” (Marx 1976:855). Coupled with a dramatic increase in livestock, pasturing was gradually replacing tillage in many districts. The number of sheep increased from 1.9 million in 1850 to 3.6 million in 1855, whilst cattle rose from 2.9 million to 3.6 million over the same period (Figure 4).

One way to achieve this agricultural revolution was to eliminate the tillers (and consumers) of subsistence crops. Therefore, landlords who were the immediate enforcers of this clearance strategy, not only cleared their estates of surplus population, but simultaneously began to enforce a draconian policy of farm consolidation. Marx in *Capital* provided observations on this process of centralisation: “From 1851–1861, the number of holdings of 15 to 30 acres increased 61,000, that of holdings over 30 acres, 109,000, whilst the total number of all farms fell 120,000, a fall, therefore, solely due to the suppression of farms under 15 acres—i.e. to their centralisation” (Marx 1976:854).

An important consequence of the post-Famine accelerated process of consolidation was a change in family formation strategies. Subdivision in the pre-Famine period was driven by a combination of a buoyant grain economy, tolerance of intermediary subtenancies, and in parts of the west in particular, the presence of

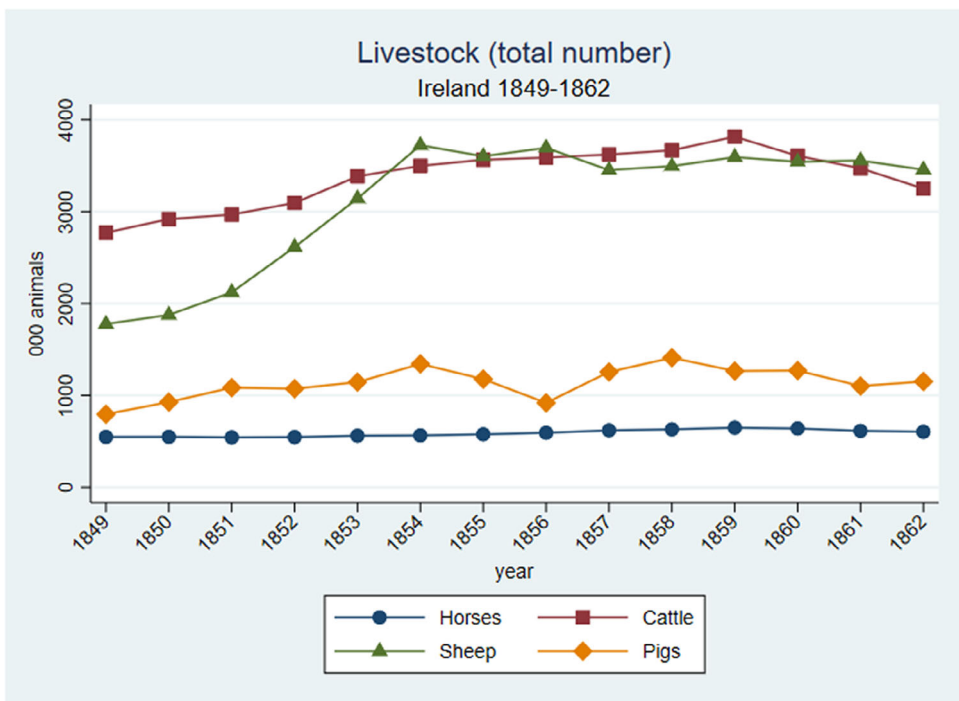


Figure 4: Livestock, Ireland (1849–1862)

a collective tenure system known as “rundale” (Flaherty 2021). The result was relatively uninhibited subdivision, easy access to land, and thus fewer barriers to early marriage such that by 1841, 70% of all females aged 26–35 were married (Vaughan and Fitzpatrick 1978). This process effectively reverted in the post-Famine era as enclosure and clearances accelerated with a shift toward grassland farming (Donnelly 1975:222). With greater difficulty securing land came a need to restrict family growth (Cousens 1964:319). In short, it was an enforced systematic process of depopulation, and the subsequent clearance of its surplus population by the landlord class, that initiated both a mass exodus of peasant population, and sustained the expulsion of a steady stream of individuals from the family farm.

We may draw a general distinction between pre- and post-Famine family formation patterns with regard to inheritance and marriage. These are the “partible and unhindered” form that occurred within pre-Famine Ireland, and “impartible and restricted” form characteristic of the post-Famine period. Both were determined by different phases of colonialism—rackrenting under the middleman system of the pre-Famine period, and the clearance process of the post-Famine. The growth of cottierism in the pre-Famine period depended on easy access to land, and where tenants were free to subdivide at will as contemporary testimony shows: “Each son, as he is married, is installed in his portion of the ground, and in some cases even the sons-in-law receive as dowries of their brides some share of the farm ... in vain is the erection of new houses prohibited” (Devon Commission 1847:418). Marriage could thus be initiated by the couple themselves due to the availability of land through subdivision, facilitated by landlords who viewed increased tillage density as a path to maximising rent. The Poor Law Commission of 1836 purported that men in County Galway “usually married when they were between 14 and 21” (Connell 1962:520), and subsequently produced large families “landlords allowed sons to settle on holdings carved from their parents’. More holdings meant more and earlier marriage, more and larger families” (Connell 1996:115).

With estate clearances and consolidation instigated by landlords in the post-Famine period, those that sought land now had to delay marriage in order to take over an intact and consolidated farm, either by gift or inheritance (Connell 1996:116). This marked a shift to the “impartible restricted” pattern of post-Famine family formation which would remain dominant into the 20th century. Not only had they to wait to inherit from their parents, however, they often needed to secure permission from the landlord or his agent (Butt 1866:37–38). Non-inheriting and non-chosen (for marriage) siblings were expelled from the farm as property-less individuals, marriable only in exile. Colonialism in this phase appears not only in the form of clearance and enclosure, but as an extra-economic mechanism of control over the peasantry, where fathers and landlords held command over the conditions and timing of the inheriting son’s marriage (Connell 1957:84; Donnelly 1975:222). Accordingly, all of these moments—consolidation, impartible inheritance, and permission to inherit—determined not only when and by whom the immediate family was to be formed but also a neighbouring family with the provision of a daughter as a wife: “even if the number of farms remained stable, there was provision only for a single son, and, on the

average, for a single daughter; the boy would inherit the farm, the 'dowried' girl could count on marrying the heir to a neighbouring farm" (Connell 1957:85).

These diverse social moments also determined the timing of conjugal union and sexual reproduction, reiterating that both the organic and social moments constituted the peasant corporeal metabolic process. Together, these moments merged into a tyrannical system of panoptic control over the corporeal and organic reproductive means of the Irish peasantry, and in the wake of this decline in the crude marriage rate, birth rates also began to decline: "In Ireland, the birth-rate was falling, partly because of the emigration of potential parents, but partly also due to fewer and later marriages" (Cousens 1964:316). There were not just fewer marriages and fewer births, but also later marriages as "between 1845 and 1914 average male age at marriage rose from 25 to 33, average female age from 21 to 28" (Lee 1973:3). It is this dramatic rise in the female age of marriage which is critical to the process of depopulation. The decline in reproductive years spent by couples in marriage led to a fall of 40% in the rate of births per thousand women aged 16–45 for women in "restricted" marriages relative to those in "partible" (Cousens 1964). The impartible inheritance regime near halved the reproductive period, pushing childbearing into later years of their life.

The corporeal metabolic rift was evident not only with potentially or married couples, but also amongst their non-inheriting siblings. Sons unable to marry due to the impossibility of subdividing the family farm, and daughters unable to marry due to the allocation of dowries, were posited as surplus population facing the choice of celibacy at home, or emigration abroad. Socially prohibited from sexual reproduction, they were "reared to regard their own emigration as a very real possibility" (Donnelly 1975:222). Both life course trajectories of domestic celibacy or emigration had the same result—the removal of the individual from the organic process of reproduction within their own family reproduction strategies. Although the rate of emigration of single adult individuals was generally constant from the Famine onwards (Cousens 1964:311), it acquired a momentum of its own in the form of "chain emigration". It particularly characterised American emigration, which was to a large extent a chain movement (Fitzpatrick 1980:129). Marx himself recognised the uniqueness of the "chain":

The Irish genius discovered an altogether new way of spiring a poor people thousands of miles away from the scene of its misery. The exiles transplanted to the United States send money home every year as travelling expenses for those left behind. Every troop that emigrates one year draws another after it the next. (Marx 1976:862)

However, the non-travelling "dispossessed" also became a growing feature of post-Famine Ireland, as the rate of celibacy increased for both non-inheriting men and women as the century moved on. This was especially so for women: "the increase in the proportion of females in the age group 45–54 never married, from 12 per cent in 1856 to 26 per cent in 1911" (Lee 1973:3). Rather than emigrate, some of the dispossessed joined the priesthood or one of the many nunneries, while others became "assisting relatives" on their brother's or sister's farm, subject to landlord approval. With the constant flow of non-inheriting children as emigrants to foreign lands, into clerical institutions, or into the particular pauperism of assisting relative,

the marriage rate subsequently declined. The “crude marriage rate (the number of marriages per 1,000 of population) [declined] from about seven in the immediate pre-Famine period to about five by 1880” (Lee 1973:3).

By denying the majority of the peasant population access to landholding through the impartible family inheritance system, Irish peasant society as a whole was able to simultaneously lower the rate of population reproduction, and yet produce a surplus product for the market. The “cost” of this strategy was mainly borne by that section of the peasant population that were wilfully dispossessed and subsequently became pauperised. This process of pauperisation contains a double moment. By preventing the majority of the population from reproducing themselves as independent tenant farmers—which in essence was achieved by excluding them from accessing tenanted property—they were not only denied the opportunity to reproduce themselves socially as commodity producers (social form), but also they were unable to sexually reproduce their own species (organic form). Accordingly, the pauperised many were “rifted” of their ability to sexually reproduce, to facilitate the chosen few. Therefore, this social form of consolidated landholding rifted the organic powers of sexual reproduction from a sizeable proportion of the Irish population—the majority of non-inheriting siblings.

Finally, not only were non-inheriting siblings denied access to property, they could not even realise what they still possessed—their labour power—by selling it to acquire a living wage, as capitalist production was not yet fully developed in Ireland. In its stead, what emerged was urban seasonal emigration, or permanent emigration. As they were posited through inheritance practices as surplus population, there was little hope of exiting that situation unless they went into exile and sold their labour power abroad. Marx highlighted the continuation of this form of relative surplus population:

What were the consequences for the labourers left behind and freed from the surplus population? These: the relative surplus population as great today as it was before 1846; wages are just as low; the oppression of the labourers has increased; misery is forcing the country towards a new crisis. (Marx 1976:862)

How the “Dual Metabolic Rift” Created the Conditions of Lasting Underdevelopment in the Irish Economy

In re-presenting “Marx on Ireland” in the post-Famine period, we have shown how the specific case of Ireland was key to his understanding of the metabolic rift, and how it operated in terms of the reproduction of both soil and body. In this final section, we argue that Marx’s formulation of the concept of metabolic rift (at least, as assembled from his disparate writings), is fundamentally a theory of underdevelopment. It is one that captures the fundamental causes of persistent underdevelopment in the post-Famine Irish economy—and indeed into the 20th century—where the metabolic rifts of soil and body are both central, and consequential. From the preceding section, we see how the wages of labourers and their underemployment were not the only symptoms of a malfunctioning economy. Several aspects of the Irish economy were thwarted, and the basis of its

lasting underdevelopment lay in how the organic processes of Irish society were impacted by the metabolic rift. Marx again identified these concrete trends in the Irish economy in his writings on the post-Famine period.

The depopulation of Ireland has thrown much of the land out of cultivation, greatly diminished the produce of the soil, and in spite of the greater area devoted to cattle breeding, brought about decline in some of its branches, and in others an advance scarcely worth mentioning, and constantly interrupted by retrogressions. Nevertheless, the rents of the land and the profits of the farmers increased along with the fall in population, though not so steadily as the latter. (Marx 1976:860)

One of the central contradictions of this period is the simultaneous decline of output in agriculture with increasing financial rewards to landlords, graziers, and large farmers—financial enrichment despite contraction of physical output. This runs contrary to the expected tendencies under a capitalist system where the forces of production are constantly developed, as Marx suggests in the *Grundrisse*:

Since in all previous forms of production the development of the forces of production is not the basis of appropriation, but a specific relation to the conditions of production (forms of, as property) appears as *presupposed barrier* to the forces of production, and is merely reproduced, it follows that the development of population, in which the development of all productive forces is summarised, must even more strongly encounter an *external barrier* and thus appear as something to be restricted. (Marx 1973:605)

Marx gives some indication of the consequences of this restricting of the development of the forces of production by referring to the essential characteristic of post-Famine Irish demography—namely, depopulation. Marx makes sense of this contradiction by outlining how it manifested itself as a decline in overall physical output, yet with an increase in surplus product:

The reason for this will easily be understood. On the one hand, with the throwing together of the smallholdings, and the change from arable to pasture land, a larger part of the total product was transformed into a surplus product. The surplus product increased although there was a decrease in the total product of which the surplus product formed only a fraction. On the other hand, the monetary value of this surplus product increased still more rapidly than its actual quantity, owing to the rise in the price of meat, wool, etc., on the English market. (Marx 1976:860)

However, the emergence of this economic contradiction had profound remote consequences for the Irish peasantry. The “throwing together of smallholdings” and the “change from arable to pasture” had a detrimental consequence for the peasant population that tilled those smallholdings, as they were exiled by eviction and permanent emigration. By engaging these diverse strategies of depopulating their estates, landlords and indeed large farmers were able to increase their surplus product by lowering the amount of land “farmed” by the peasantry, thus releasing that land for surplus production (i.e. through grazing). This became a systematic process initiated by estate clearances, but continued under the process of land consolidation through the practice of impartible inheritance. In class terms, estate clearances eliminated cottiers and the small peasantry, while the

process of consolidation dispossessed the majority of the rural population from directly subsisting on the land. This prevented them from “eating into” the surplus product, that product much coveted by the exploiting elite classes.

The crucial contribution of Marx’s ecology is to allow us to make these connections between manifest tendencies at the concrete surface level (underdevelopment), and the underlying *socio-ecological* process that underpin them. It is with Ireland that we see Marx explicitly develop this interconnection. The empirics of Irish development post-Famine are dependent on the underlying organic processes that supply the “vital powers” of the “active natural being”—the soil and body. Marx offers us a conceptual apparatus to capture how the “rifts” of these organic metabolisms determined the inherent and contradictory nature of Irish economic development. In the following excerpt, Marx finally uncovers how the presence of the metabolic rift in the Irish soil determined why the productivity of its soil was declining, resulting in the economic contradiction of decreasing output, yet increasing incomes for the exploiting classes of landlords and big farmers:

Since the exodus, the land has been underfed and over-worked, partly from the injudicious consolidation of farms, and partly because, under the corn-acre (conacre) system, the farmer in a great measure trusted to his labourers to manure the land for him. Rents and profits (where the farmer is no peasant farmer) may increase, although the produce of the soil decreases. The total produce may diminish, and still a greater part of it may be converted into surplus, falling to the landlord and (great) farmer. And the price of the surplus produce has risen. Hence, sterilisation (gradual) of land, as in Sicily by the ancient Romans (ditto in Egypt). (Marx 1971:136)

Ecological dynamics are only intelligible within the mode of production under which they operate. On this, Marx was adamant that Ireland was not a case of capitalism or proto-capitalism, but rather a feudal economy (Slater and McDonough 2008). This is revealed in the Irish rent relationship, as it determined why Irish tenants forced their labourers and cottiers to manure the arable ground. Unlike capitalism, the essential and determining economic form of the Irish economy was rent and not capital, and Irish rent was not a capitalist rent (Marx 1981:763–764). Irish rents were an extreme form of extraction, known as a rackrent, which was essentially a deduction from the level of real wages that a peasant could earn as a wage labourer in a capitalist enterprise. The consequence of this specific form of rent relationship—rackrent—was to create an insecurity of landholding that simultaneously robbed tenants of fixity of tenure, and of investment in the improvement of their holdings. With yearly leases, not only could landlords demand increased rent at the conclusion of the lease period, but if the tenant could not renew at the new conditions, they risked losing any capital invested in their holding. In the event the tenant did both improve their plot and meet the increased rackrent, Marx pointed out how this perverse incentive functioned as an effective “interest” paid to the landlord on the improvements made by tenant’s own capital (Marx 1971:77). As a result, tenants did not typically invest in soil improvements:

A tenant having incorporated his capital, in one form or another, in the land, and having thus effected an improvement of the soil, either directly by irrigation, drainage,

manure, or indirectly by the construction of buildings for agricultural purposes, in steps the landlord with demand for increased rent. If the tenant concedes, he has to pay the interest for his own money to the landlord. If he resists, he will be very unceremoniously ejected, and supplanted by a new tenant, the latter being enabled to pay a higher rent by the very expenses incurred by his predecessors, until he also, in his turn, has become an improver of the land, and is replaced in the same way, or put on worst terms ... He had, accordingly, no other alternative left but to become a pauper—to pauperise himself by industry, or to pauperise by negligence. (Marx 1971:59–60)

In the absence of improvements typical of the Agricultural Revolution, as was occurring in Britain (which Marx called the Irish version a caricature [Marx 1971:134]), agricultural production depended more on the “natural fertility” of the soil. There were few exceptions to this, save perhaps the prosperous linen districts of Ulster where spinning and weaving gave rise to stronger regional inequalities in output intensity (Gray 1993, 2006), and where the presence of “Ulster Custom” ensured a degree of compensation to tenants for capital improvement (Dowling 1999). As such, when it came to commodity production, the emergence of the metabolic rift was more intensified in the Irish context, as soil improvements were effectively eliminated under the rackrenting regime. Not only did capitalism not exist in this sphere of agricultural production, but production without soil improvement was essentially an extractive process, which accumulatively “rifted” the organic forces of the soil. All of these metabolic rifts—soil and peasant corporeal—were forms of extraction from their respective metabolic systems of reproduction. And because of this condition of existence, the “rifted” metabolic systems become thwarted in their ability to reproduce themselves as viable organic entities. Unable to reproduce through internal means entirely, they become dependent on external forms of intervention as an attempt to overcome the deficits caused by their respective metabolic rifts. The consequences of these rifts had to be dealt with by attempting to alleviate the severity of their symptoms, but never overcoming them. The inability of soil to develop its organic forces of production because of the deepening presence of the metabolic rift meant not only a decline in physical output, but also an increasing inability to meet all the costs of production. Remittances from emigrant family members previously barred from inheriting their family farm were used to buttress household incomes. Those emigrants in their newly adopted countries, could at least now choose to marry or not, a decision denied to them in their homeland. The removal of sons and daughters, despite its lasting cultural and psychological impacts, at least offered a financial lifeline to the remaining few: “many of those who remained in those emptying vastnesses often were able to do so only because of the remittances (money) they received from sons and daughters in Britain (and the US)” (Lyons 1973:138).

Conclusion

Ultimately, what Marx offers in his analysis of Ireland is a means of comprehending these diverse social-ecological processes as an organic totality, and how these processes interact with each other to complex ends. For example, the accumulation of

money necessary for the social costs of reproduction of the farm holding—rent, tenant right, dowries, passage money—meant that there was little left to invest in permanent soil improvements. Perversely, with the inherent tendency to accumulate for the costs of social reproduction rather than for the investment in the forces of production, there was little incentive to overcome the obstacles to soil fertility as conditioned by the presence of the soil's metabolic rift; in fact all of these tendencies probably intensified it by allowing the metabolic rift to remain part of the soil's condition. Therefore, this type of financial accumulation existed as a necessary cost of "entry to the soil" for newly forming families, becoming guaranteed payments for the chosen couple (dowry) and their departing siblings (passage money). As forms of circulating money, they never transformed into physical capital in the soil, nor was their investment realised in an improvement in conditions for their host population. The constant recycling of money in this circulation process ultimately prevented them becoming a force of production within the cultivated soils. Besides the "ghoulish" presence of rackrenting, this dominance of the circulation process over the production process of cultivation, prevented capitalism from subsuming the agricultural sphere of production under its laws and tendencies. Depopulation also inhibited the operation of domestic petty capitalism, by limiting local demand for labour, and thus "the incomes of small shopkeepers, artisans, tradesmen in general" (Marx 1976:863). Therefore, although Ireland on the surface had all the trappings of capitalism—money, banks, credit, commodities, and its own political economists—its economy was not capitalist. In the immediate post-Famine period, it remained a dependent economy, dependent on various forces of global capitalism for its reproduction. In this regard, the presence of these diverse forms of the metabolic rift substantiates Ireland's inability to sustain itself both economically and organically.

The key conceptual points to be gained from our analysis of Marx's investigation of colonialised Ireland, is that the metabolic rift should be seen more than a point of departure (of the soil's nutrients) but as a moment in a process which thwarts the operation of the process in which the metabolic rift occurs. However, we also uncovered the presence of a diverse range of interconnecting metabolic rifts and critically each of these identified metabolic rifts had an essential double form. The double form is best understood as a conceptual synopsis of how a social process metabolises with an organic process, and this double or dual form evolves over time as the relationships between organic nature and societal processes change in their interconnections with each other. Consequently, the contrasting processes of our Irish double forms of the metabolic rifts coevolve with each other and emerge as the dominant determinations of the underdevelopment of colonialised Ireland. The double form as an analytical concept has provided Marx in his discussion of the Irish metabolic rifts, with the necessary conceptual tool to write the "real" history of colonialised Ireland, as Marx and Engels previously stated:

The writing of history must always set out from these natural bases and their modifications in the course of history through the action of man. (Marx and Engels 1976:31)

We would add that this double form of co-existence does not just apply to societies as a whole and their development over time, but also to phenomena such as metabolic rifts that make up those societies.

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References

- Anderson K B (2016) *Marx at the Margins: On Nationalism, Ethnicity, and Non-Western Societies*. Chicago: University of Chicago Press
- Andueza L, Davies A, Loftus A and Schling H (2021) The body as infrastructure. *Environment and Planning E: Nature and Space* 4(3):799–817
- Boyle P P and Ó Gráda C (1986) Fertility trends, excess mortality, and the Great Irish Famine. *Demography* 23(4):543–562
- Burkett P (2006) *Marxism and Ecological Economics: Toward a Red and Green Political Economy*. Leiden: Brill
- Butt I (1866) *Land Tenure in Ireland: A Plea for the Celtic Race*. Dublin: J. Falconer
- Clark B and York R (2005) Carbon metabolism: Global capitalism, climate change, and the biospheric rift. *Theory and Society* 34(4):391–428
- Clausen R (2007) Healing the rift: Metabolic restoration in Cuban agriculture. *Monthly Review* 59(1):40–52
- Clausen R and Clark B (2005) The metabolic rift and marine ecology: An analysis of the ocean crisis within capitalist production. *Organization and Environment* 18(4):422–444
- Connell K H (1957) Peasant marriage in Ireland after the Great Famine. *Past and Present* 12:76–91
- Connell K H (1962) Peasant marriage in Ireland: Its structure and development since the Famine. *Economic History Review* 14(3):502–523
- Connell K H (1996) *Irish Peasant Society: Four Historical Essays*. Dublin: Irish Academic Press
- Cousens S H (1964) The regional variations in population changes in Ireland, 1861–1881. *Economic History Review* 17(2):301–321
- Crotty R D (1966) *Irish Agricultural Production: Its Volume and Structure*. Cork: Cork University Press
- Crowley J, Smyth W J and Murphy M (eds) (2012) *Atlas of the Great Irish Famine*. Cork: Cork University Press
- Devon Commission (1847) “Digest of Evidence Taken Before Her Majesty’s Commissioners of Inquiry into the State of the Law and Practice in Respect to the Occupation of Land in Ireland.” British Parliamentary Paper
- Donnelly J S (1975) *The Land and the People of 19th Century Cork: The Rural Economy and the Land Question*. London: Routledge and Kegan Paul
- Dowling M (1999) *Tenant Right and Agrarian Society in Ulster, 1600–1870*. Dublin: Irish Academic Press
- Fitzpatrick D (1980) Irish emigration in the later 19th century. *Irish Historical Studies* 22(86):126–143
- Flaherty E (2021) Common-pool resource governance and uneven food security: Regional resilience during the Great Irish Famine, 1845–1852. *Journal of Agrarian Change* 21(2):285–312
- Foster J B (1999) Marx’s theory of metabolic rift: Classical foundations for environmental sociology. *American Journal of Sociology* 105(2):366–405
- Foster J B (2000) *Marx’s Ecology: Materialism and Nature*. New York: NYU Press

- Foster J B and Clark B (2020) *The Robbery of Nature: Capitalism and the Ecological Rift*. New York: NYU Press
- Fraser N (2014) Behind Marx's hidden abode. *New Left Review* 86:55–72
- Gray J (1993) Rural industry and uneven development: The significance of gender in the Irish linen industry. *Journal of Peasant Studies* 20(4):590–611
- Gray J (2006) Gender composition and household labour strategies in pre-Famine Ireland. *History of the Family* 11(1):1–18
- Hazelkorn E (1981) Some problems with Marx's theory of capitalist penetration into agriculture: The case of Ireland. *Economy and Society* 10(3):284–315
- Holleman H (2018) *Dust Bowls of Empire: Imperialism, Environmental Politics, and the Injustice of "Green" Capitalism*. New Haven: Yale University Press
- Hoppen K T (1977) Landlords, society, and electoral politics in mid-19th century Ireland. *Past and Present* 75:62–93
- Lee J (1973) *The Modernization of Irish Society, 1848–1918*. Dublin: Gill and MacMillan
- Lloyd D (2007) The political economy of the potato. *Nineteenth-Century Contexts* 29(2/3):311–335
- Lyons F S L (1973) *Ireland Since the Famine*. London: Fontana
- Mancus P (2007) Nitrogen fertilizer dependency and its contradictions: A theoretical exploration of social-ecological metabolism. *Rural Sociology* 72(2):269–288
- Marx K (1971) *Ireland and the Irish Question*. Moscow: Progress
- Marx K (1973) *Grundrisse*. London: Penguin
- Marx K (1976) *Capital, Volume 1*. London: Penguin
- Marx K (1981) *Capital, Volume 3*. London: Penguin
- Marx K and Engels F (1976) *Karl Marx and Frederick Engels, Collected Works, Volume 5: Marx and Engels, 1845–1847*. London: Lawrence & Wishart
- Marx K and Engels F (2004) *The German Ideology*. New York: International
- McClintock N (2010) Why farm the city? Theorizing urban agriculture through a lens of metabolic rift. *Cambridge Journal of Regions, Economy, and Society* 3(2):191–207
- Miller K A (1990) Emigration, capitalism, and ideology in post-Famine Ireland. In R Kearney (ed) *Migrations: The Irish at Home and Abroad* (pp. 91–108). Dublin: Wolfhound Press
- Nally D (2011) *Human Encumbrances: Political Violence and the Great Irish Famine*. Notre Dame: University of Notre Dame Press
- Nally D and Kearns G (2020) Vegetative states: Potatoes, affordances, and survival ecologies. *Antipode* 52(5):1373–1392
- Napoletano B M, Foster J B, Clark B, Urquijo P S, McCall M K and Paneque-Gálvez J (2019) Making space for the metabolic rift in critical geography. *Annals of the American Association of Geographers* 109(6):1811–1828
- Ó Gráda C and O'Rourke K H (1997) Migration as disaster relief: Lessons from the Great Irish Famine. *European Review of Economic History* 1(1):3–25
- Orser C E (2006) *Unearthing Hidden Ireland: Historical Archaeology at Ballykilcline, County Roscommon*. Bray: Wordwell
- Orzeck R (2007) What does not kill you: Historical materialism and the body. *Environment and Planning D: Society and Space* 25(3):496–514
- Reilly C (2017) The world of the cavan cottier during the Great Irish Famine. *COLLeGIUM* 22:9–20
- Rioux S (2015) Capitalism and the production of uneven bodies: Women, motherhood, and food distribution in Britain c.1850–1914. *Transactions of the Institute of British Geographers* 40(1):1–13
- Schneider M and McMichael P (2010) Deepening, and repairing, the metabolic rift. *Journal of Peasant Studies* 37(3):461–484
- Slater E (2018) Engels on Ireland's dialectics of nature. *Capitalism Nature Socialism* 29(4):31–50
- Slater E (2021) Engels on the dialectical ontology of nature: Climate and the "heavy Atlantic rain clouds" of Ireland. *International Journal of Critical Thought* 11(1):51–75
- Slater E and Flaherty E (2009) Marx on primitive communism: The Irish rundale agrarian commune, its internal dynamics, and the metabolic rift. *Irish Journal of Anthropology* 12(2): 5–26

- Slater E and McDonough T (2008) Marx on 19th century colonial Ireland: Analysing colonialism as a dynamic social process. *Irish Historical Studies* 36(142):153–172
- Stuart D, Gunderson R and Petersen B (2020) Carbon geoengineering and the metabolic rift: Solution or social reproduction? *Critical Sociology* 46(7/8):1233–1249
- Vaughan W E and Fitzpatrick A J (1978) *Irish Historical Statistics: Population, 1821–1971*. Dublin: Royal Irish Academy
- Wittman H (2009) Reworking the metabolic rift: La Vía Campesina, agrarian citizenship, and food sovereignty. *Journal of Peasant Studies* 36(4):805–826
- Wylie J C W (1975) *Irish Land Law*. London: Professional Books
- York R, Rosa E A and Dietz T (2003) A rift in modernity? Assessing the anthropogenic sources of global climate change with the STIRPAT model. *International Journal of Sociology and Social Policy* 23(10):31–51