BRILL

Historical Materialism 15 (2007) 255–262

historical materialism
research in critical marxist theory
www.brill.nl/hima

Earth

A: ard. – G: Erde. – F: terre. – R: zemlja, Zemllja. – S: tierra. – C: diqiu 地球

1. In classical political economy the concept of earth (or soil) was identified with what Adam **Smith** called 'the powers of nature, the use of which the landlord lends to the farmer.' Rent, **Smith** contended, was 'greater or smaller according to the extent of those powers, or in other words, according to the supposed natural or improved fertility of the land' (**Smith** 1937, 344–5). David **Ricardo** defined rent as 'that portion of the produce of the earth, which is paid to the landlord for the use of the original and indestructible powers of the soil' (**Ricardo** 1951, 67). Land – the fertility of which could be attributed to the natural powers of the earth or soil – was distinguished, in the writings of Ricardo and other classical political economists such as J.B. **Say** and John Stuart **Mill**, by the fact that it was the only 'natural aid' to production that entered into the formation of prices. This was due to its scarcity and the fact that it could be appropriated. Although air and water, **Ricardo** argued, are indispensable for the production of commodities, their supply 'is boundless' and 'inexhaustible,' hence 'they bear no price.... It is only... because land is not unlimited in quantity and uniform in quality, and because in the progress of population, land of an inferior quality, or less advantageously situated, is called into cultivation, that rent is ever paid for the use of it' (**Ricardo** 1951, 69–70).

Rent, the classical political economists stressed, was not a payment for agricultural product itself, but a payment for the *use* of the land – of the 'original and indestructible powers' of the earth. The Ricardian theory of rent argued that rent was a payment occasioned by the cultivation of successively inferior plots of land as population increased and land became scarcer. As more inferior land came into cultivation, rents would be charged for the land that had previously been deemed most inferior (and for which no rent had been charged previously), and the rent of all of the more fertile lands would rise as well in proportion to their fertility (abstracting from the question of location which also has an influence on the level of rent). Hence, behind the entire Ricardian theory of rent lay an assumption that rent was governed by a supposed natural 'law of diminishing returns' which claimed that, as population expanded, land of more and more inferior quality – that is, less fertile – would be brought into cultivation, thereby reducing the productivity of labour applied to the land; while the application of capital for 'improvement' on the more fertile lands would also fall prey to diminishing marginal productivity. Inflated corn prices, which made it more expensive for industrialists to meet the subsistence needs of industrial workers, were the result. This general analysis was closely related to (and in many ways led to) the notion of a tendential law of the falling rate of profit, characteristic of classical political economy (**Lebowitz**, 1982). It also fed into Malthusian concerns regarding the overpopulation of the earth. It was because of this general orientation that Thomas **Carlyle** branded economics 'the dismal science' (**Carlyle** 1904, 29, 354).

Despite the 'law of diminishing returns', the classical liberal political economists did not deny all possibility of improvement of the productivity of soil. 'Improvements in agriculture', **Ricardo** wrote, were 'of two kinds: those which increase the productive powers of the land, and those which enable us, by improving our machinery, to produce with less labour' (**Ricardo** 1951, 80). The former type of improvement was mainly associated with 'more skilful rotation of crops, or better choice of manure' (ibid.). Hence it was a key assumption of the Ricardian rent theory that such improvements could only have limited impact on fertility. John Stuart **Mill**, in formulating the 'law of diminishing returns' within agriculture, specifically designated it as valid 'for

DOI: 10.1163/156920607X236788

any given state of agricultural knowledge' (**Mill** 1965, 174). He thereby acknowledged, while largely avoiding, the issue of improvements due to scientific advance. **Mill** was pessimistic about the capacity of new agricultural knowledge to materially improve the situation. New forms of machinery within agriculture, he suggested, do not generally 'counteract or retard the diminution of the proportional return to labour from the soil … yet, [they] in some degree compensate' for it (**Mill** 1965, 181–2). Hence, for **Mill** the law of diminishing returns to the land remained a question '… more important and fundamental than any other'. The productivity of the soil, while elastic, was not susceptible to indefinite improvement: 'The limitation to production from the properties of the soil, is not like the obstacle opposed by a wall, which stands immovable in one particular spot, and offers no hindrance to motion short of stopping it entirely. We may rather compare it to a highly elastic and extensible band, which is hardly ever so violently stretched that it could not possibly be stretched any more, yet the pressure of which is felt long before the final limit is reached, and felt more severely the nearer that limit is approached' (**Mill** 1965, 173–4).

Classical liberal political economy thus relied heavily on a simple model of diminishing returns to agriculture in which it was assumed that: (1) land was the scarce factor of production; (2) the productivity of the soil was quite limited; (3) population and hence the demand for food was ever increasing; (4) the movement in agriculture was toward the successive cultivation of ever less fertile land; and (5) the possibilities of improvements in productivity as a result of increases in agricultural knowledge were very limited.

2. The classical-Marxist approach to the question of the earth's productivity was, from the start, much more complex, since it rested not on an abstract conception of the 'original and indestructible powers of the earth', but focused explicitly on the capacity of humanity through its interaction with nature to improve or undermine the fertility of the soil. In his 1843 *Outlines of a Critique of Political Economy* (which was to influence **Marx** in the writing of the *Economic and Philosophical Manuscripts* of 1844) a young Friedrich **Engels** argued that, 'to make the land an object of huckstering – the land which is our one and all, the first condition of our existence – was the last step towards making oneself an object of huckstering' (*MECW* 3, 429). For **Engels**, the '*natural* side' of the rent question (determining supply), embraced both 'natural fertility and human cultivation – labour applied to effect improvement'; whereas this natural side was counterposed – in the formation of rent – to the 'human side of competition' (determining demand). The tendency of classical liberal political economists to see 'natural fertility' – 'the original and indestructible powers of the earth' – as virtually the only factor affecting supply of fertile soil and to treat human actions as minor influences (and of diminishing effect) was therefore decried by **Engels** from the beginning.

Malthusianism raised the assumption of diminishing fertility of the earth to the level of a natural law. In the last version of his model, **Malthus** even argued that when the earth was fully occupied the productivity of agriculture 'would have a greater resemblance to a decreasing geometrical ratio than an increasing one' (**Malthus** 1953, 123, 138). In opposition, **Engels** argued that the tendency toward human improvement of the productivity of the earth, resting as it does on the powers of science, must be taken into consideration directly (**Foster** 1994, 60–5). 'Science', **Engels** contended, 'increases at least as much as population. The latter increases in proportion to the size of the previous generation, science advances in proportion to the knowledge bequeathed to it by the previous generation, and thus under the most ordinary conditions also in a geometrical progression' (*MECW* 3, 440). Significantly, **Engels** – in this pioneering attempt to provide the *Outlines of a Critique of Political Economy* – twice invoked the name of the great German soil chemist Justus **von Liebig** as one of the living embodiments of increasing scientific knowledge, affecting the human improvement of the productivity of the soil. Hence, in the Marxist approach, fertility was not – as in **Ricardo** for example – an

original and, for the most part, inalterable property of the soil but was affected in major ways by human intervention. Any theory of agricultural productivity must therefore take into account much more explicitly the effects of human action, social organisation, and the science of agronomy itself.

Some critics have taken **Engels**'s position on the possibility of improvements in agricultural productivity through the advancement of science as evidence that the founders of classical Marxism were 'Promethean' in their approach to nature, emphasising the unlimited role of technology in the mastery of the earth, and denying the existence of 'natural limits' to human production altogether (**Benton** 1989; **Giddens** 1981, 59–60). Such interpretations, however, miss the dialectical character of **Marx** and **Engels**'s approach, which refused to accept 'a simple either/or choice between the social relations of production (people-people relations) and the relations of material appropriation (people-nature relations) as alternative analytical points of departure' (**Burkett** 1996, 62). Rather, the founders of historical materialism were concerned with what **Marx** termed the 'metabolic' relation between human beings – as social, productive beings – and nature (**Marx** 1976, 290; Chapter 7, Section 1). Hence, in their analysis of agricultural development and also in their treatment of the consequences of the division of labour between town and country, they focused on the way in which natural limits were mediated by historically specific social relations. Such an approach – far from ignoring natural limits or ecological crisis tendencies – generated a conception of a crisis in the human appropriation of the earth that was rooted – not in some transhistorical 'natural law' operating as an external force on human society – but in historically specific forms of development that severed the metabolic relation between human beings and the earth, thereby undermining the conditions of production.

From this standpoint, what was required was an empirical assessment of the way in which in the appropriation of elements of nature occurred in any given mode of production, and of the nature-imposed limits on such appropriation, rather than the simplistic propagation of suprahistorical, natural dilemmas as a means of justifying the social status quo – as was the case, for example, in the Malthusian doctrine. 'Even though fertility is an objective property of the soil', **Marx** wrote in *Capital* 'it… always involves an economic relation, a relation to the given chemical and mechanical level of agricultural development, and changes with this level of development' (Marx 1981, 790; Chapter 39); or, as he stated much earlier in *The Poverty of Philosophy*, 'fertility is not so natural a quality as might be thought; it is closely bound up with the social relations of the time' (*MECW* 6, 204). This dialectical conception of human-nature relations that characterised Marx's approach throughout his life was already apparent in his earliest writings. In the *Economic and Philosophic Manuscripts* of 1844, **Marx** insisted that the fact that 'Man *lives* on nature means that nature is his *body*, with which he must remain in continuous interchange if he is not to die. That man's physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature' (*MECW* 3, 276).

By the time he wrote *Capital*, however, this dialectic had taken a less speculative form, reflecting his developing 'Critique of Political Economy'. There he designated the labour process as 'an appropriation of what exists in nature for the requirements of man. It is the universal condition for the metabolic interaction [*Stoffwechsel*] between man and nature, the everlasting nature-imposed condition of human existence, and it is therefore independent of every form of that existence, or rather it is common to all forms of society in which human beings live' (**Marx** 1976, 290; Chapter 7, Section 1).

For **Marx**, the earth, which from an economic standpoint also encompassed water, was the 'original larder' and the 'original tool house'. Nature supplies not only the object of labour (to which labour is directed, and upon which it acts) but also the instruments of labour. Hence, the earth is 'the universal material for human labour' (**Marx** 1976, 284–5; Chapter 7, Section 1). Even with the advent

of the Industrial Revolution, **Marx** argued, nature's direct contribution to production was considerable: 'Just as the labour process originally took place only between man and the earth (which was available independently of any human action), so even now we still employ in the process many means of production which are provided directly by nature and do not represent any combination of natural substances with human labour' (**Marx** 1976, 290; Chapter 7, Section 1).

Moreover, for **Marx**, it was essential to understand that the contribution of the earth to the production of use-values was systematically downplayed by capitalist value relations, which treated nature's contributions as a 'free natural force of capital' ('a free natural productive power of labour, but one which… presents itself as a productive power of capital') (**Marx** 1981, 879; Chapter 44; **Marx** 1976, 510; Chapter 15, Section 2). In contradistinction to this, 'Labour,' **Marx** insisted, both in *Capital* and the *Critique of the Gotha Programme*, 'is… not the only source of material wealth, i.e. of the use-values it produces. As William **Petty** says, labour is the father of material wealth, the earth is its mother' (**Marx** 1976, 134; Chapter 1, Section 2; *MECW* 24, 81). Against those who would argue that nature made no contribution to wealth, **Marx** argued to the contrary that all wealth was ultimately a product of nature: 'What Lucretius says is self-evident: '*nil posse creari de nihilo*', out of nothing, nothing can be created. 'Creation of value' is the transposition of labour-power into labour. Labour-power itself is, above all else, the material of nature transposed into a human organism' (**Marx** 1976, 323; Chapter 9, Section 1).

In line with this, **Marx** argued that 'the property in the soil is the original source of all wealth, and has become the great problem upon the solution of which depends the future of the working class' (*MECW* 23, 131). Under capitalism however this property of the earth is alienated. Capitalism 'presupposes the domination of man over nature' (**Marx** 1976, 648). One manifestation of this is that the development of capitalism itself is not a 'nature-imposed necessity'. It does not develop first where the soil is most fertile, where nature is 'too prodigal with her gifts'. The mother country of capital is not the tropical region, with its luxuriant vegetation, but the temperate zone' (**Marx** 1976, 49).

Until the early 1860s, **Marx** thought that the progress of capitalist agriculture might be so rapid that it would outpace industry. Indeed, he tended to emphasise permanent improvements in the quality of the soil, referring to the 'general increase in fertility that accompanies the development of society' (*MECW* 38, 262). By the time he wrote *Capital*, however, his studies of the work of **Liebig** and other agronomists (such as the Scotttish chemist J.F.W. **Johnston**, whom **Marx** called 'the English Liebig') had convinced him otherwise (*MECW* 38, 476; **Marx** 1981, 617; Chapter 37). 'Large landed property', **Marx** explained at the very end of his discussion of capitalist ground rent in Volume 3 of *Capital*, reduces 'the agricultural population to an ever decreasing minimum and confronts it with an ever growing industrial population crowded together in large towns; in this way it produces conditions that provoke an irreparable rift in the interdependent process of social metabolism, a metabolism prescribed by the natural laws of life itself. The result of this is a squandering of the vitality of the soil, which is carried by trade far beyond the bounds of a single country (**Liebig**)' (**Marx** 1981, 949; Chapter 47, Section 5).

In **Marx**'s, view it was this rift in the metabolic relation between humanity and the soil, which went hand in hand with the promotion on a capitalist basis of large scale agriculture, which was the main reason for 'the declining productivity of the soil when successive capital investments are made' – a phenomenon that **Ricardo** had merely attributed to a 'natural law' removed from society (**Marx** 1981, 878). **Marx** also questioned the Ricardian theory of rent as deriving from the cultivation of less and less fertile land, arguing that to explain rent it was merely necessary to recognise that land was of differing fertility, not that the new land cultivated was always of inferior character (cf. **Marx** 1981, 798; **Lenin** *LCW* 5, 116).

Capitalism, **Marx** argued, transforms agriculture from 'a merely empirical set of procedures, mechanically handed down and practiced by the most undeveloped portion of society, into a conscious scientific application of agronomy' (**Marx** 1981, 754; Chapter 37). But at the same time the narrow capitalist form of landed property, which gives over 'particular portions of the globe as exclusive spheres' of private interests, undermines capitalist agriculture itself. (**Marx** 1981, 752; Chapter 37). In particular, the transportation of the products of the soil over long distances – from rural to urban centres – and the wholly inadequate measures taken for the reproduction of the soil's fertility undertaken by capitalist enterprise, leads to the long-term decline in the productivity of the earth. 'The moral of the tale', **Marx** wrote, '… is that the capitalist system runs counter to a rational agriculture, or that a rational agriculture is incompatible with the capitalist system (even if the latter promotes technical development in agriculture) and needs either small farmers working for themselves or the control of the associated producers' (**Marx** 1981, 216; Chapter 6, Section 2).

The concept of a 'rational agriculture' was taken over and adapted by **Marx** from the work of **Liebig** who had contrasted the 'empirical agriculture' of the trader who sells the constituents of the land to a 'rational agriculture' that reproduces rather than robs the soil's fertility (**Liebig** 1859, 171, 179). In his later works, **Liebig** had pointed to the rise of a 'spoliation system' of agriculture, where the 'conditions of reproduction' of the soil were violated – 'carried away in produce, year after year, rotation after rotation' (**Liebig** 1859, 177–8). 'A field from which something is permanently taken away', he wrote, cannot possibly increase or even continue equal in its productive power.' Indeed, 'every system of farming based on the spoliation of the land leads to poverty' (**Liebig** 1859, 175, 178). 'Rational agriculture, in contradiction to the spoliation system of farming, is based on the principle of restitution; by giving back to the fields the conditions of their fertility, the farmer insures the permanence of the latter.' For **Liebig**, European 'high farming' was 'not the open system of robbery of the American farmer… but is a more refined species of spoliation which at first glance does not look like robbery' (**Liebig** 1859, 183). **Liebig** pointed out that there were hundreds, sometimes thousands of miles in the United States between the centres of grain production and their markets. The constituent elements of the soil were thus removed to locations far removed from their points of origin, making the reproduction of soil fertility that more difficult (**Liebig** 1859, 40).

For **Marx**, this analysis of **Liebig**'s was the key to the problem of agriculture. Thus, in 1866, he wrote to **Engels** that in preparing his analysis of capitalist ground rent: 'I had to plough through the new agricultural chemistry in Germany, in particular **Liebig** and **Schonbein**, which is more important for this matter than all the economists put together' (*MECW* 42, 227). Indeed, 'to have developed from the point of view of natural science the negative, i.e., destructive side of modern agriculture, is one of **Liebig**'s immortal merits' (**Marx** 1976, 638; Chapter 15, Section 10). The irrationality of capitalist agriculture, **Marx** argued building on **Liebig**, was tied to the development of large-scale, mechanised agriculture which was, in turn, linked to the development of large-scale industry under machine capitalism: 'Large-scale industry and industrially pursued large-scale agriculture have the same effect. If they are originally distinguished by the fact that the former lays waste and ruins labour-power and thus the natural power of man, whereas the latter does the same to the natural power of the soil, they link up in the later course of development, since the industrial system applied to agriculture also enervates the workers there, while industry and trade for their part provide agriculture with the means of exhausting the soil' (Marx 1981, 950).

Marx made the same point in a different way in his discussion of 'Large-scale agriculture' at the end of the Chapter on 'Machinery and Large-Scale Industry' in Volume I of *Capital*: 'Capitalist production collects the population together in great centres, and causes the

urban population to achieve an ever-greater preponderance. This has two results. On the one hand it concentrates the historical motive power of society; on the other hand, it disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil… Moreover all progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress towards ruining the more long-lasting sources of fertility. The more a country proceeds from large-scale industry as the background of its development, as in the case of the United States, the more rapid is this progress of destruction. Capitalist production, therefore, only develops the techniques and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth – the soil and the worker' (**Marx** 1976, 637–8; Chapter 15, Section 10).

These developments were related in **Marx**'s and **Engels**'s conception of what was the chief source of ecological contradiction in capitalism, the extreme antagonism of town and country, since this in itself represented a break in the metabolic relation between human beings and the soil. As **Engels** wrote in *The Housing Question*: 'The abolition of the antithesis between town and country is no more and no less utopian than the abolition of the antithesis between capitalists and wage-workers. From day to day it is becoming more and more a practical demand of both industry and agricultural production. No one has demanded this more energetically than **Liebig** in his writings on the chemistry of agriculture, in which his first demand has always been that man shall give back to the land what he receives from it, and in which he proves that only the existence of the towns, and in particular the big towns, prevents this. When one observes how here in London alone a greater quantity of manure than is produced in the kingdom of Saxony is poured away every day into the sea with an expenditure of enormous sums, and what colossal structures are necessary in order to prevent this manure from poisoning the whole of London, then the utopia of abolishing the antithesis between town and country is given a remarkably practical basis' (*MECW* 23, 384).

Marx gave concrete significance to his observations on the limits of capitalist agriculture in some of his reflections on the Russian commune. He hoped that the archaic commune might be transformed into a developed system of agriculture 'organized on a vast scale and managed by cooperative labour', through the introduction of modern 'agronomic methods.' It was he argued 'in a position to incorporate all the positive acquisitions devised by the capitalist system' without falling prey to the contradictions associated with the fragmentation of private property, and the narrow ends to which capitalist agriculture was principally directed (*MECW* 24, 356).

3. **Marx**'s general approach to the question of soil fertility was to exert an important influence on later socialist theorists such as Karl **Kautsky** and **Lenin**. **Kautsky** argued that artificial 'fertilizers allow the reduction in soil fertility to be avoided, but the necessity of using them in larger and larger amounts simply adds a further burden to agriculture – not one unavoidably imposed by nature, but a direct result of current social organization' (**Kautsky** 1988, vol. 2, 215). For **Lenin** all of this demonstrated the necessity of the 'abolition of the antithesis between town and country' (**Lenin** *LCW* 5, 154–56).

Kozo **Mayumi**, a Japanese ecological economist and student of Nicholas **Georgescu-Roegen**, the founder of modern ecological economics, has argued that **Liebig** and **Marx** both had 'prophetic visions' of land deterioration, that pointed toward a combined economic and thermodynamic analysis of the kind that was to later characterise ecological economics (**Mayumi** 1991, 35–36; **Georgescu-Roegen** 1971). One implication of this analysis was that the introduction of fertilisers and other chemicals could at best provide only 'temporary emancipation from the land', which would

require ever increasing material inputs to compensate for the impoverishment of the soil, a characteristic of modern agribusiness dramatically documented by Barry **Commoner**. Thus, between 1949 and 1968, US agricultural production increased by 45%, while the annual use of fertilizer nitrogen increased by 648% (**Commoner** 1971, 149).

4. What is certain is that where **Marx** himself was concerned, the analysis of the crisis of the earth (or soil), and his reflections on the necessary bases of agriculture in a society of freely associated producers, led to a larger notion of sustainability that prefigured much of modern ecological thought (**Foster** 1995). The key insight here was **Marx**'s tendency to see the crisis of the soil in capitalist agriculture as a crisis of ecological sustainability related to the ecological conditions that future generations can expect to inherit as a result of today's actions. Thus **Marx** wrote: 'The way that the cultivation of particular crops depends on fluctuations in market prices and the constant changes in cultivation with these price fluctuations – the entire spirit of capitalist production, which is oriented towards the most immediate monetary profit – stands in contradiction to agriculture, which has to concern itself with the whole gamut of permanent conditions of life required by the chain of human generations' (**Marx** 1981, 754; Chapter 37).

For **Marx**, who understood that transcending the contradictions of capitalist agriculture was an absolute necessity for communist society, the question of sustainability stood out quite sharply. The 'conscious and rational treatment of the land as permanent communal property', he wrote in the conclusion to his discussion of capitalist ground rent, was 'the inalienable condition for the existence and reproduction of the chain of human generations' and stood in sharp contrast to capital's 'exploitation and squandering of the powers of the earth' (**Marx** 1981, 948–9; Chapter 47). This way of thinking led **Marx** to a notion of global sustainability: 'From the standpoint of a higher socio-economic formation, the private property of particular individuals in the earth will appear just as absurd as the private property of one man in other men. Even an entire society, a nation, or all simultaneously existing societies taken together, are not the owners of the earth. They are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations, as *boni patres familias* [good heads of the household]' (**Marx** 1981, 911; Chapter 46).

Marx's critique of capitalist agriculture, and of the squandering of the fertility of the soil, therefore led him to a classic statement of what has become known in recent times as the notion of 'sustainable development', which the Brundtland Commission was to define, in terms not much different than those adopted by **Marx**, as 'development that meets the needs of the present without compromising the ability of future generations to meet their needs' (**World Commission** 1987). For **Marx**, it was already clear by the late 1860s that capitalism, by undermining the conditions of the reproduction of the earth, presented a threat to future generations, and must for this reason if no other be replaced by a society that could apply a more rational approach to the cultivation of the earth. At the dawn of the twenty-first century, there can be little doubt that this warning is more important than ever.

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Agriculture, agrobusiness, capitalism, city/country, classical bourgeois economy, destructive forces, disembedding, ecobalances, ecologisation of production, ecology, ecosocialism, electrification, energy, entropy, environment, excrements of production, exhaustive cultivation, expropriation, green new deal, green revolution, historical materialism, industrial pathology, industrial revolution, labour, labour-power, limits to growth, Malthusianism, mastery of nature, metabolism, poverty/wealth, productivity, relation of humans and nature, rent, social costs, sustainable development, transport, use-value, waste

Agrobusiness, Arbeit, Arbeitskraft, Armut/Reichtum, Destruktivkräfte, Elektrifizierung, Energie, Entbettung, Enteignung, Entropie, Exkremente der Produktion, Gebrauchswert, Grenzen des Wachstums, Grüne Revolution, Grüner New Deal, historischer Materialismus, industrielle Pathologie, industrielle Revolution, Kapitalismus, klassische bürgerliche Ökonomie, Landwirtschaft, Malthusianismus, Mensch-Natur-Verhältnis, nachhaltige Entwicklung, Naturbeherrschung, Ökobilanzen, Ökologie, Ökologisierung der Produktion, Ökosozialismus, Produktivität, Raubbau, Rente, soziale Kosten, Stadt/Land, Stoffwechsel, Transport, Umwelt, Vergeudung.