

GLOBAL JUSTICE AND THE DISTRIBUTION OF NATURAL RESOURCES

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Abstract

What should a political theorist say about the justice of the global distribution of natural resources? One issue is whether principles of distributive justice should be applied globally, and this has been debated between nationalists and cosmopolitans. A second, though, is how the category of 'natural resources' should be conceived in relation to other distributable goods. This has not adequately been addressed even by theorists of global justice who expressly focus on natural resources. In particular, neither Charles Beitz's argument for a natural resources redistribution principle nor David Miller's argument against works with a satisfactory account of how the physical distribution of resources relates to the distribution of their economic value.

A more satisfactory account can be developed from the perspective of ecological economics as inspired by Nicholas Georgescu-Roegen. From this perspective, global inequalities in the command of natural resources can be viewed with the clarity that a normative theory of their justice requires. Natural resources are conceived in terms of 'ecological space'. I explain and defend the case for claiming that justice entails an entitlement to equal per capita ecological space. Once natural resources are conceptualised in this way, Beitz's argument can be recast and vindicated.

GLOBAL JUSTICE AND THE DISTRIBUTION OF NATURAL RESOURCES

What should a political theorist have to say about the justice of the global distribution of natural resources? Any given answer to this particular question will depend in part on what answer is assumed to hold for each of two more general questions. One is whether principles of distributive justice can or should be applied globally at all; the other is how the category of ‘natural resources’ is conceived in relation to other goods that may appropriately be distributed according to principles of justice. In recent years, the former question has been quite widely discussed by political theorists, in particular as a debate between ‘cosmopolitans’ and ‘nationalists’ (see e.g. Caney, 2001; also Miller, 2002 and Caney, 2002), but the latter question has received relatively little attention. The priority given to the former question in the literature might be thought to correspond to a logical priority: for unless it can be shown, as cosmopolitans seek to show against nationalists, that any goods at all should be subject to principles of distributive justice globally, then the question of the just distribution of natural resources globally would appear not even to arise. However, if one does not simply assume that natural resources should be conceived as a subset of distributable goods in some more generic sense, then the logic of that priority may not apply. Certainly the question of how natural resources are to be understood in relation to other distributable goods can be addressed without making any initial assumptions about the proper scope of distributive justice. I shall in fact show that addressing it provides a route into the more general global justice debate, illuminates it, and highlights how a concentration on the cosmopolitan/nationalist opposition misses some of the most critical issues.

In order to show this, I shall begin by briefly examining two contrasting answers among the few that have been offered to the main question of this paper. These have been provided by Charles Beitz and David Miller. The contrast between Beitz and Miller as representatives of cosmopolitanism and nationalism respectively is well known, but the issue between them here does not depend primarily on that opposition, since Beitz’s argument in favour of a natural resource redistribution principle is advanced from nationalist assumptions.

In the first section I show that his argument to this effect is unpersuasive because of problems that arise from an inadequate conceptualisation of natural resources and their relationship to distributable economic goods. In the second section I show that while Miller is alert to some of the difficulties which are not fully recognised by Beitz, his own counterargument also rests on a conception of natural resources which can be criticised as importantly incomplete.

Thus the critical question that neither theorist satisfactorily addresses is how an account of the physical distribution of resources relates to the distribution of their economic value. In section 3 I suggest that a more satisfactory answer to this question can be provided from the perspective of ecological economics as inspired by the work of Nicholas Georgescu-Roegen. From this perspective, the utilisation of resources represented by environmental harms is included in the reckoning. When the command of natural resources is thus conceived in the more comprehensive terms of utilisation of 'ecological space', a positive correlation is revealed between economic and resource inequalities. This allows a clearer view of the issues to which a normative theory of justice can then be applied. In particular, as I show in section 4, it highlights an important difference between justifying inequalities which are generated by efficiency gains from an equal share of a single resource base and justifying inequalities in the share of the resource base itself. For the total global resource base cannot accommodate an indefinite expansion of productive economic activity. The answer I develop to this article's central question is that there is a strong case, which is resilient against nationalist counterarguments, for claiming that justice entails a fundamental principle of an entitlement to equal per capita ecological space. Once natural resources are conceptualised in this way, Beitz's argument can be recast so that its normative animus is vindicated.

1. Beitz's global resource redistribution principle

Charles Beitz has developed several arguments in support of the view that distributive justice should have global applicability. For the most part, these arguments proceed from cosmopolitan premises, but the argument he develops with specific reference to natural resources is advanced on the basis of a premise he concedes to the opposition, namely, that it is with reference to nations rather than individuals that principles of global justice should be developed.

His point of departure is the account given by John Rawls of how representatives of states, in a hypothetical international original position behind a veil of ignorance, would arrive at principles to regulate states' conduct with one another. The principles Rawls envisages would be yielded are familiar principles of self-determination, non-intervention, just war, and so on (Rawls, 1972, p.378). What they do not include, crucially, are principles of distributive justice (Rawls, 1999, pp.113-120). For Rawls, distributive justice can only apply where there is an ongoing scheme of social cooperation: such a scheme exists within a state but not between states.

Beitz, however, believes the distinctiveness of natural resources is such as to make a breach in Rawls's consistently maintained line that principles of distributive justice do not apply as between nations. He argues that parties to the international original position would, behind the veil of ignorance, have a distinct interest in guarding against resource inequalities: for they 'would know that resources are unevenly distributed with respect to population, that adequate access to resources is a prerequisite for successful operation of (domestic) cooperative schemes, and that resource supplies are scarce. ... Not knowing the resource endowments of their own societies, the parties would agree on a resource redistribution principle which would give each national society a fair chance to develop just political institutions and an economy capable of satisfying its members' basic needs.' (Beitz, 1979, p.292)

However, there are three reasons I wish to highlight as to why they ought not and would not agree to this principle.

i) To begin with, there is reason to question Beitz's contention that a redistribution of natural resources is morally permissible. He contends it is because the actual distribution of natural resources is neither just nor unjust, but simply a matter of fact. The natural endowments of territories are arbitrary from a moral point of view 'in the sense that no one has a natural prima facie claim to the resources that happen to be under his feet.' (Beitz, 1979, p.292) There is thus no claim attached to natural resources which would block a moral claim for transfer of some from richer to poorer nations. Yet this argument disregards an important feature of natural resources that lie 'under one's feet': they cannot themselves be transferred at all unless either they are brought out from under one's feet and made transportable or else the transferee takes control of the territory in which they lie. Once either of these preconditions for transfer is met, circumstances will have changed in ways which can be expected to render the pre-transfer distribution either more just or less just, and hence no longer morally neutral.

Beitz's characterisation of the natural distribution of resources as morally arbitrary actually equivocates between three distinct claims. Two of these, with certain caveats, are consistent with one another, but they are disjunctive with the third. The first claim, essentially a statement of physical geography, is that the distribution of terrestrial minerals and biota is simply what it is and thus can be neither just nor unjust. The second is that the fact of human geography, that different populations inhabit different territories with different natural endowments, is not - if we bracket out historical questions about how they came to occupy their territories and claim sovereignty over them - one that need be construed as a question of justice rather than one merely of relative fortunes. In both cases the natural distribution of resources can be considered morally arbitrary because it refers, in Beitz's words, to the naturally occurring phenomena that happen to lie 'under one's feet'. However, the natural phenomena that 'lie under one's feet' cannot, without significant qualifications, be considered resources as such at all. There are very few resources (- so few as to be for all intents and purposes insignificant in relation to the general arguments -) which are available simply in virtue of lying where they do as a result of natural evolution. More generally, the

mineral and biotic constituents of the planet only become *resources*, as distinct from pure natural phenomena, through processes of prospecting and appropriation. Resources typically require some development (at the very minimum prospecting) which makes possible the harvesting or extracting of them. It is therefore significant that when Beitz speaks of redistributive claims he refers to '*available resources*'. It is with reference to these that he makes the third claim, that they may be justly redistributed. Indeed, it is only *available resources*, rather than what simply 'lies under one's feet', which *can* be redistributed; yet the argument for the moral permissibility of redistribution applies only to resources 'under one's feet' and *not* to available resources. Or so I shall now show.

ii) If one seeks to establish the moral neutrality of the distribution of *available resources* one has to be able to show that there is no pre-existing claim of justice to them. Yet if one considers, as mentioned, that this involves either getting them into a transferable state or else allowing agents of another nation to take control of their territorial location, one can immediately envisage claims of justice on the part of the host population being advanced as at least *prima facie* reasons for resistance.

Appreciating this, one is brought to recognise that there is after all a *prima facie* moral claim that can underpin the sovereign legal right of a nation to its territorial resources. Beitz's denial that the fact that a population occupies a territory endowed with a particular bundle of resources confers on that population any special claim of justice to use or enjoy those particular resources rests on an equivocation in his conceptualisation of natural resources. The applicability of the distinction between resources as they naturally occur and resources as are available for human use or valorisation may in practice not always be entirely clear cut, but conceptually, and especially in relation to such arguments as Beitz advances, it is of considerable significance. Available resources are - in almost every case - available in virtue of prior labour and the application of science and technology in the broadest sense, which embodies historical labour. Such processes can be understood to attach a claim to the available resources on behalf of the people who engaged in them: those who have 'mixed their labour with', or 'applied human intentionality to', a particular parcel of the earth's bounty

have one justification more than everyone else for a claim of entitlement to the resources they have thereby made available. Prior to engaging in the requisite extractive or harvesting labour no one can have any special claim to anything, perhaps, as Beitz says, but in those circumstances, if ethical considerations can apply at all, then one of these can reasonably be assumed to be that everyone is entitled to try to make the most of what they find round about them without interference from others. A crucial part of the point of political association is to provide security for the members of the polity. Before resources are exploited or prospected there can be no way of knowing whether any community might have a larger global share than others and at this stage there can be no justification for any action on the premise of the justice of redistribution. There can, on the other hand, be a powerful normative premise that each community leaves each other community in peace to explore, develop and exploit its resources as best it can, particularly as doing so can require historically protracted development of appropriate techniques.

iii) What the arguments thus far have shown is that a redistribution of natural resources is not so evidently or straightforwardly permissible as Beitz supposes, since it has to stand up to opposing claims of justice. Nevertheless, this does not rule out the possibility of arguing that in a contest between the two opposing claims the redistributive principle might have the moral victory. The rationale for the redistributive principle, it will be recalled, is that it would 'give each national society a fair chance to develop just political institutions and an economy capable of satisfying its members' basic needs'; so in a world where some nations have less than enough and others have more than enough to meet these ends, a general case for redistribution could reasonably be advanced and accepted behind an 'international veil of ignorance'. But can or should the redistribution be of *natural resources*? Without denying a case for redistributing *economic* resources on the general grounds Beitz gives, it can nevertheless be argued that the application of a *natural* resource redistribution principle would not necessarily improve the economic position of the worst off. Beitz takes the parties to the international original position to suppose that societies established in areas rich in resources 'can be expected to exploit their natural riches and to prosper.' (Beitz, 1979, p.289)

Yet this supposition would fly in the face of a vast weight of contrary empirical evidence to show that some resource-rich nations are anything but prosperous whereas some extremely prosperous nations have a relatively meagre natural resource base (Barbier, 2003). The natural resource endowment of a nation does not only not bear any particular correlation to its well-orderedness, it also does not correlate with its economic well-being. The capacity to valorise resources is the key determinant of wealth; the original provenance of the resources is a matter of relative indifference. This is a more significant arbitrariness than that which Beitz focuses on.

So while Beitz is justified in assuming (and this is something elided by modern economists) that economic wealth depends on - and represents - a command of natural resources, he is wrong to assume that finding such resources naturally occurring on a state's territory is either a necessary or a sufficient condition of that state enjoying economic prosperity. This is something the parties to the international original position ought to know; and, knowing it, they would not envisage a principle of natural resource redistribution that would apply independently of economic inequalities.

2. David Miller on natural resources and distributive justice

It is the indeterminacy of the value of natural resources which is a central consideration in the critical response to Beitz's proposal that has been advanced by David Miller. In response to Beitz, Miller begins by noting, like Rawls, that there are real difficulties in conceiving how such a principle could be operationalisable. For one thing, 'natural resources are very heterogeneous in nature, and we should expect different people and different societies to value them differently' (Miller 1999, pp.191-2). Moreover, not only are there cultural dimensions to the valuation of any resource, there are cultural limitations even to what features of the natural world are allowed to count as resources at all. Furthermore, 'the value of a natural resource depends upon the technical skills and knowledge of the people who

intend to use it. Uranium-bearing rock had no value until very recently: no one knew how to extract the uranium, and no one would have been able to think of a use for it even if they had.' (Miller 1999, p.193) Because the value of resources remains indeterminate it follows that we cannot say whether the citizens of this or that country have more, or less, than their equal share of natural resources (Miller 1999, p.193).

If the value of natural resources is so contingent - and I do not dispute this - then one might think that the aim of attempting to redistribute natural resources in proportion to their value ought simply to be abandoned. Interestingly, though, Miller proceeds to bracket out this problem in order to advance an objection of normative principle (ostensibly) against that aim itself. The fact that he does so is indicative of his recognition that despite the difficulties of operationalising the principle, there is nonetheless a normative case underpinning the principle that merits consideration. Hence the key argument Miller presents against Beitz he believes would hold even if problems stemming from the foregoing indeterminacies could be resolved.

Miller's argument is that the attempt to maintain resource equality by means of a redistribution principle would be self-defeating. He invites us to suppose that operational difficulties could be circumvented and - as a thought experiment - to imagine, once the requisite redistribution had been fully effected, two neighbouring countries with an equal per capita share of natural resources.

The citizens of one country, call it Affluenza, share an ethos of consumerism, and their democratically elected government allows oil deposits to be used up to make petrol for private cars, permits the cutting down of forests for timber and paper, and so forth. Next door in Ecologia, by contrast, there is a strict policy of sustainable development, with a heavy carbon tax on the use of fuel, higher prices for wood products to cover the costs of replanting trees, etc. As will be immediately apparent, if we look at natural resource levels one generation into the future, Ecologia will turn out to have a higher per capita share than Affluenza. (Miller, 1999, p.194)

If the principle of equality is to be maintained over time, then resources will have to be transferred from Ecologia to Affluenza, says Miller, and this would be to institute the perverse incentive to be profligate in one's use of resources in order to be entitled to more as a reward. The consequences of pursuing such a policy reveal its deep irrationality: 'if a global equalisation policy was applied in a world of many states, any one state that tried to conserve per capita resources ... would find that it lost almost everything it had saved - so no state would make the attempt.' (Miller, 1999, p.194) Moreover, Miller adds, it would be unfair to citizens of ecologically responsible states, who have made sacrifices in order to effect their policies, to have their achievements frustrated and undermined by having to transfer resources to people who have made no such sacrifices. Miller's argument, as he sums it up, is 'that global equality of resources, even if it can be coherently defined in the abstract, must be defeated over time by the different policies followed by autonomous political communities, which give rise to fair inequalities in per capita shares of natural resources.' (Miller, 1999, p.195)

In response to this argument there are three critical observations I shall make: i) there is an internal weakness in its initial conditional premise; ii) the argument advanced does not actually engage with the real concerns of resource egalitarians; and iii) even as a purely hypothetical argument, it misses its purported target.

i) A paradoxical feature of Miller's argument is that it depends on an assumption - that global equality of resources might be coherently defined - which he does not in fact grant. Nonetheless, as paradoxes often are, this one is perhaps only apparent rather than real. What Miller believes cannot be coherently defined is the *value* of natural resources in terms of which their equality might be pursued. The actual argument he advances makes no reference to their value. As a glance back at the passage quoted above will confirm, the shares Miller talks about are shares of biophysical resources themselves, not of their value. Indeed, Affluenza, as Miller hints by so naming it, may well have amassed greater income and wealth - and thus economic *value* - than Ecologia over the period referred to, and so it cannot be in any straightforward way the value of resources that has diminished for Affluenza. What the argument assumes is that the

biophysical stock of unvalorised resources attributed to Affluenza has diminished whereas that attributed to Ecologia has been conserved. That this cannot be the whole story, and that some account of the relation between economic value and physical resources needs to be offered, is a matter we shall have to return to. For the moment it suffices to note the clarification of what Miller's argument is assuming equality of natural resources to mean. And thus what its conclusion holds, namely, that the diminishing of Affluenza's stock does not represent an injustice, and that there can thus be justified inequalities in natural resource holdings.

ii) Resource egalitarians have little or no reason to dispute the conclusion referred to since it does not really have any purchase on any claim they would wish to make. Miller's thought experiment certainly illustrates one particular way in which a fair inequality in per capita shares of natural resources might arise, but this would only be troubling to the egalitarian if the conception and criteria of inequality invoked represented the contrary of the conception of equality to which resource egalitarians are committed. But this is not the case. It is no part of the egalitarian cause to seek redistributive measures in favour of states that fit the description of Affluenza. The purpose of redistribution for egalitarians is to rectify damaging inequalities: people's life chances depend on access to resources insofar as they are able to draw benefit from those resources; and in the real world, people in states with the features ascribed to Affluenza have precisely drawn ample benefit. It is not self-evident why the hypothetical circumstances are supposed to yield a case for redistribution of natural resources: if Affluenza has been profligate in its use of natural resources why should it not be subject to discipline, rather than to the receipt of further natural resources with which to be profligate?

Part of the answer must have to do with how natural resources are conceived. The logic of Miller's argument depends on taking into consideration no factor other than the stock of unexploited resources possessed by a nation: it disregards not only the economic benefits that a nation may have drawn from exploitation of its resources, but also the power represented by economic gains to command shares of others' natural resources. It crucially

disregards, too, the fact that resources are embedded in the products which the affluent dispose of and also in the byproducts. I shall elaborate on these points later.

On the face of it, then, Miller's thought experiment does not seem to capture the relevant features of resource inequalities in the real world which are actually of concern to egalitarians. That concern is much more directed to the plight of those nations which they would see as victims of the predations of the Affluenzas of the world. For in the real world, it is often the case that affluent nations deplete not only their own territorial resources, but also those of others. Such circumstances are not modelled in Miller's hypothetical scenario.

iii) Even as a hypothetical argument, Miller's does not hit the target it purports to. His argument against redistribution in general presupposes an initially equal distribution of resources (and subsequently legitimate utilisation and just transfers of them). Even if one allows that his argument against redistribution applies after equality has once been achieved (and as long as those other conditions hold), the argument cannot - I claim - be invoked preemptively against the aim of achieving equality (and those conditions) in the first place. Certainly, to say, as Miller does, that an initial situation of equality is 'bound to undo itself' is not the same as saying that the aim of striving to achieve one is unjust. That, after all, is the avowed aim of resource egalitarians, and it is perfectly conceivable that in the event it were achieved, then the ways in which it might undo itself could be acceptable to them. In fact, if we are to follow Miller's lead into the realm of the speculative, we could just as well say that if the nations of the world were so to discipline themselves as to achieve a situation of equality they would already have so transformed their motivations and behaviour as to have lost the drive to behave like Affluenza.

So the argument developed around the Affluenza/Ecologia thought experiment does not succeed in showing that the inequalities now existing globally in the real world are justified or that redistributive measures to reduce them would be self-defeating.

It remains now to clarify what is the relation between natural resources and economic value, why the current global distribution can be considered unjust, and what justice requires by way of redistribution.

3. The relationship between natural resources and their economic value

It has so far been shown how both Beitz and Miller work with some unexamined assumptions about natural resources and the relation they have to economic value. In this section I aim to show how natural resources and economic value do correlate positively at the scale that matters for considerations of global justice if natural resources are conceptualised in terms of 'ecological space'. I shall argue that the correlation is sufficiently determinate to sustain the proposition that if redistribution is warranted on the basis of a presumption in favour of an equal per capita entitlement to ecological space, then redistribution in economic form is just.

We have agreed that the relationship with economic value is indeterminate for any particular natural resource. Yet if we think at a high enough level of generality - one at which arguments about global justice have purchase - certain propositions may *ceteris paribus* be held to be true:

- a) different resources have different uses, and the value of a resource has some relation to the value attached to its use;
- b) the value of a resource also depends on the relationship between supply and demand;
- c) as resources are transformed through the application of technology their value increases; technology can increase the range of uses for any given resource;
- d) physical resources are embodied in the products of applied technology: their form/configuration is altered, they do not disappear or cease to exist;
- e) any accounting for shares of natural resources should (following from (d)) include the *total* resource appropriation as included in the products, rather than consider the resource to have disappeared;

- f) natural resources include environmental services and energy, so these have to be included in the accounting; this includes material order and negative entropy;
- g) (following from (f)) any adverse impact on resources not directly embodied in the product must also be included in the accounting.

In support of these propositions I offer the following remarks. If (a) were not true then there would be no rationality at all in economic behaviour considered in the aggregate; (b) is a standard proposition of economic theory; (c) is empirically obvious as well as necessary to the rationality of economic behaviour; (d) is a matter of natural scientific fact, grounded in conservation of matter and first law of thermodynamics, whether or not the fact figures as a relevant one in conventional economic accounts. So (a) through (c) are uncontroversial observations from the standpoint of macroeconomics; (d) is uncontroversial from the standpoint of physical science.

Propositions (e) through (g), however, are of a normative character. They depend, first, on taking proposition (d) as having relevance to economics, and thus also to a normative theory of justice insofar as this is concerned with the distribution of economic goods. The proposition is not uncontroversial for those disciplines, however (and we saw that Miller disregarded it in reaching his conclusion that Affluenza's share of resources was diminished by transforming their configuration). So one question is whether there can be any justification for disregarding the fact represented by this proposition, (d), and thus for denying (e). Propositions (f) and (g) represent a necessary further elaboration and expansion of (d) and (e). I confess that I can conceive of no good reason for denying (d), or therefore (e), and so I have to leave the onus on anyone else who does to bring it forward. Meanwhile, I shall assume they hold.

In consequence of granting these propositions we necessarily take a more comprehensive biophysical view of the global economy than that presupposed by Miller (and other mainstream liberal economists and political theorists). In principle, it is possible using such an expanded account to identify more realistically the respective shares of resources actually commanded by different agents - whether individuals, firms or polities.

This is not the place to develop at length an account of the biophysical perspective, but certain key features may be noted. In order for there to be trade in goods, these goods must first be produced. Unless, *per impossibile*, the economy is conceived as consisting purely in immaterial services, it has to be conceived as based on production. Production is, of course, the process whereby natural resources are physically transformed into usable products. While conventional economic theory disregards the question of what the economic process actually has to do with its natural, biophysical, basis, more critical perspectives have been developed in recent decades. The perspective I wish to sketch here, as an especially fruitful one, is that which has been advanced in particular by ecological economists who have developed some key insights of Nicholas Georgescu-Roegen, an economist who has actually attended to the relation between economic value and natural resources.

From this perspective, the economic process is viewed in terms of the throughput of energy and matter which enter as ‘resources’ and leave as a ‘product’ plus ‘waste’. Energy, as a resource input, is characterised by its low entropy. Georgescu-Roegen indicates how the difference between low and high entropy energy is perceived by humans in their productive activities: ‘Energy exists in two qualitative states, *available* energy, over which man has almost complete command, and *unavailable or bound* energy, which man cannot possibly use.’ (Georgescu-Roegen, 1976, p.54) He illustrates this distinction:

The chemical energy contained in a piece of coal is free energy because man can transform it into heat or, if he wants, into mechanical work. But the fantastic amount of heat-energy contained in the waters of the seas, for example, is bound energy. Ships sail on top of this energy, but to do so they need the free energy of some fuel or of the wind. (Georgescu-Roegen, 1976, p.54)

He then makes the further observation:

When a piece of coal is burned, its chemical energy is neither decreased nor increased.

But the initial free energy has become so dissipated in the form of heat, smoke, and ashes

that man can no longer use it. It has been degraded into bound energy. (Georgescu-Roegen, 1976, p.54)

In other words, the productive process has a tendency to increase the entropic processes that are anyway occurring in its environment according to the Second Law of Thermodynamics. Configurations of matter can also be more or less available for human productive use. From the point of view of human purposes, the transformations of matter in processes of industrial production are analogous to the increase of entropic energy. Thus Baumgärtner and de Swaans Aron refer to the necessity and unavoidability, in every process of industrial production, of the occurrence of a by-product alongside the desired product. This is simply conservation of mass as demanded by the First Law of Thermodynamics. 'If, for instance, pure iron is produced from iron ore with a carbon fuel, the desired product, which is pure iron, does not contain any carbon. Yet, the carbon material from the fuel has to go somewhere. Hence, there has to be a joint product containing the carbon.' (Baumgärtner and de Swaan Arons, 2003, p.116) What when viewed from an economic perspective is a system of *production*, is, when viewed from a biophysical perspective, a system of *dissipation* of natural resources.

The negative environmental impacts of productive processes should not be abstracted from broader issues concerning the effective command of natural resources. This is worth stressing. Conceptually it would be artificial, and practically it would be inappropriate, to consider 'environmental bads' and 'environmental goods' as entirely separate sets of phenomena. There is just one biophysical reality to which the various categorisations of environmental goods and bads relate. A unified description of them is therefore appropriate. This is acknowledged for instance in the life cycle analysis of products. The general principle that 'everything goes somewhere' underlies the development of systematic attempts in recent years to account for the biophysical basis and impacts of human economic activity. These have developed converging methodologies to determine the total amount of biologically productive land and water area required to produce the resources consumed and to assimilate the wastes generated using prevailing technology. This aggregated amount is referred to as 'ecological space'; and the use or 'occupation' of an amount of it is referred to as an

‘ecological footprint’ (Wackernagel and Rees, 1996). Ecological footprint accounts express in ‘global hectares’ the amount of biologically productive space with ‘world average productivity’ which is necessary to maintain the current material throughput of the human economy under current management and production practices. The Ecological Footprint measures a nation’s resource consumption by adding imports to, and subtracting exports from, domestic production.

I would not underplay the operational difficulties and indeterminacies in actually supplying such accounts, but recent work developing the methodology in calculating ‘ecological footprints’ suggests at least that more reasonable approximations to real resource usage can thereby be supplied than by any form of accounting based on less comprehensive criteria. Such accounts also depict a pattern of distribution which does have significant correlations with the distribution of economic wealth (see e.g. Venetoulis, Chazan, and Gaudet, 2004). They thus tend to confirm Beitz’s essential intuition that a country’s wealth depends on its command of natural resources, providing that we take a *full* account of the resources at its disposition and not only of those which happen to be its natural territorial allotment.

The question then becomes whether the inequalities revealed in this distribution are or are not unjust - and thus whether they do or do not warrant a principle of redistribution.

4. Justice and ecological space utilisation

If inequalities of ecological space utilisation do (unlike territorial endowments of natural resources) correlate positively with economic inequalities, then it is reasonable to maintain that if redistribution is warranted in order to offset injustices of ecospace utilisation, it is economic benefits that may actually be redistributed. The question for this section is whether redistribution *is* warranted. For this to be the case it would have to be established why inequalities of ecological space utilisation are unjust. I shall develop my account of why they are by anticipating arguments to the contrary.

A potential line of justification for inequalities was implicit in a point earlier made in criticism of Beitz. In emphasising that natural resources normally only attain any use value, and thus only become the potential subject of distributive justice, through development, I suggested that those who engage in the development have a *prima facie* right to enjoy the benefits of the valorised resources. This reasoning carries clear resonances of the Lockean justification for initial acquisition of property rights in the ‘state of nature’. In the Lockean state of nature, there are initially no individuated property rights and the ‘world’ is assumed to be held by ‘all in common’. But because the use value of nature is for the most part only realised through the application of human labour, then the agent that labours to create the value is entitled to enjoy its benefits. There is no injustice in this, on the Lockean account, since any other agent could do the same. The condition which guarantees there is no injustice is normally referred to as a proviso: namely, that ‘as much and as good is left for others’. This proviso places a constraint on developers’ *prima facie* right to enjoy the benefits of valorised resources.

Now the utilisation of ecological space should be conceived of as the ongoing initial appropriation of nature by humans. The utilisation of an amount of ecological space by any particular party would accordingly be just if, adapting the Lockean proviso, ‘as much and as good’ ecological space remains to be utilised by all other parties. But since any given amount of ecological space is as a point of methodological principle ‘as good’ as any other equal amount, then the proviso would require that *as much* ecological space remain for utilisation by others. This means that justice requires entitlements to equal shares of ecological space, and thus that inequalities are unjust.

When ecological space utilisation is conceived as initial appropriation, therefore, the only inequalities that are justified are those achieved by a more efficient extraction of benefits from one’s equal share of ecological space. It is worth emphasising that there is a difference between allowing efficiency gains from an equal share of a single resource base and justifying inequalities in the share of the resource base itself. Thus the concept of efficiency, as related to the use of ecological space, has a narrowly defined meaning: it refers to the economic gains that can be achieved from the more productive use of a given amount of ecological space.

Such inequalities would tend to be localised, temporary and marginal. I shall say more about this tendency below, but first there is an obvious complication to address.

Once we admit the possibility of ecological efficiency (or 'resource productivity') gains, we are faced with the prospect of their being used to cumulative effect and thus creating greater and more pervasive inequalities. The reasoning is straightforward. If we suppose that for a given bundle of resources, fully accounted in ecological terms, *A* can yield more net economic benefit than *B*, there is no evident injustice in *A* continuing to enjoy that greater benefit. But given that *A* can produce greater benefits than *B* can, it would be rational for *B* to trade its own share of the resource with *A*. That is, if *A* would pay *B* a price representing a greater benefit than *B* could achieve by developing the bundle of resources for itself, then it would be rational for *B* to accept the deal even though *A* might retain a larger share of the surplus. There would appear to be nothing self-evidently unjust in the inequalities arising from such trading practices, at least considered purely in themselves. Yet as a result, *A*'s total wealth represents a greater command of ecological space than *B*'s.

So as soon as we consider the effects of trade, the principle of equal ecological space entitlements appears to be undermined. For the political theorist concerned with global justice, this raises the question whether trade should simply be allowed freely to occur, be blocked, or be subject to redistributive taxation. Since there would be no realistic prospect of blocking global trade in general nor any obvious justification for desiring this (even if trade in particular ecologically sensitive goods might be justifiably be controlled), this option is not considered further. At the global level there is also the practical problem of how redistributive taxation might be applied, and in this paper I cannot hope to address this practical problem. I confine attention to the question of principle as it has already been identified in the disagreement between Beitz and Miller: do the net beneficiaries of international trade have redistributive obligations or not?

Miller's view is that they do not. They may have 'duties of assistance', as Rawls also holds (Rawls, 1999, pp.106-113), but these aim only to rectify severe hardships as could reasonably be held to represent inadequate fulfilment of basic human rights. There is no further duty to redress inequalities, however dramatic these may be, as a matter of justice.

It is a striking feature of liberal thought generally, in its political theory as well as in its political economy, that the effects of free trade are presumptively just, even where they give rise to dramatic inequalities. This is because free trade is held not simply to embody the abstract ideal of 'freedom' but also to enhance and optimise the sorts of efficiency gains we have referred to. At the heart of this view is the doctrine of 'comparative advantage'. This doctrine holds that among trading partners there will - *ceteris paribus* - be an aggregate efficiency gain, and although how that aggregate gain is apportioned will depend on other factors, with the stronger partners (i.e. those with more absolute advantages) normally acquiring the greater proportion, for reasons conventional liberal economics can avow, the weaker - poorer - partners will still get something. In other words, the doctrine leads us to expect, *ceteris paribus*, that while economic inequalities between stronger and weaker trading partners would continue to increase, the weaker partners would at least continue to get better off as a result.

Yet for many nations in the world this expectation appears to be unfulfilled (Pogge, 2002). If we ask why a poor nation may continue to get poorer, not only relatively but in absolute terms, several possible answers are familiar from theories of international political economy. However, the further one I want to set out here - and which has a key relevance regardless of what explanatory power the others may have for particular cases - is that the total global resource base cannot accommodate an indefinite expansion of productive economic activity. It is a material impossibility for inequalities to grow indefinitely and still yield gains for the worst off. This is because, despite liberalism's occlusion of the fact, economic growth (as distinct from inflation) does in the aggregate represent increased use of natural resources. The depletion of available resources wipes out the gains of the worst off - those who have traded away their resources - before it seriously affects the richer who are still working with the gains accruing as a result of the compound advantages they enjoy over the poor.

So while efficiency-based arguments can serve to justify local and temporary inequalities in circumstances conceived statically, they should not be assumed to justify

inequalities that are cumulative or systematic - which is how the dramatic inequalities between global rich and global poor appear when viewed more dynamically. On a static view, the failure of a poor state to benefit from its comparative advantages is due either to its failure as a state, or else to failures of the market adequately to transmit the gains as in principle it 'should' (see next paragraph). On a more dynamic view of international political economy, however, the consequences of the rich and powerful recurrently drawing relative advantages of trade lead, in circumstances of contextual finitude, to the further immiseration of the poor in absolute terms. I shall therefore argue that because of the finitude of the global resource base the inequalities between global rich and poor are symptomatic not simply of state or market failure but of relationships that are systematically exploitative.

This is something that is denied by David Miller. He recognises that there are aspects of current international economic relations which embody exploitation, but he denies that such exploitation is in any way systematic enough to warrant as a corrective the application of a general redistributive principle. If an archetypal case of exploitation is where small cash crop producers have their prices driven down by oligopolistic purchasers, the solution, as Miller sees it, is to aim at creating a more genuinely free market for cash crops: 'we should ask what price coffee or bananas *would* sell for in a free market in order to give us a benchmark for judging how far the producers are exploited by the bargaining process in the real world.' (Miller, 1999, p.209) I would not deny that the situation of the poor could be less bad than it currently is with the breaking up of trading monopolies and dismantling of tariff barriers which discriminate against imports from poor to rich countries. Yet to suppose that trade liberalisation superimposed on a situation of dramatic and systematic inequalities with respect to the command of resources would prevent the further intensification of deprivation and exploitation of the world's poor is mistaken, and I now want to suggest why.

It is mistaken, conceptually, because the idea of a 'genuinely free market' which determines objectively fair prices is a chimera, given that a market price can only ever be determined by effective demand and that effectiveness of demand is inherently contingent on empirical factors - especially the actual distribution of wealth and power (to which a more

genuinely 'free market' would allow more genuinely free rein). A 'fair' market price thus presupposes a 'fair' distribution of wealth and power. Yet it is precisely the 'fairness', or justice, of the current global distribution of wealth and power which is at issue.

More crucially, it is also mistaken materially, as is highlighted in the explanation of how natural resource inequalities and economic inequalities are mutually reinforcing in a cumulative and systematic fashion which has been offered by Alf Hornborg. Adapting the approach of Georgescu-Roegen, Hornborg shows that when global patterns of trade are viewed from a biophysical perspective they reveal a prevalent occurrence of an 'unequal exchange of resources'. This is made visible 'by identifying, beneath the flows of monetary exchange value, uneven flows of real resources such as energy, labour time, and hectares of land productivity.' (Hornborg, 2001, p.33) From the biophysical perspective, finished products represent an increase in entropy and material disorder compared to the resources from which they were produced. Yet from an economic view they have a greater value as represented by price. To put it simplistically, the growth represented by the increase in the value of products in the economic system is only achieved at the 'cost' of a diminution of the capacity of the ecological system to maintain the supply of intact resources. Accordingly, as Hornborg observes, if we take a longitudinal view of the transformation of a given set of natural resources - fuels and raw materials - into an industrial product, we see that there is a negative correlation between the amount of negative entropy embodied in a product and its price. He spells out the socio-economic consequences of this negative correlation: 'industrial centers exporting high-utility commodities will automatically gain access to ever greater amounts of available energy from their hinterlands. The more energy they have dissipated today, the more "new" energy they will be able to buy—and dissipate—tomorrow.' (Hornborg, 2003, p.6) This process has clear distributive implications inasmuch as industrialism implies a *social* transfer of entropy.

The sum of industrial products *represents* greater entropy than the sum of fuels and raw materials for which they are exchanged. The net transfer of "negative entropy" to industrial centers is the basis for techno-economic "growth" or "development". ...

Inversely, the non-industrial sectors must experience a net increase in entropy as natural resources and traditional social structures are dismembered. (Hornborg, 2001, p.11)

It is because of the social transfer of entropy and material, according to Hornborg, that world trade can be regarded as exploitative - of the poor by the rich - in relation to natural resources. The notion of a reasonable market price 'conceals the fact that what is being exchanged are intact resources for products representing resources already spent.' (Hornborg, 2001, p.47)

Once the depletion of resources starts to take effect, the circumstances which made considerations of efficiency relevant to justifying the fairness of free trade no longer obtain. The key point is that, normatively, there is a difference between allowing efficiency gains from an equal share of a single resource base and justifying inequalities in the share of the resource base itself. When we conceive of resources in terms of ecological space it is the latter inequalities that require justification.

The focus on the justice or otherwise of inequalities generated by trade misses the crucial point that occupation of ecological space is as a matter of principle more closely akin to the 'initial acquisition' of natural resources, and is thus a matter that even on standard liberal accounts of distributive justice is subject to a different principle from justice in transfer and also, crucially, a limiting proviso. It is worth highlighting that the Lockean liberal tradition defends two different principles of justice which are taken to govern two distinct kinds of activity: 'initial appropriation' on the one hand, and 'transfer' on the other (Nozick, 1974). The former is subject to the 'sufficiency proviso'; the latter is not. That the inequalities arising from 'just transfers' may have the effect of contravening the sufficiency proviso is a thought that theorists in the Lockean tradition have generally assuaged by putting their faith in the ultimate 'trickling down' of aggregate efficiency gains. However, that faith rests not only on assumptions about the ultimately benign distributive effects of market transactions in a world of moderate scarcity, but more critically on the cornucopian assumption that there is no limit to the amount of gains human ingenuity will make possible (a faith made explicit in Mark Sagoff's (1998) misdirected 'critique' of ecological economics).

The background assumption, then, of liberal political theory, as of liberal political economy, is that the question of justice of initial appropriation of natural resources need not be considered a 'live' one. Theories and principles of justice can concentrate on the distribution of valorised resources as represented by economic income and wealth. Natural resources may be the material substrate of wealth, but there is nothing about this fact that requires to be accounted for in economic thought, or therefore in political reflection on the economy.

The concept of ecological space, however, restores the question to centre stage. Once natural resources are conceived in terms of ecological space there can be no 'justice in transfer' which can be conceived in indifference to justice of initial appropriation. For the initial appropriation of natural resources is precisely what ecological space accounts track. The idea of initial appropriation may conjure images of direct physical interaction with a parcel of territory, but there is no particularistic territorial reference for the concept of ecological space other than the planet earth as a whole; physical interaction with the natural world continues to occur not only in prospecting and cultivating, but also through the production, pollution, use and disposal of all physical products - and even as they change hands through trade.

The justifications for inequalities arising from trade and productivity considered in this section are inapplicable to the distribution of ecological space because the total global resource base cannot accommodate an indefinite expansion of productive economic activity. I conclude that global inequalities are such as to warrant redistribution.

5. Conclusion: justice as an equal distribution of ecological utilisation space

So what would a resource redistribution principle entail when resources are conceived in terms of ecological space? It would mean first introducing the idea that those who use more than their fair allocation (however that is determined) incur a 'debt' that requires repaying (Martinez-Alier, 2002); this would be repaid by reducing the occupation of

space to the appropriate amount (or in other words reducing the ecological footprint to the permitted size), and as necessary by redistributing, in economic form, a proportion of the benefits acquired by way of a compensatory substitute for immediately allowing the ecological 'creditors' to recuperate whatever space they may have been deprived of.

How would the 'fair allocation' be determined? Continuing to assume, as did Beitz and Miller in the arguments considered above, that attributions will be made to states, I can conceive of two possible bases for attributions. One is an entitlement to equal per capita footprints; the other is an entitlement which corresponds to the ecological space attributed to the nation's own territory. My argument has been directed in support of the former, because at the level of fundamental normative principle I see no decisive objection or clear alternative to the proposition that there is a universal per capita entitlement to an equal share of ecological space. However, since it might be argued that the argument exhibits an inbuilt bias towards a cosmopolitan conception of global justice, and questioned whether the focus on equal per capita shares is appropriate, I'll briefly mention why I would reject the alternative, of what might be called 'principled nationalism'.

This alternative position would be nationalist in the sense that it upholds the sovereign right of each nation to dispose of its own territorial resources, and denies that any part of its resources should be subject to a global redistributive principle. The position would be a 'principled' nationalism in the sense that the reasoning just described applies only to its own territorial endowment of resources, and, on the version I have in mind, this means that it is fully entitled, but entitled only, to the equivalent of its own 'ecological space'. This would allow a given state to 'do well' if it achieves efficiency gains while 'living within its ecological means', and it implies no duties of strict justice to share its benefits outside the state. However, the version of nationalism which is principled in the way I suggest would not allow accruing advantages in command of resources which arise from a net importation of ecological space.

On the basis of principled nationalism there are some states which could continue justly to enjoy an affluent lifestyle: Australia, Canada, Sweden, for instance,

are nations with large ecological footprints per capita but even larger endowments of ecological space. There are some poor countries, however, which would be squeezed further even than they already are - in South Asia, for example. For most of the leading industrialised nations very significant reductions in the command of natural resources would be required - certainly, sufficiently significant to amount to a demand with similar chances of political success as any advanced on cosmopolitan presuppositions. In fact, the chances of success for this principle would be subject to newly-generated grievances of e.g. the USA towards Canada, or mainland Europe towards Scandinavia.

Certainly, if one is precommitted to universalism in ethical principles one would find principled nationalism arbitrary in its recommended outcomes. They would be viewed pretty much as Beitz thinks national territorial resource endowments would be in the argument examined at the beginning of this article. In fact, once natural resource endowments are theorised in terms of ecological space, I believe the essential argument Beitz advances is vindicated.

Finally, then, to answer my initial question, what a political theorist should say about the justice of the global distribution of natural resources: justice requires of ecological debtors a long term commitment to reduce their ecological space utilisation and imposes an immediate obligation to contribute at least part of the economic benefit derived from that excess use into a global fund for redistribution to the ecological creditors.

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