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Special Claims from Improvement: A comment on Armstrong

Abstract: Chris Armstrong argues that attempts at justifying special claims over natural resources generally take one of two forms: arguments from improvement and arguments from attachment. We argue that Armstrong fails to establish that the distinction between natural resources and improved resources has no normative significance. He succeeds only in showing that 'improvers' (whoever they may be) are not necessarily entitled to the full exchange value of the improvement. It can still be argued that the value of natural and improved resources should be distributed on different grounds, but that the value of improvements should be conceived differently.

Keywords: added value; exchange value; improvement; natural resources; special rights.

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Introduction

Natural resources matter. Every human being needs access to some the Earth's resources to survive, let alone to live a good life. That much is obvious. What is less obvious is how to translate this basic idea into principles of fair distribution. Accounts of distributive justice increasingly either define justice in terms of resource distribution or in terms of the welfare or well-being that natural resources typically provide. However, whilst theorists of distributive justice have argued for 'equality of resources' (e.g., Dworkin, 1981), and the merits of a global 'resource redistribution principle' (Beitz, 1979) or 'global resource dividend' (Pogge, 2002), the concept of 'natural resources' itself has largely escaped serious scrutiny.

Chris Armstrong's book (2017), along with that of Avery Kolers (2009, 2012), marks the end of this relative blind spot in the global justice literature. Armstrong is rare, at least among theorists of global justice, in giving explicit definitions of terms such as 'natural resources,' and 'improvement', as well as clearly distinguishing arguments for special claims to natural resources. Armstrong's main objective in *Justice and Natural Resources* is to show that natural resources are 'extremely important, but nothing special' (2017: 4). He convincingly argues that the category of 'natural resources' – and the rights to them – must be investigated and disaggregated and rejects the common

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assumption that rights to natural resources must mean something akin to sole exclusive possession, or 'full liberal ownership' (2017: 98).[1]

In this commentary, we focus on the definition of 'natural resources' and the complementary concept of 'improvements.' Improvement is one of the bases identified by Armstrong for special claims, the other being 'attachment.' The fourth chapter of his book is devoted to arguing that too much normative weight has been placed on the contrast between 'natural resources' and 'improved resources.' Armstrong claims 'we ought to reject any simple view that the difference between unimproved and improved portions of value is of fundamental significance such that redistributive claims can arise over the former, but not over the latter' (2017: 107).

Armstrong does not explicitly attribute this 'simple view' to any theorist in particular, but refers to 'statists' and 'nationalists' who argue against global egalitarianism on the grounds that nations or states create additional value from resources on their territories and therefore should keep it.[2] Theorists of a left-libertarian persuasion could also be said to hold the simple view.

The two key components of the simple view are (i) a patterned principle for the distribution of unimproved resources or the value thereof (e.g., egalitarianism), and (ii) the endorsement of the 'added value principle' as the principle for distribution of increased values associated with improvements (2017: 98). The added value principle holds that agents who make an improvement (individual agents in the case of left libertarianism; collective agents in the case of statism and nationalism) are entitled to keep '[only] the extra value that comes into being when the object is improved (2017: 98).

The added value principle is an example of what Armstrong calls a *direct* justification to improvement-based claims (2017: 97). On the direct justification, justice simply *is* served if agents keep the added value of their improvements. The direct justification thus brings a responsibility catering element into the simple view.[3] The direct justification for rewarding improvement is one kind of justification for rewarding improvement. Its rival is the *instrumental justification*. This holds that agents should be allowed to keep (some of) the value of their improvements *insofar* as it serves broader goals of distributive justice that are defined at least partially independently of considerations of

1 Here, Armstrong is following lawyers and economists have long distinguished various 'incidents of ownership' (Honoré, 1961) or types of property rights (Ostrom, 2000).

2 One of David Miller's arguments against global egalitarianism is an appeal to national responsibility (e.g., Miller 2007). Armstrong also cites Cara Nine (2012), claiming that her statist account could in some circumstances 'coincide with those of the nationalist account' (2017: 111, f.n. 22).

3 It is possible to weaken the added value principle so that it does not exclusively track responsibility. One way of doing so it is to make it *pro tanto*: an improver's claim to the added value could be over-ridden in certain circumstances, such as another's extreme need.

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responsibility. For example, allowing agents to keep the value of improvements could be a means to encourage activities that increase the overall social product, which could then be used to raise the position of the less well off. However, this is a purely contingent matter. It might be the case that there are equivalent or even better means to do achieve this end, in which case the instrumental justification would not apply (2017: 102).

Following – and extending Barbara Fried (2004), we can now compare the simple view with three other broad positions in political theory. [4] Some might accept the added value principle, or perhaps some other form of direct justification for rewarding improvement, but reject the initial patterned distribution of resources stipulated by the simple view. Robert Nozick's right libertarianism is one example. Others – the 'luck egalitarians' – generally think that justice should track responsibility and could also embrace the direct justification. However, they also hold that all unchosen disadvantages must be corrected for, not simply the unequal initial distribution of resources. Finally, other broadly egalitarian positions disavow the added value principle and direct justifications altogether. Instead, they choose a principle that embodies the instrumental justification for rewarding improvement, e.g., something akin to the difference principle.

The simple view's combination of a patterned principle for the distribution of the initial holdings of natural resources and the added value principle to distribute values created by agents from their initial holdings is what distinguishes it from the other three positions. It is also the source of the 'fundamentally (normatively) significant distinction' between claims to the value of unimproved resources and improvements that Armstrong wishes to challenge. He does so seemingly from the broad (not luck) egalitarian position.

As the simple view has two components – the patterned principle for distributing 'raw' – unimproved – resources (or values drawn from them), and the added value principle for the distribution of value created by improvement – it can be defeated by criticizing either component. Armstrong's challenges focus on the latter component: he challenges the added value principle (2017: 101-105), before expressing more general reservations about direct justifications to improvement-based claims (2017: 108-110). However, his critiques are not sufficient to overturn the 'much beloved distinction between unimproved and improved natural resources' (2017: 107) and the intuitive idea that special claims arise over the latter, but not the former. In short, Armstrong has not defeated the simple view.

4 Barbara Fried writes that whilst neither 'conventional libertarianism' (e.g., Nozick) nor 'egalitarianism' (e.g., Rawls, Dworkin and Sen) distinguish sharply between 'internal endowments' and 'external resources' in their distributive schemes, left libertarianism stakes out the middle ground between them by doing just this (Fried, 2004, 67).

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To make our case, we begin by examining Armstrong's definitions of 'natural resources' and 'improvements.' There, we highlight an inconsistency between the two. The third part of this paper argues that Armstrong succeeds in defeating formulations of the added value principle that conceive of 'added value' solely in terms of exchange value, but that the added value principle does not have to be committed to valuing improvements in terms of exchange value. Armstrong shows that exchange value is not always (or perhaps not at all) a good indicator for an improvement. However, all that follows from this is that holders of the simple view should change their preferred indicator, not that they should abandon outright the normatively significant distinction between unimproved and improved values. In a similar vein, the fourth part argues that Armstrong's assumption that improvement is to be conceived of in terms of exchange value means that his other criticisms of the direct justification can be answered.

On Improvement

Endorsing special claims based on improvement of natural resources can potentially justify huge distributive inequalities. However, as noted above, explicit definitions of 'improvement' or the substrate of acts of improvement (i.e., natural resource) are usually lacking. Armstrong takes care to fill this void.

Using the German word *Rohstoff* (lit. 'raw material'), Armstrong defines natural resources as things that humans do not produce, which 'would be 'there' whether there were human beings or not' (Armstrong, 2017: 11). However, by 'things' Armstrong means more than simply discrete, tangible objects – the 'stock' resources that people have in mind when talking about gold, oil or diamonds. There are also the various interacting natural systems and cycles that, over time, create these stocks (Armstrong, 2017: 93). Although these 'flow' resources have in the past been largely overlooked in theoretical discussions, they can be utilized by human beings and most of them have been (if unknowingly). In sum, natural resources are:

> the raw material we are confronted with in coming into existence in the world, with which we can potentially support our various (and competing) human projects. The trees of the forests, the water of the rivers and oceans, and the mineral and petrochemical wealth lying under the soils and the seas are familiar enough examples. But we can also include the air that we breathe, wild (uncultivated) plants and animals and the energy contained in wind, waves and sunlight. So too can we include the land itself. Land after all possesses the same key normative features as other resources: whilst all of us require some land to live upon, none of us is responsible for creating it (2017: 11).

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The conceptual opposite of a (purely) natural resource is an artefact. Armstrong readily acknowledges that 'natural resources' and 'artefacts' are [theoretical] ends of a continuum and that there will be much disagreement over how 'natural' or 'artificially produced' any particular object is.[5]

The way in which objects move along the continuum from 'natural' to 'artefact' is by being acted upon by a human agent, for example by being improved. Armstrong's definition of improvement is as follows:

> We will construe the improvement of a natural resource as the altering of its chemical and/or physical properties in such a direction *as to make it more economically useful*. These chemical and physical properties include ductility, porosity, conductively, flammability, opacity, reflectivity, brittleness, elasticity, hardness, and so on. Industrial processes will value resources principally as carriers of these properties and shifts along each property-continuum (as a resource becomes harder, or more ductile, or more elastic) will make them more valuable than rival resources bearing similar properties. *To count as an improvement these changes must be perceptible as improvements by others. As a working assumption, we can expect those changes to be accompanied by increases in exchange value* (2017: 99 – emphases added).

There are two points that we would like to raise here. The first is a puzzlement over Armstrong's claim that to count as improvement, changes must be 'perceptible as improvements to others'. This 'perceptibility criterion' is introduced without explanation, and, we shall argue, is seemingly inconsistent with Armstrong's definition of natural resources. The second challenge concerns the nature of the link Armstrong postulates between improvements and exchange value. This challenge has wider implications for Armstrong's argument against the added value principle and his conclusion that there is no normative difference between improved and unimproved resources.

A Puzzle About the Perceptibility Criterion

As we have seen, Armstrong defines a natural resource as a piece of Rohstoff, which human beings may make use of in the course of various projects. Perhaps a more commonsensical way of putting it is to say that a natural resource is Rohstoff which can be used by human agents to serve various ends, some of which are very simple (breathing) while others support more complex projects. Nowhere in the definition of natural resource is any mention made of perceptibility.

5 The disagreement might go deeper: a standard criticism in environmental philosophy is that the concept of nature sets up an untenable dualism between supposedly untouched natural entities, and the objects of human culture (see Callicott and Nelson 1998). This dualism is commonly ascribed to Western thought and science, and is directly opposed by cultures which do not recognise a separate 'nature'.

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It seems that Armstrong could very easily do the same when defining the concept of an improvement. If he omitted the perceptibility criterion, then an improvement could be defined as *a change in the material properties of a natural resource in order to make it more economically useful*. Here, 'economically useful' should be understood in broad terms, i.e., in terms of meeting various human ends. For example, economically useful could be understood in terms of 'use value,' or something similar. However, it should not be cashed out solely in terms of exchange value. Otherwise, Armstrong would not note that improvements are *typically* accompanied by increases in exchange value.

Thus, we may ask: what role does the perceptibility criterion play? Why, when natural resources are defined without reference to perceptibility, does it appear in the definition of an improvement to the same natural resources? To confuse things further, note that Armstrong is not talking about the perceptibility of a change *per se*. Rather, he states that to count as an improvement, changes must be perceptible *as improvements* by others. The perceptibility criterion is really a requirement that it must be possible for other agents to judge that the change results in the resource being able to meet certain human ends more effectively. So, our question can be restated as follows: why is the possibility of this judgement by others a necessary condition for any change to *be* an improvement?

The commonsense understanding of improvement does not depend on the potential judgement of others. For example, if an agent, A, picks up a piece of flint and strikes it a few times to make a sharper edge, which can cut through certain things more readily, it seems natural to say that A has made an improvement to the flint. This obtains regardless of whether others around her can detect the change or themselves value being able to cut things more easily. Nor need there even be any other agents in A's immediate vicinity. However, consider another facet of the commonsense understanding of improvement. If an agent changes a natural resource to better serve the purpose of Φ, but Φ was something that no other agent could ever have serious reason to care about, it does seem counter-intuitive to describe A's action as an improvement. We would be more likely to say that A has wasted her own time and the natural resource. It is difficult to think of an example of an end that *no-one* would ever care about, but here is an attempt. Consider the Harvard mathematician who devotes his life to counting blades of grass. He does some amateur engineering and builds a machine from raw materials that can more efficiently count blades of grass, but nothing else. It is more natural to say that he is wasting his time and the raw materials than it is to say that he has improved those raw materials, even though he has created something that serves a particular end better. We refrain from calling it an

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improvement, however, because of disagreement about the value of the end in question, not about whether the changes made can serve that end.

Therefore, one plausible function of the perceptibility criterion is that it seeks to capture these broader considerations that come into play when talking of improvement. Given that there is disagreement about ends, the perceptibility criterion may stand in for the sort of agreement necessary about ends to judge something as an improvement. That is, in order for special claims from improvement to be made, it must be the case that other agents agree that A has improved the natural resource in question (in either the narrow or the broad sense). The perceptibility criterion is therefore necessary for the added value principle (or any others that distribute improvements) to come into play.

However, this line of reasoning puts the cart before the horse. It is one thing to say that others agreeing that A has improved the resource – and desire some or all of the improvement or the improved value – is a necessary condition for there to be questions of distributive justice raised about its distribution. Issues of distributive justice arise when there are competing claims – in this case claim to an improvement. Yet this is a different question to what an improvement actually is. Questions about *what X is* are analytically distinct from, and should not be conflated with questions about how to distribute X. Recall, too, that Armstrong sees no need to put anything like perceptibility in his definition of natural resources.[6] The fact that some are prepared to judge something as an improvement serves as reasonable evidence that an improvement has occurred, but this is quite different from saying that the perception of an improvement by others is *constitutive* of it actually being an improvement. It thus seems reasonable to conclude that the same line of thought applies when it comes to defining improvement. Therefore, we reject this suggested function of the perceptibility criterion.

To summarise: Armstrong's definition of improvement thus begins by defining improvement in terms of making a natural resource a better means for certain ends. Limiting the understanding of improvement to this sense renders the perceptibility criterion unnecessary. However, including the perceptibility criterion brings in the broader question of what ends or purposes are valuable, an issue which does sometimes appear in discussions about whether actions improve natural resources or waste them. Yet the perceptibility criterion does not allow us to define something as an improvement. Instead, it merely signals

6 It is true that if we are to discuss justice in the distribution of natural resources, there must be others to judge that certain lumps of Rohstoff are natural resources and are valuable. Otherwise, there would be no competing claims and no moderate scarcity. But defining a natural resource is a different issue to that of considering what else has to be in place for questions of distributive justice to arise.

the need for agreement about whether the ends in question merit talking about improvement.

Armstrong Against the Added Value Principle: Exchange Value and Use Value

According to Armstrong's formulation of the added value principle:

> when an agent changes the properties of a resource, with the result that its market value increases from, say $10 to $15, that agent is entitled to retain the additional $5 *on the grounds that he or she is responsible for its coming into being* (2017: 101).

The added value principle thus expresses the direct justification of special claims from improvement: it simply *is* just that agents keep the additional value that they create.

The problem with the added value principle, Armstrong argues, is that agents are never *fully* responsible for the exchange value of resources they improve. Rather, the price of any given improved resource is a social creation. Prices are heavily influenced by supply and demand for which no single agent can be responsible. Nor can any single individual agent be fully responsible for the political systems which make markets possible. Finally, no single agent can be responsible for the infrastructure and technology that is often used in the course of making improvements. Analogous arguments – especially the point about supply and demand – apply at the global level, which means that statists and nationalists cannot claim that states or nations are collectively responsible for the exchange value that their resources command in the global markets. Armstrong concludes that 'no individual or (non-global community) can be fully credited with the coming to existence of that value' (2017: 106). To allow agents to claim the full exchange value of resources they improve is to indulge them in 'rent-seeking behavior' (2017: 106).[7]

It is hard to disagree with Armstrong's basic point. However, the implications might be different from those he imagines. Although Armstrong says that improvements are typically accompanied by an increase in exchange value, here he assumes that exchange value simply *is* the appropriate way of valuing an improvement, following left-libertarian theorists and perhaps some statist

7 Note that this is precisely the opposite conclusion from standard rentist critiques against 'idle' holders of wealth, which hold that such agents are not entitled to the income accruing from their assets *because* they do not improve (add exchange value to) them but merely benefit from wider forces of demand and supply.

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and nationalist views.[8] One implication of Armstrong's critique is that as *joint* creators of added value, the direct justification should acknowledge that both an individual agent and wider society can have claims to the improved exchange value.

However, there is another implication of Armstrong's critique that he does not consider, namely that exchange value is not the only way to value improvement. Therefore, it is possible for those who employ the direct justification to hold that agents who improve natural resources can keep the value of that improvement, but where that value is not conceived of as exchange value. This would retain the basic intuition behind the direct justification. It would also signal the need for an investigation of the different conceptions of valuing improvements and the relations between them, including the question of whether exchange value is a suitable proxy – an investigation which is arguably overdue.

Earlier we suggested that an improvement should be understood as a change in properties that makes a natural resource a better means to suit human ends. If we take this simple understanding of improvement then the added value reflects exactly how better the improved resource realizes the end in question, compared to the 'raw' resource. As such, the conception of added value will vary according to the ends the improvement serves.

Returning to our example of an improvement: if A picks up a piece of flint and strikes it a few times to make it sharper, then the added value is the increased ease with which A can use the piece of flint to cut through something and the saving in time and effort in which A can achieve a particular end. The added value is first and foremost to be measured according to something akin to *use value*. In this example, providing A had the right to pick up the piece of flint in the first place, it seems odd to deny that she has a right to use and enjoy the added value of the improvement she made, as well as a right to exclude others from doing so. If another individual (who can make one himself, or has an available alternative), nevertheless keeps asking – even demanding – to use A's blade, then it seems reasonable of A to ask this other individual

8 David Miller is a possible exception here. Armstrong takes Miller to be his main opponent in his argument against the added value principle, writing that Miller 'has argued that the basis for desert claims is best understood in terms of one's productive contribution and best measured in terms of exchange value' (2017: 111, n. 18). Armstrong cites Miller (1996), which is focused on domestic justice. However, when writing about global justice, Miller rejects global resource egalitarianism, citing a lack of 'common metric'. Miller writes: 'In the case of exchangeable commodities, the global market provides a metric of sorts, but this overlooks the specific use-values that a resource may have for the community that possesses it' (1995: 105–6). It seems unclear, therefore whether Miller would fully commit to exchange value as a global measure of improvement.

not to use her blade.[9] She has the right to keep her blade and the benefits it brings. Such benefits might include time and effort saved – perhaps with the new blade A can cut kindling in half the time it used to take. Or it might be an increase in overall productivity – A keeps working for a similar amount of time and thus produces more kindling, which she would be entitled to keep providing she did not cut more wood than was in her original fair share. A is entitled to keep the improved blade and gain benefits from its use, which is measured by reference to the purpose to which A puts it.[10] This is a formulation of the added value principle, understood without any appeal to exchange value. Armstrong's criticisms of the added value principle are all directed towards whether an individual can keep exchange value. We can accept the points he makes when it comes to exchange values and markets, but the lesson here for the left-libertarians, statists and nationalists who are Armstrong's target is that they should recast their arguments with a different conception of value in mind. Improvement and improved value should not be conflated with exchange value. The latter is at best a proxy for the former, and might not be a very good one. However, with a different idea of how to measure improvement, e.g., use value, it remains the case that different principles of justice might apply to the distribution of Rohstoff and the distribution of improved resources and their benefits. So the simple view withstands Armstrong's critique.

It remains open for anyone who still wishes to criticize the direct justification (and with it, the simple view) to argue that A would not have had the skills to sharpen the flint, or even be alive in the first place without some contribution from the wider society in which she grew up. So conceptualizing the added value principle in terms of use value does not refute Armstrong's point that value is created jointly by an agent and the society in which they live. However, those who wish to employ the direct justification can retain the idea that improvers can keep the added value. It is simply that for the vast majority of cases of improvements, there will be more than one improver (i.e., the individual(s) concerned and the wider society).[11] This would be a more significant change for the classic left libertarians than it would be for nationalists or statists; as the

9 Perhaps A's interlocutor may reply that his energy is better spent on other tasks, in which case there might be an agreement to make some sort of exchange. But this comes after the added value is created, and so the basic point that added value and exchange value are separate still holds. Another reason that could over-ride this presumption might be that the individuals concerned are part of a group which has an explicit commitment to shared ownership of resources, including 'improved resources,' as many hunter-gatherer groups are reported to have.

10 There are restrictions: A has no claim to improved resources or the benefits if she has no claim to the initial *Rohstoff* that is the substrate of the improvement, howsoever that claim is characterised from Locke's stipulation to leave 'enough and as good' (Locke 2003 [1689]: 112) to equality. Nor is she entitled to infringe upon the claims of others when using her improved resources. This point becomes salient in the next section.

11 As one reviewer pointed out, this does raise the question of how to distinguish and reward the contributions of an agent compared to that of the wider society. As we are not seeking to provide a defence of the simple view or of any account which uses the direct justification, we put this issue to one side.

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latter two already incorporate some notion of collective action to create things of both material and symbolic value (e.g., Miller, 1995; 2007).

Recasting the Direct Justification for Improvement

We have seen that a key lesson of Armstrong's work is that improvement, improved values and exchange value should not be conflated. While exchange value is one way of measuring improved value among others, Armstrong assumes that it is the correct one when critiquing the direct justification. We have argued that the added value principle, the direct justification and with them, the simple view are considerably less vulnerable to Armstrong's critiques when improvement and improved value are understood in terms of increasing a natural resource's effectiveness in meeting certain ends. The same move also helps the direct justification withstand Armstrong's final remarks against it.

In the conclusion to his discussion on rewarding improvement, Armstrong compares 'the direct view (once it has conceded the contextual determination of exchange values)' to the instrumental view (2017: 108). The first difference is that the direct justification maintains that there is something morally fitting about leaving a (portion of) added value in the hands of the improver, whereas the instrumental justification rejects this and considers alternative incentives (2017: 108). Second, Armstrong argues, 'the instrumental view will – or should be – much more circumspect about when to issue rewards to improvement than the direct view' (2017: 109). This is an advantage of theories that use the instrumental justification over those that adopt the direct justification. Armstrong writes:

> … the advocate of the direct argument wants to ask questions about whether the act can be considered an improvement by others, and will suggest a benchmark (such as exchange value) for assessing when this is so. But after ascertaining answers to those questions the direct argument becomes rather undiscriminating: the very fact that an improved object commands a higher market reward is enough to justify a claim over (some portion of) that reward. There is no reason why we should be so undiscriminating, however, because there is no reason to suppose that the fact that a market can be found for an improvement establishes that justice is served by that improvement (2017: 109).

This is certainly true. Indeed, it is arguable that market forces have been the drivers of much environmental destruction, and industrial capitalism the driver of global climate change which is projected to cause or exacerbate injustices on a global and intergenerational scale. Because the direct justification holds that

justice simply *is* served when an improver is rewarded for an improvement, it is insufficiently sensitive – even blind – to these other considerations. Armstrong thus suggests that alternative and presumably more attractive views (e.g., the instrumental view) may demand that some resources are not improved at all, but left as they are (2017: 110).

Need this be so? This lack of awareness arises not from the direct justification *per se*. Instead, the problem is that most accounts using it also (i.) use exchange value as the measure of improvement; and, relatedly, (ii.) do not take into account possible externalities and intergenerational concerns when defining initial shares of natural resources from which improvements are made and rewards claimed. The problem is not with the principle that improvers should keep the added value, but with using it in conjunction with an impoverished conception of the way to measure an improvement, and/or the scope of duties of justice.

To show that the accounts using the direct justification are not necessarily blind to the possibility of externalities or intergenerational injustices, recall that on the direct justification there is an initial allocation of natural resources. It is only *from her own share* that A may make improvements and, if she does, according to the direct justification, enjoy the rewards of doing so. If in the course of making improvements to one resource, A violates other agents' initial holdings, including those of persons in the future, then she is not permitted to make them in the first place, much less keep any of the added value. The direct justification only has the environmentally unfriendly and intergenerationally unjust implications that Armstrong highlights if it is employed alongside a conception of resources and value of resources that does not take these concerns into account.

Consider, for example, an account of justice which combines the direct justification with the idea of 'ecological space.' Ecological space is, quite simply, the sum total of natural resources, measured in terms of 'biologically productive land and water area required to produce the resources consumed and to assimilate the wastes generated using prevailing technology' (Hayward, 2006: 359; Wackernagel and Rees 1996; Chambers, Simmons and Wackernagel, 2000). This concept explicitly includes systemic resources as well as the objects that come most naturally to mind when we think of natural resources. As such, it automatically accounts for what are normally considered 'externalities.' Relatedly, because it is based upon criteria of environmental sustainability, it is inherently concerned with intergenerational justice. As Edward Page notes:

> Whereas the established currencies are designed to apply to relations within a single generation, with their intergenerational implications being a matter of further deliberation, ecological space turns this methodological approach on its head by embracing an explicit commitment to intergenerational justice at the outset' (2007: 461).

If, as Tim Hayward has argued, there should be an 'equal right to ecological space' (2006; 2007), this would mean an equal right to an equal share of whatever amount of ecological space is available. If the sum of human activity means that more ecological space is used than what is available, then environmental systems will become degraded.

Further, while exchange value is often used as a proxy for some ecological variables, incorporating many other elements of ecological space would require the use of hypothetical 'shadow prices' to simulate non-existent markets. This complicates any attempt to determine resource improvement in relation to unpriced ecological elements. Aside from the non-trivial challenge of assigning plausible numbers, this approach also relies upon a metaphor of stocks and flows which oversimplifies how ecologists understand ecological functioning so as to conform to a dominant economic (partial equilibrium) understanding of the benefits provided by ecosystems (Norgaard, 2010; Kosoy and Corbera, 2010). As such, there will be a significant difference between judging an improvement by means of exchange values (whether real or hypothetical) or by means of a biophysical measure such as ecological space.

If something like ecological space is the relevant conception of a natural resource, the direct justification would not have the adverse environmental and intergenerational implications Armstrong claims. People would be assigned equal shares of ecological space and it would be through interacting with various components of this that they would engage in activities of production and consumption. Thus, an agent might be said to make an improvement in one of at least two ways. One way would be to use or combine different components of ecological space (different natural resources, including sink resources) to make a product that was better suited to meeting a particular human end. The other would be to make some kind of improvement that increased the overall amount of ecological space. The direct justification would hold that the agent would be entitled to the increased use value in the first instance, or even have a greater share of ecological space in the second instance. But entitlements to improvements only arise if the process of improvement does not encroach on others' initial shares of resources. Where these are conceived of in intergenerational terms, and take into account all resources including sink

resources, the direct justification will allow only entitlements to improvements which do not create externalities or intergenerational injustices. The problem is not that the direct justification itself is rather undiscriminating, but that most accounts using it have done so in conjunction with an environmentally and intergenerationally inappropriate conception of natural resources, and an overly narrow measure of improvement.

Conclusion

While Armstrong's criticisms of the simple view are convincing when directed towards accounts which value improvements in terms of exchange value, exchange value is often a poor proxy for the value of an improvement. This may be especially clear in relation to ecological functioning, where exchange values may be completely absent or merely hypothetical. Armstrong is also correct that justice may require not exploiting some natural resources. Yet we have shown that this is only an objection against direct justifications for improvement if one assumes an impoverished conception of what natural resources are, which ignores the possibility of improvement based upon a just and sustainable initial distribution. Armstrong's critiques are not sufficient to overturn the 'much beloved distinction between unimproved and improved natural resources' (2017: 107) and the intuitive idea that special claims arise over the latter, but not the former. In short, Armstrong has not defeated the simple view.[12]

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