

A Study on Environmental Justice and its Flip Side, Environmental Injustice

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In recent years there have been efforts to study the concept of environmental justice. However, when we hear that term getting bandied about, often what is really at issue is the dark side of this topic – environmental *in*justice.

Some of the most prominent of these examples would include the findings on toxic water in Flint Michigan and Camp Lejeune North Carolina. In both these cases, residents have been exposed to toxic water intended for drinking. We could easily say that these phenomena constitute a lack of environmental justice, or use the flip side and say they are examples of environmental injustice. In this way, we can think of the topic of environmental justice as constituting a continuum from worst to best.

That leaves us with the problem of defining environmental justice. We must address each component separately before combining them to conduct an analysis. We will start this exercise with a discussion of justice and gradually move toward environment.

What is Justice?

The question of how to define justice has had an extremely long and complicated history. It has been the subject of theologians, philosophers, those who study various forms of jurisprudence, economists, and many others practically since the early stages of civilization.

During the 20th century the philosopher John Rawls addressed this topic in a way that increased the rigor of analysis to a new high. His seminal work, *A Theory of Justice*, published in 1971, has been cited by scholars working in all the fields mentioned above and constitutes the foundation of how modern scholars take the dive into any study that deals with justice (Rawls (1971, revised 2020). We, like many others who are involved in the topic of justice, must start with Rawls. (Hauchecorne, 2020; Hendrix, 2005; Manning, 1981).

The veil of ignorance

In Rawls's analysis, we all must step back behind what he calls a veil of ignorance. From that side of the veil, we know everything about the world in general, but not anything in particular.

So consider that we are presented with a two-version description of the world, one in which wealth, income, amenities and other things that contribute to well-being, are distributed equally. We can call this state A. The other alternative to which we are presented is one in which some citizens are quite wealthy, and get to enjoy a wonderful life filled with travel, an abundance of food and other necessities, great shelter and medical care, etc, while many in the population are systematically deprived of these goods, essentially living with lack in a condition of poverty. We can call this state B.

So here you are on one side of the of the veil. You know the conditions of state A and state B very well, in fact essentially perfectly, all the technology and what it can produce, and so forth. But there is a particular thing about the other side you do not know. And that is where *you* will fall in society once state A or state B is chosen.

So if you choose state A you can avoid a very bad outcome for yourself, but you will not be at the top either, primarily because there is no top. On the other hand, choosing state B may allow you to be wealthy, entitled and all the rest, but it also exposes you to the possibility that you could wind up deprived, and living a life of poverty along with all your family.

Maxi-min as a Decision Rule

Rawls then appeals to the "maxi-min" principle of choice. According to maxi-min, people tend to avoid choosing options that could lead them to disaster. In other words, they look at all the possible outcomes, and *avoid* the choice that could potentially lead them to the *worst* outcome.

Maxi-min is one of the most important choice strategies in decision theory. It is one reason people buy comprehensive car insurance when they get a new vehicle. Even though the premium payments make them worse off by having to forgo spending that money on goods and services, people consider this insurance "worth it" because it allows them to avoid the worst outcome (having the car stolen or destroyed and having to pay for its replacement out of pocket).

This attitude toward risk is called *risk aversion*. People go with maxi-min because they are risk averse in the sense that they do *not* wish to run the risk of catastrophe, or a horrible outcome. They are even willing to pay money to avoid such an outcome.

Rawls then applies maxi-min, or risk aversion to the problem of the kind of society we want. When we are behind the veil of ignorance, Rawls shows that risk aversion will lead us to pick the option that has the *best* of all the *worst* outcomes for any individual, group or community – maxi-min. This means that no rational risk averse person would choose state B. In other words, state A wins in a landslide.

The implications

It should be obvious that according to Rawls's theory of justice then, following the veil of ignorance and the maxi-min principles, that we have created a civilization that resembles state B more than state A. That means the system is unjust. Again, a simple glimpse around the world proves this to be the case, including the examples from Camp Lejeune and Flint. But others abound, such as the location of waste dumps, landfills, and extractive industries in areas that are poor. Unequal income distribution is also the focus of much work that applies Rawls's theory.

Any policy change that leads us deeper into state B is therefore unjust. It is immoral and unethical. It is unfair. We should only adopt policies that lead us closer to state A. This is basically the difference between justice and injustice.

An example of an unjust policy then, would be providing tax cuts to high income citizens while citizens in some parts of the country have contaminated public water supplies, or schools that are in states of disrepair, or cuts to social safety net programs. If you were standing on the other side of the veil of ignorance, not knowing whether your children would have decent drinking water if you chose state B, then you would choose state A, even if it meant that you would never be wealthy, because extreme wealth does not exist in state A. Forgoing that possibility of a wealthy life would be "worth it" to you because it allows you to avoid a catastrophic outcome for you and your family.

Environmental Examples

Let's take a look at an environmental example. Suppose we have a public lake in which people like to pursue certain activities, such as fishing. Lake Erie would be a good example for Ohio, but since a number of Great Lakes states are involved in this study, it could be any of them. Suppose that all along the shoreline, property that borders the Lake is in the hands of private individuals with spatially separated locations where members of the public can "walk through" to get lake access to fish (or swim, sightsee, birdwatch, etc). The distance between these passages can vary considerably.

We can examine two different examples of proposed changes and evaluate them using Rawls's criteria.

Let us suppose that many of the visitors are low income residents who just happen to live in close proximity to the lake, but not adjacent to it, and lack transportation to go to more distant access points. Studies show that these characteristics do in fact apply to many Great Lakes anglers (people who fish with a rod and reel Blaine et al. 2015). Suppose further that once the member of the public gets through the "walk-through," (s)he would like to walk parallel to the shore to find a good spot. A question that immediately arises is whether the person has a right to stay on the shore, or must stay in the water, wading along there because the lake is public property and the shoreline past the point of public access is not.

The answer to this question depends on where we consider the private space to end and the public space to begin. If we decide that the *high* water mark is the border, then under most conditions, the visitor will be able to walk along the dry shore from wherever the current waterline is to the high water mark. In some stretches of beach, this is a considerable space.

However, if we consider the public/private boundary to be the *low* water mark, then once the visitor leaves the walk-through space, in order to move parallel to the shore to find a different spot, (s)he is not allowed to walk on dry land. This would constitute trespassing, for which the visitor could be arrested and prosecuted.

So a public decision to make the border the low water mark would be a step toward society B and would constitute environmental injustice. On the other hand, setting the public domain to the high water mark would be a step toward society A and would constitute a move toward environmental justice.

A related example involves the availability of the walk-through areas themselves. As stated above, these occur at various intervals along the lakeshore. It is well known that lake front property is extremely valuable. Suppose someone moves to privatize one of these areas, say for a high-rise apartment building or a marina. There is an enormous amount of money at stake here. Whatever public entity owns the property would be able to fund a great many programs with that money, and high income users of the lake would have private access.

But again, this option fails the justice test because it will inevitably exclude low income people who no longer have access to the lake. Most of these individuals/families could neither afford to buy or rent a residence in the high rise or procure a boat to lodge at the marina. Many of them would also lack the transportation to get to a more distant public access site. Rawlsian justice requires that we prohibit the movement of any access points from the public to the private sector, regardless of the benefits calculated by developers or elected officials.

A good exercise might be for the reader to engage in a thought experiment here. Imagine withdrawing back behind the veil of ignorance. Set up these examples (the high versus low water mark as a public-private boundary and the decision to convert current public access sites into private marinas or buildings). Follow maxi-min to identify the “just” versus “unjust” options. Making a table to show the options and results may be of help here.

Before we move to a fuller discussion of environmental goods, let us consider the progress we have made so far.

Statement 1: Any change that leads to a more equitable distribution of environmental amenities by making them available to those who have been going without, is a step toward environmental justice. Any change that reverses this outcome constitutes environmental injustice.

What Makes Environmental Justice Distinct From Other Kinds of Justice?

So in the previous section we learned that justice is really about the distribution of well-being. When we talk about what constitutes well-being, we can turn to modern microeconomic analysis at least as a starting point.

In the received view of modern microeconomics, an individual’s well being is often described as “utility” and is expressed as a mathematical function:

$$U = f(\mathbf{X}) \quad (1)$$

where \mathbf{X} is a vector of goods and services the individual consumes. The vector is divisible or can be aggregated according to the purposes of analysis. For example, x_1 may be clothing, x_2 food, x_3 , shelter, x_4 , transportation and so on.

Disaggregation would divide x_1 into shirts, shoes, coats, hats, and so forth. Any level of aggregation can apply, depending to the researcher's purposes.

We assume that U is increasing in all x . That is, the more consumption the individual obtains, the better off (s)he is. That means that the consumer attempts to maximize the utility function. The limit on utility is a limit on consumption, and is achieved by rationing consumption by market prices p . along with finite income I .

The income constraint is therefore written:

$$I = p_1x_1 + p_2x_2 + \dots\dots\dots p_nx_n \quad (2)$$

Where p_j is the price of the j th consumption item. Total spending cannot exceed available income I . N denotes the number of items being considered for consumption.

So this gives us an income-constrained utility function established by Lagrange as:

$$L = f(\mathbf{X}) + \lambda[I - p_1x_1 - p_2x_2 - \dots\dots\dots p_nx_n] \quad (3)$$

Maximizing (3) involves taking the derivatives of all the endogenous variables \mathbf{X} and λ , (the Lagrange multiplier $\partial U/\partial I$) setting each of them equal to zero, and solving for \mathbf{X} , which yields consumer demand functions of the form:

$$x_j = x_j(p_1, p_2, \dots\dots\dots p_n; I) \quad (4)$$

For normal goods, $\partial x_j/\partial p_j < 0$ and $\partial x_j/\partial I > 0$. If items x_j and x_k are complements, $\partial x_j/\partial p_k < 0$, while if they are substitutes, $\partial x_j/\partial p_k > 0$

We can now take the items on the right hand side of equation 4 and substitute them into equation 1 to get an indirect utility function of the form:

$$V = V(p_1, p_2, \dots\dots\dots p_n; I) \quad (5)$$

The indirect utility function, or the well-being of the individual, is decreasing in prices and increasing in income. Higher prices make the individual worse off and higher income makes the individual better off etc.

Externalities and Public Goods Change Things

The reader has perhaps noted that a number of assumptions are embedded in the received model that do not apply in the real world. Ignoring these assumptions may allow us to conduct analyses of many goods and services, but it turns out that in the realm of environmental amenities, we will not get too far if we do not incorporate exceptions to these assumptions explicitly into the analysis.

Probably the most important assumption in the received model is the assumption that property rights are rigorously defined, specified and enforced. When the consumer makes the purchase of an item in the x vector, ownership passes from the seller to the buyer. The buyer now has complete ownership of the item, be it a hamburger, a house, a pair of shoes, the list goes all the way through the x bundle. Everyone else must yield under penalty of the law from consuming what the buyer has purchased – barring invitation. In other words, non-buyers are excluded from use. This is called the exclusivity principle, and is crucial to market economics.

But there are goods and services that may benefit the consumer where it is just not possible to exclude those who do not pay or buy. The classic example economists use for this is the lighthouse. A lighthouse on the shore is used by navigators in its proximity. If a ship is sailing close to a hazard, the lighthouse serves an important role in advising the ship's crew not to come close. It provides an enormous service. But people can use it whether they pay or not. Therefore the lighthouse, along with other non-exclusive goods and services, enters into the indirect utility function directly (Z), even though it is not expressed in money terms the way the other items were.

$$V = V(p_1, p_2, \dots, p_n; I; Z) \quad (6)$$

There are lots of examples of items where those who do not pay cannot be excluded, but receive benefits from the good anyway. The presence of these goods constitutes a *market failure*. The reason this is such a serious matter is because, unlike individuals or companies that produce market goods (the farmer producing food, the builder producing housing, etc) anyone who provides a non-exclusive good would go broke because there is no mechanism to make users pay. Who is there to prevent non-payers from taking note of the lighthouse and steering clear of threats to navigation? Exclusion of those who use the lighthouse would be impractical or even cost prohibitive and therefore impossible, so the lighthouse is

an example of a non-market good, a good for which the market fails. The “free market” can never produce a lighthouse, but we need lighthouses. What should we do about this?

Another example of a non-exclusive good is the United State military. The military simply cannot exclude non-payers. If the armed forces are there to protect the United States from invasion, for example, how can they protect you without protecting your neighbor? It does not matter how much you have contributed or how little your neighbor has contributed, the military either protects no one or everyone. It, like the lighthouse, is an example of a non-exclusive good. National defense is just another example of market failure.

So go back to our example of the public walk-through area on the lake. It is free and open to the public. Many people benefit from it. But since no one is forced to pay to use it, the market cannot provide it, and left to its own devices, there is a good chance the market will wind up turning the public space private, providing the high rise or the marina to those willing to pay for such items. But this would be to the detriment of people who need the path to get to the lake. Because the market has failed and no one can own the path, many people, especially low-income people as it turns out, lose utility (read, standard of living). As we have seen, this may be a step toward market efficiency, but it is a step away from environmental justice.

In the cases of market failure we have considered, the market fails due to the inability to apply private ownership to the good or service in question: the lighthouse, national defense, the Lake Erie shore. You cannot buy a lighthouse, national defense, and you cannot buy the Great Lakes. But each one of these items makes a big difference in people’s lives.

Non exclusivity as a cause of market failure is more common for environmental goods than for most other goods. Make a list of 5-10 goods in each category to see. Food, clothing, automobiles, all are bought and sold in markets. That’s because they are exclusive. You are not allowed to take your neighbor’s car on a joyride without permission. So there is no market failure there.

But think about the Ohio River, Lake Erie, clean air, peace and quiet, and wild game like deer. These are all items that have no market. You simply cannot go and buy them like you can buy the market items listed above. But that doesn’t mean

they are not valued highly by consumers, members of the general public. In fact these amenities are actually typically more highly valued than most market goods. They just don't exist in a market. Market failure is the primary reason that environmental topics become so controversial.

Statement 2: The provision of environmental goods is controversial, because these goods tend to be unattainable in markets due to attenuated property rights (non-exclusivity). This constitutes market failure, which reduces or even eliminates the amount of money available to provide for these goods, which, though useful to society, may disappear or become degraded as a result. Those that do exist tend to require management by the public sector, including elected officials who come under a great deal of scrutiny by a divided public as to what policies are the best for the maintenance of these goods. Moreover, money is required for these public sector operations. Whether the money is collected in the form of taxes or fees always leads to controversy, partly because of widespread aversion to paying taxes on the part of many in the American electorate. Paying fees is not always a popular alternative either.

As noted in statement 2, the solution to the problem of market failure must lie with the government, whether the item in question is environmental or not. For example, even though it is non-exclusive, the United States military is the best in the world, not because people are altruistic and donate for the cause. The US military exists for the same reason the publicly provided path to the lakeshore exists, because government coerces its citizens to pay taxes to provide these items. The political basis for this is in the Constitution of the United States, which states that among the purposes of government is to "promote the general welfare" of its citizens. It may be true that people do not like to pay taxes, but the arguments for non-exclusive goods in the indirect utility function are broadly interpreted in that way, at least implicitly.

This causes a new term to emerge in (6), namely taxes (T):

$$V = V(p_1, p_2, \dots, p_n; I; Z; T) \quad (7)$$

where $\partial V / \partial Z > 0$ and $\partial V / \partial T < 0$

So non-exclusivity, the inability to force users of an item to pay, is a characteristic often associated with public goods: the military, a sidewalk, the Great Lakes. As we have seen, the government may institute certain policies to try to overcome

these problems, especially if they could not be afforded without money flows. This is part of the rationale for boating licenses on the Lake or gasoline taxes. Using the road may be non-exclusive, but if you must pay taxes to obtain gasoline and other items to use the road, the presence of taxes on gasoline, tires, driving licenses etc, are really just means to correct a market failure by generating funds to build and maintain the roads. They also provide a minimal form of exclusivity at the same time. People who engage in strong attempts to avoid making payments of this type are often referred to as “free riders” because they are using the resource or goods without paying their share.

Perhaps you can think of some other examples of non-exclusive public goods. This would make another relevant thought experiment. Why is the good or service you came up with non-exclusive? Would it simply be too expensive to exclude those who do not pay, or just a nuisance? What remedy would you suggest for correcting this market failure.

Taking another look at the path to the lake, think of it this way. No one disputes that the lake is an open access non-exclusive public good. But if all access to it - all the lakeshore - is in private hands, it is empty rhetoric to say that the lake is open to the public. The only way it can be open to the public is to include areas where non-owners *could* be excluded but are NOT excluded as a matter of public choice, hence the “paths” etc. It would actually be fairly easy to put admissions stands at these pass-through points to force visitors (users) to pay, but as we have seen, this is a fundamentally unjust and unfair practice, and is not popular either. As an exercise for the reader, try to think of how this policy would differ from other government efforts to collect money to pay for public goods (licenses, taxes, etc).

Non-Rivalry is Often Conflated With Non-Exclusivity

Rivalry and non-rivalry are also important characteristics of goods, just as exclusivity and non-exclusivity are. Again, let’s consider the case of the lighthouse. Just as it is non-exclusive, the lighthouse is also non-rival. Whereas a shirt, a food item, or a car is something where one person’s ownership and use would interfere with another person’s ownership and use of the item, it is not so with the lighthouse. Its use is non-exclusive as we have seen, but it is also non-rival.

My use of it to avoid a shipwreck has no bearing whatsoever on your use of it. We can both use it at the same time or at different times and would never even know. This means the lighthouse is non-rival. So is the military. The military's protection of me has no bearing on its ability to protect you.

An on-line book or video is the same – they are non-rival because different people can use them at the same time without interfering with each other. This is not the case for items like food, clothing, automobiles, etc.

So now that we have rivalry and exclusivity as characteristics of goods and services, we have four types of goods and services to consider. They are, non-rival/non-exclusive, non-rival/exclusive, rival/exclusive and rival/non-exclusive. We have to consider items in each category, because various items that are associated with environmental justice may fall into different categories and require different considerations.

Table 1: Rivalry and Exclusivity in Consumption or Use

	Exclusive	Non-Exclusive
Rival	Pure private good, clothing, food, etc	Tragedy of the commons common property resources
Non- Rival	A club good, may be congestible; concert or movie	Pure public good: lighthouse, national defense, a sidewalk

Rival exclusive goods are pure private goods in that my use would interfere with yours and non-payers can be excluded from consumption. Food, automobiles, clothing, are all pure private goods. See the upper left of Table 1.

An exclusive non-rival good, often called a club good, is one in which non-payers cannot use it but one person's use does not interfere with another's. This would include a concert or a movie. You cannot get in unless you pay, but once inside, your enjoyment of the good does not interfere with anyone else's. However, club goods can potentially become congestible, where people's use interferes with that of others when crowding comes into the picture. See the lower left of Table 1.

An item that is non-rival and non-exclusive is a pure public good. We have already discussed examples of these kinds of goods (the lighthouse, the military, the sidewalk). See the lower right of Table 1.

If a good occupies the upper right part of the table, a rival non-exclusive good, we have a recipe for disaster. Imagine a public pasture where everyone can bring their livestock and allow them to graze as much as they wish. No one can be prohibited from doing this if the pasture is non-exclusive. The pasture would be said to be a “common property resource.” However, this resource is rival because allowing my livestock to graze there infringes on others. Any vegetation my livestock consumes cannot be consumed by anyone else’s. Everyone has an incentive to graze their animals on the commons as much as possible. No one has an incentive to invest in the commons, because unlike private property (such as the livestock themselves) no one can be guaranteed to be able to reap the rewards of their investment. Of course a portion of this problem applies to the pure public goods. But unlike the pure public goods, those that fall into the tragedy of the commons category will be “used up” or depleted because they are rival, while the pure public goods are not rival and cannot therefore be “used up.”

One of the best examples of a common property resource is overfishing. The ocean and many other bodies of water are not privately owned. If the fishing industry is attempting to maximize profits, each industry participant has an incentive to catch a number of fish that, given what others catch, may very well be unsustainable. Disaster and even extinction can be the end game for these kinds of goods (Ostrom, 2008).

The scholar most highly recognized for describing this tragedy, and the problem with common property resources, is Garrett Hardin (1968).

Again, one thing that can prevent the tragedy of the commons is government action, where governments restrict the size of the catch, require licenses, or declare off seasons in the case of hunting. For ocean fishing or whaling, international agreements are required.

As a thought experiment, see if you can make a list of rival non-exclusive goods. Some may even be close to where you live. Do you think they are in danger of disappearing because of overuse, or have policy-makers created ways to prevent that from happening?

Externalities are NOT Public Goods – Why do People Conflate Them?

As we have seen, the *deviation* we described in the received view on consumption in equations (1) – (5) comes about because of one major problem. That problem is that for whatever reason, there are some goods where property rights associated with the good are attenuated – they cannot be properly specified, defined and enforced. Hardin and others have argued that this is due to a characteristic of the good. It is pretty easy to prevent those who do not pay from obtaining goods from a store, for example, so those goods are private and it is business as usual. But it is not so easy to prevent a person from benefiting from national defense or using a sidewalk or lighthouse. The problem of the commons becomes tragic if the good in question is rival, because then it just might disappear altogether.

Now let's move into the realm of externalities. Suppose you decide to locate a factory on property that you own that happens to be in proximity to mine. You manufacture a product and sell it to willing buyers. In that sense the market works fine.

But, suppose that the activities of production in your factory pollute the air. This could change the whole characteristic of the neighborhood from very pleasant to foul. I may not participate in buying or selling any of the products you use or make, but I have been pulled into your market transaction none the less.

The presence of pollution to which I am exposed enters my indirect utility function just like the public good Z did in equation 7. It does so by reducing my utility since I am now exposed to dirty air. The item that you have foisted onto me is called an externality. When you play your stereo late at night so loud that your neighbor can't sleep, your music is an externality. In fact externalities are ubiquitous.

Just a note here. The two examples of externalities that we have considered so far diminish utility: $\partial V/\partial ED < 0$. These types of externalities are more precisely referred to as external diseconomies (ED). But not all externalities reduce utility. Some externalities, (EE) may increase the other person's utility, denoted EE for external economy, where $\partial V/\partial EE > 0$. An example of an external economy would be a yard project where your neighbor plants vegetation that is not very mosquito friendly, preventing the insects from bothering you in your adjacent lawn. Likewise, the neighbor's setting out a bird feeder that enables you to enjoy viewing birds you like to see would be an external economy.

When most people say “externality” though, they are almost always talking about external diseconomies. It is just a characteristic of the world we live in that when most people do things that unintentionally influence others, those things tend to have negative effects, like the air pollution and the loud music.

Most people are exposed to externalities every day. When you are sitting in your car at a traffic light behind a vehicle that is belching fumes right at you, this is an example of a common externality. Most externalities do not make enough difference to affect you much. Generally speaking, most people chalk externalities up to just being a part of life.

However, an externality that bothers you to the point where you might want to confront the person generating it, take them to court, or pay money to stop it or require them to pay money to allow them to continue it, this is called a “Pareto-relevant” externality. The name comes from the 19th century Italian economist Vilfredo Pareto.

Like public goods, externalities constitute a form of market failure. And they do so again, because of attenuated property rights. No one owns the air into which the factory dumps its pollution or the stereo owner pumps his music. So externalities and public goods have something in commons, but they are not the same. As a thought experiment, consider some items where property rights are not specified, defined and enforced (they are attenuated). Can you categorize which ones are public goods and which ones are externalities?

Conclusion and Direction

Identifying and correcting externalities is not easy. We must also take care to distinguish them from public non-exclusive goods. External diseconomies tend to be more common in communities that are poor than elsewhere, and non-exclusive public goods are less common there (O'Neill, 2003; Taylor, 2014; Farmer, 2017). Think of the location of sanitary landfills, toxic waste dumps, coal mines (both abandoned and operating) and so on. Contrast this with the paucity of public swimming pools, tennis courts, parks and other items that contribute to quality of life in those locations.

The kinds of arrangements we as a society have made in these regards violate both Rawlsian justice and Pareto efficiency. Their analysis will mark the initial step we take from the theoretical to the empirical domain.

Statement 3: The point of departure for this study is to examine patterns in the distribution of externalities and non-exclusive public goods. Are high income residents more likely to benefit from external economies and non-exclusive public goods? Are low-income residents more likely to be exposed to external diseconomies while lacking public goods? If the answers to these questions are yes, we need to identify examples and describe how we can ameliorate these conditions with solutions that are consistent with Pareto-efficiency and Rawlsian justice.

This paper is part 1 in a series on environmental justice published by The Ohio State University. Peer Reviewers for both parts are Dan Remley, Gwynn Stewart and Brian Raison, all with Ohio State University Extension.

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