Full citation: Wenz, Peter S., "Environmental Justice through Improved Efficiency." *Environmental Values* 9, no. 2, (2000): 173-188.
http://www.environmentandsociety.org/node/5797

Environmental Justice through Improved Efficiency

PETER S. WENZ

University of Illinois at Springfield
Philosophy Program
Sch. of Liberal Arts/Sciences Brookens 482
Springfield, IL 62794-9243, USA

ABSTRACT

Environmentalists can convince others to adopt nature-friendly policies through appeal to commonly-held values. Efficiency and justice are such values in industrial societies, but these values are often considered at odds with each other and with policies that preserve land and reduce pollution. The present paper analyses the notion of efficiency and argues that transportation policies that environmentalists favour – substitution of intercity rail and urban mass transit for most automotive forms of transport – are both efficient and just.

KEYWORDS

Automobiles, efficiency, justice, mass transit, rail, transportation

INTRODUCTION

Environmental philosophers in western democracies often attempt to influence public policies. We advocate, for example, habitat protection for endangered species, sustainable agriculture and increased use of renewable sources of energy. But how do we convince fellow citizens? We must relate our proposals to commonly held values.

In this paper I enlist the commonly held values of efficiency, justice and environmental justice in support of environmentalist proposals for more public and mass transportation, particularly for transportation by rail. My argument goes beyond what Bryan Norton calls the convergence thesis,[1] insofar as anthropocentric values support environmentalist proposals regarding transportation *without considering the welfare of future generations of human beings*.

Efficiency is widely considered praiseworthy in our culture. However, I do not claim it is our most important value, or that it alone supports environmentalism. Efficiency is highlighted here due to its usual association with environmen-

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tally ruinous 'progress'. Making efficiency an environmentalist value removes a major ideological impediment to environmental sanity.

JUSTICE, ENVIRONMENTAL JUSTICE, AND EFFICIENCY

Justice and Environmental Justice

I do not attempt here a full characterisation of either justice or environmental justice, which are topics that I have considered elsewhere.[2] For present purposes it suffices to note that justice generally increases when the burdens of meeting basic needs, and the benefits derived from social and economic life, are more equal, except where moral considerations and other values support greater inequality. In other words, equality is presumptively just, but the presumption can be rebutted. Environmental justice is merely justice as applied to policies and programmes related to the quality of the environment.

Anti-environmental Invocations of Efficiency

A common view that pits efficiency against the environment (a view that I oppose in this paper), starts with the claim that human wants are insatiable. This creates scarcity. According to environmental economist Clement A. Tisdell, economic activity aims to reduce scarcity. 'The basic [economic] problem is considered to be how to manage or administer resources so as to minimise scarcity, that is, the "gap" between individuals' demand for commodities and the available supply of them.'[3] Efficiency is necessary because the more efficiently people use resources, the more human needs and wants can be satisfied.

Free markets are commonly thought to promote efficiency. Ideally, suppliers of goods and services compete for customers' money by offering better products at lower prices. Prices are kept low by using raw materials and labour efficiently.

Many people claim, for example, that farmers can gain greater yields at lower cost by growing cash crops on their fields year after year. People who accept this view of agricultural efficiency recommend that farmers apply artificial, nitrogen fertilisers every year to maintain soil fertility, which is otherwise degraded by continuous cash cropping. 'Efficient' farmers reduce labour costs by using chemical herbicides, rather than human labour, to control weeds. They save additionally on labour when they use large farm machinery to plant seeds, spread fertilisers and herbicides, and harvest crops from large fields where such machinery is most useful.

Such farmers are widely regarded as the most efficient in the world. Food is relatively inexpensive so people who farm this way compete successfully in the free market. Because the food is cheap, consumers have money left over to buy other items that they want and need. Free market, agricultural competition seems, then, to ameliorate scarcity.

However, most environmentalists oppose this kind of agriculture. They oppose the use of artificial fertilisers because these are made from petrochemicals, a non-renewable resource. Processing the chemicals pollutes water and air. Chemical herbicides also add to water pollution. What is more, only crop rotation maintains soil fertility in the long run. The large fields required by large farm equipment deprive non-agricultural species, such as birds and rodents, of the habitat that traditionally exists in hedgerows surrounding smaller fields. It would seem, then, that environmentalists are opposed to modern agricultural efficiency and the reduction of scarcity.

Free market, efficient agriculture seems opposed to equality as well. As some farmers prosper through the use of expensive, modern methods, others lose their farms because they lack the capital or the vision to modernise. Advocates of free market-induced efficiency do not consider such inequality unjust if it is necessary to reduce scarcity.

I argue that real efficiency is opposed neither to environmental concerns nor to greater equality. I illustrate this thesis through extended consideration of transportation. But I must first clarify the meaning of 'efficiency', and do so by continuing a more cursory consideration of agriculture.

What 'Efficiency' Means

Efficiency refers primarily to a relationship of inputs to outputs. Other things being equal, efficiency increases as valued inputs in limited supply decrease, and valued outputs increase. Most often the relevant inputs and outputs are implicit in claims of efficiency, because they are part of people's background understanding. For example, agriculture in the United States is often said to be the most efficient in the world. The understood inputs are labour hours expended directly on agriculture and the outputs are bushels of grain.

However, sometimes the understood inputs are not the only ones worth considering. The input in agriculture could be arable land, so that efficiency would be measured in output per hectare. Or the input could be money invested, making efficiency a measure of output per dollar invested. The output could also be altered from bushels of grain to nutrition available for people, or to monetary returns. If both input and output are put in purely monetary terms, the efficiency calculation amounts to a standard calculation of return on investment. If, however, the input is monetary and the output is nutrition available for human beings, then a different agricultural strategy may be deemed most efficient, because feeding poor, starving people may not be the way to gain the greatest monetary return on investment.

Because many different efficiency calculations are possible, judgments that environmentalism opposes (or favours) efficiency cannot be made in abstraction from either a given type of endeavour (agriculture in this example), or determination of inputs and outputs appropriate to that endeavour.

How do we recognise the most appropriate inputs and outputs? The most appropriate inputs are those that are necessary and in short supply. The most appropriate outputs are those that correspond to the legitimate goal(s) of the enterprise.

Again, consider agriculture. Atmospheric nitrogen is valuable and necessary for agriculture, but because it is so plentiful, reasonable calculations of agricultural efficiency do not rate farming practices according to their conservation of such nitrogen. Worldwide, the same can be said of labour hours expended directly on agriculture. Unemployment is a major problem in many parts of the world. An abundance of labour makes calculations of agricultural efficiency according to labour hours expended directly on agriculture about as reasonable as calculations based on the use of atmospheric nitrogen.

In agriculture, the most appropriate inputs are arable land, fertile soil and fresh water. They are necessary, and the currently short supply is diminishing quickly. Worldwatch's Gary Gardner reports that arable land is being lost at an alarming rate to urban expansion,[4] and that much soil fertility is being lost to salination[5] and topsoil erosion.[6] Water shortages affect many parts of the world already, and are expected to become acute in many other parts, including the United States, in the next century.[7] So reasonable calculations of efficiency in agriculture will prominently feature arable land, fertile soil and fresh water among inputs to be conserved.

And what is the most appropriate output? Rather than bushels of grain, it would be people fed adequately or well, as feeding people has always been the main goal of agriculture.

When agricultural efficiency is understood as the efficient use of arable land, fertile soil and fresh water to feed people, conflict between environmentalist concerns and efficiency disappears. It is beyond the scope of the present paper to argue the case in detail here, but the outline of the argument is that the highly mechanised, high-input agriculture that environmentalists oppose makes inefficient use of scarce resources needed to feed people. It tends to degrade soils and waste water. The major output is grain that is fed to animals that are grown for their meat. This is inefficient because the animals use about 90% of the food value of the grain for their own bodies' maintenance, leaving only 10% to feed people. Thus, environmentalist critiques of modern factory farming do not call for reduced efficiency, but for increased efficiency in the effort to ameliorate scarcity.

This is the kind of argument that I make below, and in greater detail, concerning transportation.

Efficiency and Plural Values

This analysis of the concept of efficiency implies that judgments of efficiency cannot be divorced from judgments of value, and that plural values may need to be considered. In the case of agriculture, for example, the values of arable land,

fresh water and fertile soil all had to be considered. Discomfort with the need to make controversial value judgments motivates some thinkers to seek a single measure of value that can be used on all occasions and for all endeavours.

The most influential proposal of this kind comes from economists who have tried to reduce all values to a medium of exchange, such as money. On this view, the relevant 'valued input' into any activity is monetary investment (money and the monetary worth of all non-monetary inputs), and the 'valued output' is profit (gross income minus expenses). Society as a whole is thought to be operating most efficiently when its resources (the monetary value of all its inputs) are used to maximise gross domestic product (GDP) (the monetary worth of its outputs).

Some consequences of measuring efficiency by GDP alone suffice to show the inappropriateness of reducing all inputs and outputs to monetary terms. The most abstract consideration was put forward in 1819 by classical economist Lauderdale, who made a distinction between 'public wealth' and 'private riches.' Both public wealth and private riches contain what 'man desires as useful or delightful to him', but private riches, unlike public wealth, have exchange value because they exist 'in a degree of scarcity'.[8] The GDP, of course, measures everything in terms of exchange values. Because exchange values increase with scarcity, there is a paradox: 'Private riches could expand while public wealth declined simply because formerly abundant objects with great use value but no exchange value became scarce, and thereby acquired exchange value and were henceforth counted as riches'.[9] Lauderdale maintained that 'the common sense of mankind would revolt at a proposal for augmenting wealth by creating a scarcity of any good generally useful and necessary to man.'[10]

To recognise how revolting this is, consider home security. In a society where there is little crime, people can feel, and be, secure in their homes without elaborate home security systems. In such a society home security is part of public wealth. Imagine that social disaffection increases, or the effectiveness of law enforcement decreases, and home security becomes a problem. People now buy elaborate home security systems and purchase the services of private security personnel, because home security is now a scarce item. It has become part of what Lauderdale called 'private riches'. Because more goods and services are bought and sold, the GDP increases, all other things being equal. So if GDP were the sole measure of efficiency in society, a society where people are insecure in their homes is more efficient than one where they enjoy home security without expense. This is absurd.[11]

Other absurdities abound, because increases in GDP often fail to improve people's welfare. Some increases in GDP simply compensate for the loss of welfare. For example, *WorldWatch*'s Sandra Postel reports that cleanup expenditures after the Alaskan oil spill of 1989 added $2 billion to the economy, and air pollution in the United States causes illnesses whose medical treatment costs $40 billion annually.[12] Again, it is absurd to suppose that society is doing better when it has pollution to clean up and related illnesses to cure.

Of course, some workers and investors benefit when people spend money on private security systems, environmental clean-up and medical care. But a more secure, pollution-free and healthy society could use its resources to further improve welfare, rather than merely compensate for welfare losses. This is surely better, all things considered, even if the GDP is somewhat lower.

If GDP is unacceptable as the sole measure of economic efficiency in society, then, because no other sole measure is plausible, judgments of efficiency will have to be made using a plurality of values. This means that we will have to say, as I have illustrated above in the case of American agriculture, that a given practice may be efficient on one measure, but not so efficient on another. In such cases purely mathematical calculations will not suffice to judge efficiency. Instead, we will have to use common sense (i.e. the common web of value beliefs that we have internalised through socialisation) to determine which practices and strategies are, all things considered, more efficient than others.

TRANSPORTATION

I now argue that, all things considered, transportation policies favoured by environmentalists, such as greater reliance on public and mass transit systems, and greater use of railroads, are not only better environmentally than current emphases on automotive transport, but are also more efficient and just.

Current Problems

Most of the current transportation problems in the United States stem from excessive reliance on automobiles and trucks to transport people and goods. *Traffic congestion* 'not only causes stress and inconvenience', writes *WorldWatch* researcher Marcia Lowe,

> but also costs countries billions of dollars a year in lost employee time and delayed delivery of goods. The United States General Accounting Office (GAO) reports that productivity losses from highway congestion cost the nation some $100 billion annually.[13]
>
> The Texas Traffic Institute estimates that, in 1988, traffic congestion in US urban areas cost more than $400 per vehicle. In cities in the Northeast, the figure rose to $750 per vehicle.[14]

The Union of Concerned Scientists' Deborah Gordon reports similar findings:

> The Federal Highway Administration (FHWA) estimates that congestion wastes 1.4 billion gallons of fuel annually, 2 per cent of the energy currently used for highway passenger transport, and the US Department of Transportation estimates that congestion costs each driver $375 annually in extra fuel and maintenance expenses.[15]

What is more, the problem seems to be getting worse. Gordon writes, 'According to an FHWA estimate, in just three years, between 1985 and 1988, traffic delays from road congestion increased by 57 per cent.'[16] The future looks bleak. 'The US General Accounting Office has calculated that if present trends continue, road congestion in the United States will *triple* in only 15 years even if capacity is increased by 20 per cent, a goal that is unlikely to be achieved.'[17] The result could be a 10-fold increase in urban rush-hour congestion.

> What these figures mean is that by 2005 the average commuter from one suburb of a metropolitan area to another suburb could spend up to five times as long in traffic as in 1990. This could mean moving at five miles per hour over a 10-mile trip – a two-hour commute. Not only time but fuel would be wasted; the FHWA projects that by 2005, 7.3 billion gallons of fuel will be wasted each year – 7 per cent of projected oil use for highway passenger transport.[18]

Automobile Accidents are another problem. Traffic injuries and fatalities cost society roughly thirty cents per gallon of gas used in automotive transportation.[19] These financial losses and, more importantly, related human tragedies, could be reduced dramatically by a switch to rail. 'In the United States, the risk of death in an auto accident is roughly 18 times that for rail....'[20]

Air pollution caused by automotive transport takes a larger toll on *people's health*, and costs even more money. According to Deborah Gordon, 'The annual cost to human health and the environment from vehicle pollution has been estimated at between $4 and $93 billion. In addition to morbidity, as many as 120,000 deaths each year can be linked to air pollution.'[21] These problems could be ameliorated significantly through greater reliance on mass transit. 'Cars and light trucks have the highest emission levels per passenger mile for all principal pollutants. In fact, a single-occupancy car emits twice as much NOx, three times as much CO_2, 10 times as much hydrocarbon, and 17 times as much CO as mass transit.'[22]

Vehicle air pollution damages more than people's health. It 'is also responsible for extensive environmental deterioration, including damage to agriculture and wildlife, corrosion and soiling of buildings, [and] degradation of visibility....[23]

Military security in the United States is aggravated by reliance on automotive transport, because such transport uses more oil than the US can produce domestically.

> By 2000, the average barrel of crude will be 40 per cent domestic and 60 per cent imported.... More troubling in terms of national security, the US is importing an increasing amount of oil from politically unstable sources, including the Persian Gulf countries and Nigeria.... These countries accounted for one-third of all US imports in 1989 – up 11 per cent from a year earlier.[24]

The military buildup in 1991 to protect oil from the Persian Gulf 'cost the equivalent of an average 40 cents per gallon of imported gasoline.... Furthermore, the cost will be a continuing one, since even if future wars are avoided, the US is expected to maintain a constant military presence in the Middle East.'[25]

The US *trade deficit* with the rest of the world is worsened by reliance on foreign oil. 'According to Department of Commerce calculations, imported oil accounted for 50 per cent of the nation's $108-billion trade deficit in 1990.'[26]

There are other problems associated with over reliance on cars and trucks to transport people and goods, but the above suffice to make the point. I add here only that these problems sometimes interact to create negative synergy. For example, congestion exacerbates problems of air pollution. 'Carbon dioxide emissions double when average speed drops from 30 to 10 mph, and hydrocarbon and carbon monoxide emissions triple at speeds of less than 35 mph compared with a constant speed of 55 mph.' This takes a double toll on human health. First, more pollutants that impair health are emitted per mile driven. Second, more people spend more time in the vicinity of the greatest concentration of pollution when they are stuck in traffic jams. 'Exposure to ozone can cause chest tightness, coughing, headaches and nausea as well as pulmonary disease, heart disease and cancer.'[27]

Traffic congestion and related increases in exposure to air pollution can also precipitate traffic accidents.

> High carbon monoxide concentrations on crowded roads, for example, can restrict oxygen flow to the brain of a driver sitting in traffic, impairing driving performance.... Aggressive behaviour and physiological reactions have also been linked to exposure to congested traffic conditions.[28]

Besides taking a toll on human health, increased accident rates trigger higher insurance premiums.

More Efficient Alternatives

Transport by *rail* is the key to a more efficient transportation system. Consider, for example, the problems of energy dependence and air pollution. According to Marcia Lowe,

> For every kilometre of travel, an intercity passenger train consumes only one-third as much energy per rider as a commercial aeroplane, and one-sixth as much as a car carrying only the driver. Commuters who take light rail or the subway to work instead of driving solo slash their contribution to urban smog, cutting nitrogen oxide emissions from each trip by 60 per cent and nearly eliminating carbon monoxide and particulate emissions.[29]

An increased use of rail would also relieve traffic congestion, and, as noted above, reduce significantly injuries and deaths due to transportation accidents.

Rail makes more efficient use of space. 'Two railroad tracks can carry as many people in an hour as 16 lanes of highway.'[30] Efficient use of space is particularly important in crowded urban areas where land values are high. In addition, 'rather than the strip malls and sprawling developments that spring up along highways..., urban rail typically encourages compact, higher-value land use.'[31] More compact development lessens transportation difficulties because people typically are closer to where they need to go, so they can walk or ride a bicycle. This benefits their health and further relieves traffic congestion, air pollution and energy dependence.

Compact development that results from using rail can improve prospects for economic growth.

> Montgomery County, Maryland – a county of 740,000 people near Washington, D.C. – is a case in point. A long-range planning study for the county found that if urban growth continued in the usual auto- and highway-oriented pattern – even at a slower pace – the resulting traffic congestion would stifle further economic development. In contrast, focusing most new urban growth in pedestrian- and bicycle-friendly clusters along an expanded rail and bus system – and revising commuter subsidies to discourage the use of cars – would enable the county to double its current number of jobs and households without exacerbating traffic congestion.[32]

Intercity rail tends to help keep city centres vital, because most train stations in large cities are downtown. This encourages compact development that lessens distances to be travelled and fosters walking and the use public transportation.

Public sector investment in public transport is more efficient than investment in improved infrastructure for automobiles.

> A recent US study looked at the impact of government transport expenditures on worker productivity. A 10-year, $100 billion increase in public transport spending was estimated to boost worker output by $521 billion – compared with $237 billion for the same level of spending on highways. Moreover, public transport investments began returning net benefits nearly three times as quickly as highway expenditures.[33]

A 1991 study of transportation investment alternatives in Philadelphia reached similar conclusions. The study

> compared the economic effects of investing in rehabilitation and continued operation of SEPTA (the light rail, subway, and commuter rail system in the Philadelphia metropolitan area) with cutting or eliminating its services. The study found that for every dollar of public spending on rebuilding and operating SEPTA, $3 would accrue to the state and the region as a direct result of improved

> transport. The total economic impact... would be nine dollars for every dollar invested.[34]

The European Conference of Ministers of transport found similarly that the total social benefits of investment for intercity travel in fast trains (the TGV), was two-thirds greater than investment in highways.[35]

Transporting freight by rail is also more efficient than highway (truck) transport. 'Although they carry only 20 per cent of the nation's payload, trucks burn 59 per cent of the energy devoted to moving freight.'[36] Rail, by contrast, 'although it moves one-third of US freight, accounts for a scant 5 per cent of energy consumption.'[37] In addition, 'because trains can use cleaner and more diversified fuel sources than trucks, such as electricity, shifting freight from trucks to trains would reduce both emissions and US demand for imported oil. Moreover, greater use of trains would reduce highway congestion and traffic accidents.'[38]

Inefficiency through Subsidies

Most people in the United States imagine that automobile transport is cheaper for them than public transportation, and that lower prices reflect efficiency. Public transportation, they have been told, requires considerable government subsidies. These people do not realise that cars are highly subsidised. With much less subsidy, public transportation could be convenient and widely available. Many car subsidies are hidden and long-standing.

Consider, for example, subsidies for *parking*. Deborah Gordon points out:

> Recent studies have found that 75 per cent of all commuters park in free, employer-provided spaces; an additional 18 per cent park for free in on-street spaces.... Studies conclude that 'free' parking costs employers $166–$1,657 per space per year (in 1985 dollars).
>
> Parking is expensive: an above-grade space can cost up to $18,000 to build, and underground parking is at least twice that much. Moreover, a 500-car parking lot requires an estimated 170,000 gallons of gasoline to construct and 1,200 gallons of gasoline for annual maintenance.
>
> Parking has hidden costs as well. Land devoted to parking means lost revenues from the tax-generating activities it precludes – residential, commercial, and industrial.[39]

In large measure, 'free' parking is subsidised by the customers of the employers who provide such parking. This is, in effect, a hidden subsidy of automotive transport by the consuming public. When the employer is a unit of government, the consumer subsidises automobile use through tax contributions. Even when the employer is a private enterprise, taxation is used to subsidise parking. As Gordon points out, the provision of 'free' parking reduces tax

revenues by taking space that could be devoted to tax-generating activities. Other things being equal, the taxes generated by these activities would enable others in society to pay lower taxes. In addition,

> A 1985 federal law allows employers to subsidise mass transit at the rate of $15 per month; anything over this amount must be added to employees' reported earning for tax purposes. Parking benefits to employees, on the other hand, are not taxed at all. Furthermore, employers can deduct their parking maintenance and operating costs for tax purposes.[40]

Thus, taxpayers indirectly subsidise personal-auto commuting. General tax revenues must compensate for taxes lost through parking lot tax deductions. Public transportation enjoys no such tax advantage.

In sum, 'the real value of 'free' parking... may total more than $85 billion per year.'[41]

Military expenditures constitute an enormous hidden subsidy of oil-thirsty automotive transport. According to Amory and Hunter Lovins:

> Earl Ravenal, of the Georgetown University School of Foreign Service, found that in fiscal year 1985 alone... the United States spent $47 billion projecting power into the Persian Gulf: $468 per barrel imported from the Gulf in that year, or eighteen times the $27 or so that we paid for the oil itself....[42]

When people think of automotive transport, they seldom consider such military expenses as part of the bill that they are paying for the privilege of using a car. Yet if public transportation were developed properly, the United States could eventually eliminate its dependence on foreign sources of oil, and reduce its military budget.

The *health bill* for illnesses associated with air pollution generated by cars and trucks constitutes another hidden subsidy. Costs include not only direct payments from individuals, businesses, and government units for medical attention, but also revenue lost due to workdays missed as a result of illness, permanent disability or premature death. Paying for medical attention and lost productivity due to the higher accident rate of automotive as opposed to rail transport is yet another hidden subsidy.

Highway law enforcement is also a subsidy. Many fewer police are needed to enforce traffic laws against possible violation by the relatively few drivers of public transport. For the most part, highway law enforcement is a hidden subsidy of transportation by car and truck.

Road construction in the United States has been highly subsidised from general tax revenues. No comparable subsidy exists for rail or mass transit. 'WPA projects in the 1930s, for example, included a strong road-building component;

10 times as much WPA money was spent on street and highway projects as on mass transit.'[43]

At the same time the federal government began subsidising a form of *housing development*, suburban sprawl, that favours the use of cars instead of public transportation. The Federal Housing Administration (FHA), which gave federal guarantees for home mortgages, promoted new construction. According to author James Kunstler,

> These new houses tended to be located outside the dense cities, because during the Depression vacant land on the periphery was very cheap. The kinds of houses that the FHA frowned upon were those in the cities: old houses with leaky plumbing, jammed into narrow lots on crowded streets, inhabited in some cases by immigrants or, increasingly, African-Americans.[44]

Subsidy for this kind of housing persists in the form of the mortgage interest income tax deduction available to homeowners.

All things considered, public subsidies for automotive transportation are enormous. Considering just 'major costs – including those from [parking,] smog, accidents, and traffic jams – the total US subsidy paid to drivers is estimated to range from $300–$600 billion per year. This is enormously inefficient. But because the subsidies are largely hidden or taken for granted, the cost-inefficiency of cars and trucks is largely unknown. On grounds of transportation efficiency alone, then, it makes sense to do exactly as most environmentalists advise. Identify and phase out subsidies to cars and trucks and increase subsidies for mass transit, especially rail. Subsidise compact development that renders mass transit most useful, and subsidise fast intercity rail. Provide bicycle lanes and paths, as well as pedestrian zones, in cities.

The Environment and Environmental Justice

Greater transportation efficiency is good for the environment and promotes social justice.[45] As for the environment, transportation efficiency lessens automotive air pollution that harms not only people but wildlife and crops. The energy efficiency of travel by rail, bicycle and foot reduces the use of fossil fuels that contributes to the greenhouse effect. Because less land is needed for rail and other forms of public transportation, not to mention bicycle and foot, more land is available for preservation of wetlands and other types of wilderness areas. Compact living and working arrangements that accompany efficient modes of transportation augment this effect.

Social justice is facilitated by more efficient, public transportation because, as Marcia Lowe points out, 'Even in the highly mobile United States, which nearly has a car for every two people, more than ten million households have no

motor vehicle.'[46] James Kunstler adds that many households and families that have cars are strained by the associated expense.

> The $4500 it costs to own and operate a car each year could cover a year's payments on a $30,000 mortgage. Often, it is absolutely necessary to keep two cars operating in a family so that two adults can drive long distances to work low-wage jobs. The cost of driving everywhere, to work, or to obtain the necessary goods and services of life, impoverishes families. It makes it impossible for them to own their own home.[47]

In sum, it should come as no surprise that relatively inexpensive public transportation is more helpful to poorer than to richer people, and, therefore, that it promotes social *equality*. Social arrangements that facilitate walking and bicycling also benefit the poor disproportionately, resulting in greater equality.

Increased equality is increased *social justice* in this context because, as noted earlier, equality is presumptively just, and there are no countervailing reasons or values here to rebut that presumption. We no longer think that economic inequality is justified by God's special love for some groups or individuals over others. Instead, we justify inequality primarily as a by-product of free market competition that serves to ameliorate scarcity through efficient use of resources. As I have just argued, however, in the present context efficiency and the amelioration of scarcity are served by mass and public transportation, which also disproportionately aid the poor. This aid therefore advances not only equality, but social justice.

Reductions in air pollution that would follow reduced reliance on automotive transport are also disproportionately helpful to the relatively poor. Many poor people inhabit inner cities where excessive traffic congestion, as we have seen, increase and concentrate air pollution from cars and trucks. The resulting illnesses are especially disadvantageous to the poor in the United States because there is no universal health insurance.

Any reduction in the use of petrochemicals also disproportionately benefits poor people and people of colour, because polluting industries tend to expose such people more than others to toxic substances.[48] Again, in the present context, advantages to the poor constitute increases in justice as well as equality. Because environmental quality is here at issue (air quality and exposure to industrial pollution), these increases in justice constitute improvements in environmental justice.

In sum, pursuing the goals of efficiency, environmental protection, and social justice converge in the case of transportation. Limitations of space preclude discussion here of particular proposals for achieving these goals in transportation.

CONCLUSION: EFFICIENCY AND JUSTICE

The foregoing means that the generally recognised value of efficiency can be enlisted in the cause of environmentalism and of environmental justice, at least so far as transportation is concerned. I have elsewhere constructed a similar argument regarding agriculture.[49] Such arguments can be made without emphasis on the effects of our actions on future generations, because many of the efficiency, environmental, and justice benefits of environmentally-friendly transportation systems accrue within a single generation. Additional study is required to see how many, and which, other areas of human endeavour, when subject to similar analysis, yield similar conclusions.

There is reason to suppose that the confluence noted here is common, if not universal. To the extent that efficiency improvements enable people to get what they want and need from fewer environmental resources, such improvements tend to promote reductions in the burden that people place on the environment. So efficiency improvements tend to be environmentally friendly.

For the most part, efficiency improvements probably also promote social and environmental justice. Poor people and people of colour generally have less access to environmental resources. Efficiency improvements generally enable people to get more from fewer environmental resources. When human life is so organised that fewer resources are needed, those with access to the fewest resources are generally helped the most. Social justice improves as benefits accrue disproportionately to poor people.

Environmental justice improves with reductions in people's disproportionate exposure to deleterious substances, such as toxic pollution. All other things being equal, improvements in efficiency that allow human needs to be met with fewer natural resources may reduce unwanted by-products of human activities, such as toxic pollution. Where poor people are disproportionately exposed to environmental disutilities (as, for the most part, they are), a general decrease in pollution will likely reduce their deleterious exposure to it.

These general, theoretical considerations are only suggestive. They are no substitute for case-by-case exploration of confluence among improvements in efficiency, environment, and justice.

NOTES

[1] See Norton 1991.
[2] See Wenz 1988.
[3] Tisdell 1990, pp. 1–2.
[4] Gardner 1996, p. 6.
[5] Ibid., pp. 30–31.
[6] Ibid., pp. 26–27.

[7] See Blatz 1991, 'General Introduction', pp. 11–12; and Postel 1996, especially pp. 17-19.
[8] This quote from Lauderdale is from Daly and Cobb 1994, p. 147.
[9] Daly and Cobb 1994, p. 147.
[10] Ibid., pp.147–148.
[11] This example is taken from Wenz 1996, p. 155.
[12] Postel 1990, p. 22.
[13] Lowe 1994, p. 6.
[14] Ibid., p. 13.
[15] Gordon 1991, p. 25.
[16] Ibid.
[17] Ibid., p. 3. Emphasis in the original.
[18] Ibid., pp. 42–43.
[19] Ibid., p. 46, endnote #11.
[20] Lowe 1994, p. 16.
[21] Gordon 1991, p. 63.
[22] Ibid., p. 64.
[23] Ibid., p. 63.
[24] Ibid., pp. 40–41.
[25] Ibid., pp. 41–42.
[26] Ibid., p. 42.
[27] Ibid., p. 25.
[28] Ibid., p. 25.
[29] Lowe 1994, p. 6.
[30] Ibid., p. 7.
[31] Ibid., p. 7.
[32] Ibid., p. 15–16.
[33] Ibid., p. 41.
[34] Ibid., p. 42.
[35] Ibid., p. 41.
[36] Gordon 1991, p. 29.
[37] Ibid., p. 32.
[38] Ibid., p. 142. Of course, there is a limit beyond which rail cannot substitute for trucks. So long as the location of homes and businesses are disbursed away from rail lines, trucks are needed for at least part of the journey for freight to reach its final destination.
[39] Ibid., p. 147.
[40] Ibid., pp. 148–149.
[41] Lowe 1994, p. 35.
[42] Found in Daly and Cobb 1994, p. 344.
[43] Gordon 1991, p. 11.
[44] Kunstler 1994, p. 102.
[45] By 'improvements in social justice' I mean in this context greater equality of income, wealth, non-monetary access to needed environmental inputs, and freedom from environmental disutilities such as polluted water and air. I use 'environmental justice' as a subcategory of social justice that refers particularly to equality of non-monetary access to needed environmental inputs and freedom from environmental disutilities.
[46] Lowe, p. 7.

[47] Kunstler, p. 183.
[48] See especially Lavelle and Coyle 1992.
[49] See Wenz 1999.

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