

**The Missing Link- Transportation in Political Ecology:  
The Case of the Interstate Highway System**

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## Introduction:

This year marks the fiftieth anniversary of one of the most controversial developments in the history of the United States, the Dwight D. Eisenhower System of Interstate and Defense Highways. By creating a uniform network that has connected smaller highways within cities and towns, the Interstate Highway system has effectively connected all parts of the United States to each other in one of the fastest, most efficient land-based transportation networks in the world. Transportation systems have a unique importance to the field of geography because they link places and people by making access easier, and reduce temporal space by making travel faster. The Interstate Highway system has done both of these things within the United States, which has allowed goods and people to travel farther for less cost. However, it has also altered the American

landscape to one that has necessitated the automobile as the dominant means for transportation, thus marginalizing people, land, and the environment.

Three main issues of contention involving the interstates and their broader implications for society and the environment will be addressed in this paper. The first is that increased access to land further from cities has created an expanding urban fringe and physical space between community groups leading to increasing socio-economic inequalities. Secondly, by creating fast, inexpensive transportation, it has allowed big businesses to capitalize on economies of scale and ignore the vast distances required for shipping, therefore separating the consumer from the supply and waste ends of the market chain. Finally, the system itself is unsustainable because it relies on the use of the automobile and fossil fuels, which are contributing to anthropogenic global warming.

Evaluating the environmental and social changes both directly and indirectly caused by the Interstate Highway System requires a broad and complex framework. Most Americans have benefited from the increased mobility that the interstates provide. Even if they do not personally travel on the interstates, motor carriers that travel on the interstates have become the dominant means for delivering goods. However, the expanding geographic separation that the interstates have allowed has created a landscape that leaves little choice for the average American but to drive in order to sustain their livelihoods. This requires them to rely on a system that is ecologically unsustainable and that creates a distancing effect that requires unsustainable consumption. Though many fields and subfields grapple with the place that humans hold in nature, political ecology attempts to survey environmental and social problems from all angles – cultural, political, and ecological while taking notice of issues of scale, economy, and class. Therefore, it is

with this framework that this paper will consider the impacts of the Interstate Highway System.

Though significant work in political ecology has focused on consumption and production angles of the market economy, there has been little analysis of the transportation methods required to move goods and people from one place to another. However, these transportation networks have created enormous changes to both the ecological and social landscapes, and are contentious because of the political struggles that involve building such massive infrastructure.

In 1956, the geographer Edward Ullman said that, “few forces have been more influential in modifying the earth than transportation, yet transportation itself is a result of other forces.” Transportation systems are used as a tool to drive economies. Without them there would be no way to transfer goods from one place to another, therefore broad socio-political forces promote the construction of transportation systems. Ullman identified three conditions that were needed for interaction to occur between places. The first is complementarity-“in order for two areas to interact, there must be a demand in one and a supply in the other.” It is a function of natural and cultural differences or based on economies of scale. The second explanation for increased interaction is intervening opportunity- interchange will only occur between two areas if there is no closer (spatially or temporally) source of supply. The third is transferability- this has to do with the distance traveled between two places. “If the distance between market and supply is too great or too costly to overcome, interaction will not take place in spite of

complementarity and lack of intervening opportunity.” Efficient transportation allows an efficient market to transpire.

Political ecologists are interested in the interactions between people across geographic space and its relation to capitalist markets. While much of political ecology has focused on the production of goods and raw materials, Bryant and Goodman (2003) argue that examining consumption is just as important, “Starting from processes of commoditization and associated narratives of development allows the researcher to go ‘forward’ into the processes and meanings of consumption.” They also argue that it is necessary to break down the dualism between consumption and production. Because the connection between consumption and production would not be possible without the transportation of goods, political ecology should address this important link.

Thomas Princen, (2002) explains that distancing contributes to a consumer’s powerlessness to make choices that allow them to evaluate the full environmental and social costs of the purchases they make, which has led to wide scale degradation of natural resources in many parts of the world. He says that “Distance is the separation between primary resource extraction decisions and ultimate consumption decisions occurring along four dimensions – geography, culture, bargaining power, and agency.” The interstate highway system, in creating a high paced method for easy transportation has effectively reduced the time it takes goods to get from one place to another, but has not reduced the geographic space. This has meant that goods shipped from the coasts can reach the center of the country in record time, but that consumers who purchase those goods may have little to no idea where they came from. Therefore, unless the consumer has the power and will to carefully research where the product is coming from, their

decision about whether or not to purchase the product can be based on little but quality and price. This leaves the consumer in the dark about what environmental and social impacts the raw material resource extraction has left on the communities that use these resources to sustain their livelihoods, be it in the first or third world.

Understanding the dynamics of urban changes becomes important in understanding why certain transportation networks have succeeded even though they have caused immense social and environmental damages. Political ecologists Heynen, Perkins, and Roy (2006) say that “cities have emerged as centers for the production, exchange, and consumption of their environments as commodities.” Political economist Adam Smith stated that in order to maintain cities, the land must produce a surplus. Harris and Ullman (1945) expand on these ideas to show the importance of transportation networks in maintaining cities, “modern mechanization, transport, and a complex interdependent economy enable much of the economic activity of mankind to be centered in cities.” This has implications for the broader capitalist system because if it relies on the interdependent economy which itself relies on these transportation networks, then capitalism is only sustainable as long as the transportation is sustainable, and with the increasing problems of green house gases associated with the use of the automobile, pollution and congestion, these systems are increasingly less stable and less sustainable, which has broader implications for the economy and the future.

By leaving out the important study of transportation networks, political ecologists have not only ignored an important link in the economic chain, but have also forgotten a contributing factor to the growing dichotomy between cities and nature. In diverse

disciplines, such as ecology (Alberti et al, 2003), ethics (Light, 2001), environmental history (Cronon, 1995), and the works of Heynen and Swyngeduw (2003) in political ecology, there is a recognition of the theoretical problems arise when the notion of the urban is separated from nature because those who live in urban environments depend on the natural world for their sustenance, health, and wellbeing. Without the advanced transportation systems that carry goods and wastes into and out of cities, these cities could not be successful. Thus, Heynen and Swyngeduw's argument that cities "are built out of natural resources through socially mediated natural processes," has particular weight when understanding the socio-political processes that were involved in creating the transportation networks that have allowed urban populations in cities to grow. It is for this reason that careful study of transportation must occur in political ecology.

In the contiguous United States today, only 2% of all land remains wilderness; humans use the rest for anthropogenic purposes like farming, housing and transportation. (Light, 2001) This reality puts enormous pressure on developers and scholars of development who are trying to determine the human's place in nature because they use it to decide how landscapes are shaped and why humans live where and how we do. In his book, *The Uncommon Ground; Rethinking the Human Place in Nature*, William Cronon suggests that, "We need to embrace the full continuum of a natural landscape that is also cultural, in which the city, the suburb, the pastoral, and the wild each has its proper place, which we permit ourselves to celebrate without needlessly denigrating the others" (Cronon, 1995). The transportation choices that have been made in the United States reflect the dichotomy between man and nature, and so must be addressed if we would like to join Cronon in the 'unending task of struggling to live rightly in the world.'

## A Brief History of the Interstate System:

There was a significant increase in the demand for automobiles in the decade immediately following WWII. The number of motor vehicle registrations doubled from 24 to 68 million, and the annual number of miles driven rose from 34 to 68 billion vehicle miles. (Friedlaender, 1965). Roads across the country were increasingly seen as inadequate to meet the demands of drivers, and the government strove to meet the demand. In January 1955, the New York Times reported, “[The automobile manufacturers association] urges that the Federal Government take over the full cost of modernizing the 40,000-mile interstate system.” (Special to the New York Times, 1955). One and a half years later, on June 29<sup>th</sup>, President Dwight D. Eisenhower signed the Federal Aid Highway Act of 1956. This bill would provide federal funding for the interstate highway system, which was built to “reduce the number of highway deaths and injuries, cut down on delays because of detours and traffic jams, reduce the amount of highway-related litigation, and allow more efficient truck transportation of goods” (Pfeiffer, 2006). Several federal highway acts preceded President Eisenhower’s final bill, but none had provided enough federal aid to be attractive to the states, and few interstate highways were built before 1956.

To pay for the interstates, the federal government initiated The Highway Trust Fund, which would receive revenue from a federally imposed gas tax. In 1956, the tax was \$.04 (today it is \$.243). (Internal Revenue Code, 4081)The federal government would pay 90 percent of the cost of all interstate highways, with states providing the



other ten. All of the interstates had to follow certain standards to ensure uniformity. State highway agencies acting through the American Association of State Highway and Transportation Officials (AASHTO) developed the standards that the Federal Highway Administration (FHWA) adopted. Some examples of these standards “include full control of access, design speeds of 50 to 70 miles per hour (depending on type of terrain), a minimum of two travel lanes in each direction, 12-foot lane widths (for tanks), 10-foot right paved shoulder, and 4-foot left paved shoulder.” (US Department of Transportation [DOT], 2006a). The system originally put forward by the Eisenhower administration would have connected major cities, but would not have extended into them. Instead, the interstate would create a ring road around the cities and put traffic onto urban fringe roads. However, this created massive congestion on outer city roads that were unable to handle the new traffic that was created by the interstates, and so in 1962 the interstate highways were extended into cities (Black, 2003, p. 28). Today the interstate consists of 46,876 miles of road. (DOT, 2006b)

During the 50’s and 60’s, the interstates became a cultural icon. Movies, books, and magazines praised the automobile and the open road; The Bureau of Public Roads created films and propaganda in the early 1960s to promote the interstates. One of these films, *The Road to Prosperity* claimed that the interstates were “opening up new avenues of growth, providing direction and a timetable that will help keep all American cities alive.” (The Bureau of Public Roads, 1961) Car advertisements were also pervasive during this time, as they are now. Though many people were skeptical of the changes to the landscape that the interstates and car travel brought about, intensive campaigning by government officials and car companies created a change in attitude of the American

people, and solidified the automobile as the dominant means for transportation, and the development was labeled as the “Greatest Public Works Project in History” (DOT, 2006c)

### Changes to the Social Landscape

Though originally the interstates were not supposed to travel into cities, the routes were extended in the early sixties to alleviate traffic. As a result, neighborhoods were destroyed and communities split apart to make room for the new road systems. Often these interstates ran through poor and ethnic minority communities, thus further marginalizing them. On Rondo Avenue in Saint Paul, “the construction of I-94 in the 1960s shattered this tight-knit community, displaced thousands of African-Americans into a racially segregated city and a discriminatory housing market, and erased a now-legendary neighborhood” (Minnesota Historical Society, 2006).

Interstates further disadvantaged these communities as more people moved out of central cities and into car dependent suburbs. Many cities dismantled their urban public transit services around the time that the interstates were constructed. In October of 1953, the City of Minneapolis and mayor Eric H. Hoyer “authorized and directed the Minneapolis Street and Railroad Co. to discontinue its streetcar service and remove its streetcar tracks [at its own expense] on the streets and avenues” of Minneapolis (City Council Proceedings, 1953). San Francisco lost their street car service in 1954. D.C. and Saint Louis followed a decade later. Except for a few major East Coast cities like Boston and New York, most American cities dismantled their street car service in favor of bus

lines. However, street cars had many advantages over buses, they were more spacious, were electric, provided a smoother ride, and usually had an exclusive right of way.

By making public transit less appealing, it encouraged more Americans to buy cars. In a chapter called “Automobiles and Automobility,” Ruth Cowan claims that, “In the postwar years, ownership figures [of cars] rose not because automobiles had become status symbols but because an increasing number of Americans could neither get to work nor do their work without them.” (Cowan, 1996) Congested and crowded cities were another incentive to move to the wide open spaces of the suburbs.

As the interstates expanded, more land became available for new single-family housing developments, and young families streamed to the suburbs that previously had been inaccessible. Chrysler and other car companies sponsored and paid for characters in popular television shows in the 1960s and 1970s, like *The Brady Bunch*, to drive their vehicles, and portrayed the ‘American way of life’ as a suburban way of life. (Internet Movie Data Base, 2006a, b) Zoning regulations in most states also promoted single-use building regulations that encouraged separation of housing units from retail and business districts.

By financing roads, the government created an avenue into the suburbs and provided Americans with a relatively inexpensive transportation option for reaching them. Anthony Flint argued at a speech at Macalester College on November 6, 2006 that people moved to the suburbs for two reasons, the first is a quest for wide open spaces, elbow room, and “the safety and security of our own backyard.” The second is that moving into sprawl has typically been what people can afford, as zoning laws have encouraged new growth, rather than growth in denser areas. The Federal Highway

Administration lists these as a few of the changes that have occurred in America over the past fifty years:

- “Since 1950 metropolitan areas have grown from 56% of national population to 80%.
- All of the growth in metropolitan areas in the eighties occurred in suburban areas, as central cities actually declined in population.
- Metropolitan areas were roughly 50% suburban and 50% urban in 1950; now that ratio is closer to two-thirds suburban, and is rising.
- Despite the emphasis on metropolitan areas, metropolitan areas are losing population to non-metropolitan areas, often to those rural areas on the fringes of metropolitan complexes.” (DOT, 2006d)

Though the interstate system certainly was not the only cause of these changes, the road network has made access to areas farther from cities easier, and it has necessitated that car travel become the dominant mode of transportation, and for many areas of the country, the only mode. In creating spaces that could be traversed only by motor traffic, the government created a physical divide between those who lived with and those who lived without cars, and the economic gaps that arose are evident of this separation.

In the years from 1956 to 1968, the country experienced a slight decrease in income inequality, but since that time, the gap has increased steadily. Looking at a population map of the Twin Cities from 2000 (see graph a) one can see that this income inequality is still geographically situated. The poorest neighborhoods are centered in the

cities themselves; the closest suburbs have the greatest wealth, and the farm lands that surround the suburbs are again less wealthy. This information is not new. As early as the fifties scholars were noticing the trend of 'white flight' as middle class white families moved from urban centers to the surrounding suburbs leaving poorer black and ethnic minorities behind in slowly failing city centers. However, the fact that this unevenly distributed landscape persists today shows that little has been done to change the infrastructure that has resulted in income levels being drawn along geographic lines.

One thing that the spatial separation between income groups has helped to facilitate, is a separation of humans and nature. While, the suburban lawn can hardly be considered nature in its wildest sense, it has been shown to provide significant wellbeing to its owners. The lawn, Robbins and Sharp (2003) say, "helps to produce an association of community, family, and environmental health." They also say that people with higher incomes generally use more chemicals and fertilizers to maintain a certain aesthetic value. While the lawn may not be the perfect model of nature, if it is perceived in that light by the public, then it does contain some value. This study demonstrates that those in higher income brackets are able to enjoy some of the small bits of nature that exist in American cities. Similarly, in a study conducted on inner-city tree forests in Indianapolis, Heynen (2006) found that "areas with lower income have fewer trees than areas at the top of the income spectrum." Because neighborhoods are separated by socioeconomic class, it precludes those from poorer neighborhoods from enjoying the few everyday biological elements available to those who live in metropolitan areas, thus precluding them from nature. However, those in higher income brackets are also

marginalized because the nature that they see around them is commoditized and, in the case of the lawn, environmentally unfriendly even if aesthetically pleasing.

One of the major justifications that Eisenhower used when pushing the idea of the interstates was the effect that it would have on commerce, and the interstates have benefited the economy in many ways. They have made shipping costs so low, that they can be virtually unaccounted for in the price of most goods. Though shipping over water is still the most efficient, cheapest, and fastest mode of transportation, the interstate highways have given the inner parts of the country access to goods from all over the world that would have been impossible before.

The interstate highway system largely erased the problem of intervening opportunities within the United States by creating easy access to every part of the country. Because the roads were designed for high speeds and fast transportation, it made it possible to cross the country in record time. The interstate also reduced the problem of transferability. By creating straight, fast roads across the country the interstates both minimized the distance that travelers needed to drive, and reduced the time that it took to get from place to place. This allowed Americans to purchase almost any good that was available anywhere in the world without regarding the price of shipping.

More efficient transportation stimulated the economy. “The Interstate Highway System generated significant cost savings in relation to the system it replaced during its construction and early years of use... the average rate of return was 32% per year from 1950 to 1991, and is currently running about 16%.” (Black, 2003, 261)

While rail in the United States still transports more ton-miles of freight than motor carriers, the difference has been declining steadily in the past 50 years. In 1960, the highway system carried 19% of the total revenue of ton-miles of freight, today they carry 28%. However, more importantly, is that as of 1997, almost 89% of the total dollar value of freight was carried by highway transportation (DOT, 2006d [see graph b]). Though railroads have a similar effect to interstates, most goods require a trip by motor carrier to reach their final destination even after they have reached a central distribution point on a railroad. Therefore, by shipping just by motor carrier, it takes out the extra step.

Motor carriers also allow for 'just in time' shipping, when the goods arrive at their destination just before they are needed. This eliminates costly warehousing prices for stored goods. (Black, 2006) With the freedom of such fast shipping, stores were able to stock more goods, and were able to use economies of scale to lower prices across the country. In 1960, there were 12 million trucks in operation in the United States, and 126 billion vehicle miles of travel (VMT) accumulated by motor carrier. By 1995, these numbers had grown to 64.8 million trucks and 865 billion VMT. (Black, 2006, 32) As more of the interstate highway system was built, the motor carrier became the preferred choice in cross country shipping.

Beyond the obvious benefits of improved transportation, the government further subsidized the cost of building shopping centers with tax incentives. In his paper, *U.S. Tax Policy and the Shopping-Center Boom of the 1950s and 1960s*, Thomas W. Hanchett (1996) explained that in 1954, the federal government created several tax breaks evidently designed to stimulate growth in manufacturing facilities and factories.

However, the broad terms of the bill created an enormous real estate boom, as any type of income-producing building could apply and, “savvy investors quickly discovered that they could build a structure, claim ‘losses’ for several years while enjoying tax-free income, then sell the project for more than they had originally invested.” (Hanchett, 1996)The era of shopping malls and ‘big box’ stores began allowing ‘one-stop shopping’ for busy people on their daily commute.

As motor carrier quickly became the most popular way to move retail goods, stores responded by moving to areas that the interstates serviced. In many places, commercial businesses lined up on side highways along the interstates to facilitate easier shipment of goods. In the study “Demographic Response to Transportation Innovation: The Case of the Interstate Highway” conducted in 1980, researchers concluded that “interstate highways have the effect of redrawing trade or service areas, with implications for growth in employment in interstate counties.” (Lichter, 1980)

By separating homes from retail districts, stores were designed to service more people. Though brand name goods had been popular for several centuries before the interstates highways had been constructed, chain stores were new phenomena. Restaurants and stores like McDonalds and later Wal Mart used market strategy similar to the brand loyalty techniques that Ford and Coca-Cola had been using for half a century. This created, in many suburbs a landscape dominated by the same stores with the same products separated from residential areas.

The physical layout of these stores is not friendly to pedestrians, and often completely inaccessible to anyone without a car. The federal government has never taxed parking lots, and the minimal state and city taxes that have been instigated are often so



small in comparison to the benefits that parking lot and store owners derive from their customers, that the incentive to provide adequate parking, or even too much parking, is great. The stores greatest interest is in attracting more consumers, and as the automobile has become the dominant mode of transportation, they have had to provide access not only to their customers, but to their cars as well.

Political ecology is particularly well suited to looking at the changes that occurred to the American landscape in the past fifty years, because it addresses the roles of politics culture and economics. All of these factors played an enormous role in the creation of sprawl on the American landscape, but without the federal governments enormous investment in the Interstate System to provide access to these areas, the landscape might have been built very differently.

### Sustainability

The interstate highway system has augmented the dualities between humans and nature, and between consumers and producers. So far, this paper has attempted to illustrate how the interstates have reduced the temporal scale of the United States for those with motor vehicles while the keeping the geographic scale at a constant. This has provided better access to goods, more access to land that has been zoned for single-family housing, and created a landscape that allows for the freedom of individual travel. However, it has also created a highly uneven socio-economic landscape, distanced consumers from producers, and helped to exacerbate the dichotomy of man and nature as the country becomes increasingly metropolitan. Sneddon (2000) references Jamieson (1998) in a paper about sustainability and said “sustainability as a general frame of

reference may...help to break down traditional dualisms in the sciences.” Therefore, it is with the framework of sustainability that I will consider the impacts of the interstate highways and some possible ramifications for its future.

Transportation geographer William Black lists six restrictions to sustainability in current transportation systems, they

- Use petroleum, which is a finite resource.
- “Generate petroleum-based emissions that impact urban air quality.
- Generate carbon dioxide and other greenhouse gases that are detrimental to the global environment.
- Use coolants that destroy stratospheric ozone.
- Produce excessive numbers of accidents, resulting in high numbers of fatalities and injuries.
- Result in congestion that may border on gridlock.” (Black, 2003, 317)

They also have created a loss of biodiversity, polluted water resources, and created a system in which many are excluded because of age, income, or personal preference.

The total number of miles driven in the United States has steadily increased since 1960, and today the average commute in the United States is over 25 minutes, with the majority of people using cars as their major mode of transport. While many who live in the metropolitan areas do work in the downtown area, many also work in the businesses and stores on the outer edges of cities, although, even then their commute may still be long as they must drive from suburb to suburb. (U.S. Census Bureau, 2000)

In 2002, there were 135 million registered public and commercial automobiles and nearly 93 million light-duty trucks (this category includes vans and SUVs) for a population of just over 280 million. (Federal Highway Administration, 2003) However, ownership is highly uneven. About 60% of all American households owned two or more cars in 1999, and 19% owned three or more. (Rodrigue, 2006) In the Twin Cities metro area in 2000, there were 1.03 registered vehicles for every registered driver. With extra cars come extra trips away from home. A trip is defined as any one-way journey by any mode of transportation, including walking. In 2000, the metro council in the Twin Cities completed a Behavior Inventory of the 7 core counties in the metropolitan area. They found that 92.8% of residents' trips were made by motor vehicle, and that an average of 10.3 trips were made per household per day (metro council, 2003). It also found that 66% of all trips made, had home on one end of them, with home-work trips making up only 12.8% of trips. This means that commuting is only a very small part of the trips that people take everyday. Other leading destination activities included shopping (13%), personal business (11.9%), and picking up or dropping someone off (7.8%).

While some other countries, including Great Britain have long commutes, none compares the United States in automobile usage. Americans use more resources per capita than any other country in the world, and use approximately 65% of the transportation energy among G8 countries, even though it has less than five percent of the world's population. (Rodrigue, 2006) This is due to the fact that most Americans must drive to maintain their livelihoods. It is impossible for many to go to the store, go to work, or go to school without a car, and this is problematic because it is not sustainable.

The interstate system is responsible for thousands of fatalities injuries each year. The Federal Highway administration claims that, “The Interstate System is the safest road system in the country, with a fatality rate of 0.8—compared with 1.46 for all roads in 2004.” (DOT, 2006A fatality rate is calculated as fatalities per 100 million miles traveled. Though this is a low fatality rate compared to other roads, compared to the fatality rates of other forms of transportation it is not low. Perhaps in a system where car travel was not the dominate means of transportation there would be fewer deaths still than the deaths that happen on the interstates.

In 1994, Great Britain had 1.8 billion passenger miles traveled by rail; in that same year, two train accidents led to seven deaths. (Evans, 2000; Association of Train Operating Companies, 2005) This means that in 1994 there was a fatality rate in Great Britain of .39 on their rail systems, much less than that of the interstate system. The United States Bureau of Transportation Statistics reports that highway fatalities were 148.7 times as high as fatalities caused by transit and forty-five times higher than fatalities caused by rail, (Bureau of Transportation Statistics, 2002; See graph c)

While the deaths that are caused by automobiles are sustainable to the human population as a whole, there still must be some examination of the death rate. If other modes of transportation are significantly safer, what is the justification for the fact that 42,815 Americans die every year on the road?

The interstate highways and other roads have led to serious environmental consequences in the United States and the world. Black says that roads have a significant impact on vegetation, wildlife, water quality, soils and geomorphology, and climate.

While all of these impacts are significant, this paper will focus on climate most because it is the greatest barrier that this system has to achieving sustainability.

By structuring the United States in a way that demands that most Americans drive, and that they drive far, we emit more green house gasses than any other country in the world. The United States is the world's largest consumer of fossil fuels, and uses an estimated 20.03 million bbl/day of oil, with two-thirds of that going to transportation (see graph 2). (Central Intelligence Agency, 2006)

While global warming is not a new problem, it is only in the past few decades that it has gained status as a pressing issue. The Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 in order to recognize and address the problem of potential global climate change. As an impartial group, open to members of the UN and the WMO, they do not conduct climate research, but merely assess peer-reviewed and published literature. A summary of their findings reveals that:

“An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.

- The global average surface temperature has increased over the 20th century by about 0.6°C.
- Temperatures have risen during the past four decades in the lowest 8 kilometers of the atmosphere.
- Snow cover and ice extent have decreased.
- Global average sea level has risen and ocean heat content has increased.”

(International Panel on Climate Change, 2001)

Automobiles are responsible for emitting a host of green house gasses including

Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), chlorofluorocarbons (CFCs), ozone, water vapor, and nitrous oxide (N<sub>2</sub>O). In the United States, transportation accounts for 27% of all green house gas emissions, with highway vehicles creating 72% of green house gasses in the transportation sector. Furthermore, passenger cars and light-duty trucks are responsible for 75% of all emissions from highway vehicles (Green, & Schafer, 2003 ; see graphs d and e) This contribution of carbon dioxide to the global atmospheric commons is unsustainable because it contributes to anthropogenic global warming which is predicted to have profound impacts on the climate of all regions of the earth.

Changes to the natural landscape that have been a result of paving have also contributed to global warming. Approximately 10% of all of the land in the United States is paved,(National Weather Service, 2005) and while the interstates themselves are responsible for less than 1% of the total highway system in the United States, the construction of many roads and highways have resulted because the interstates have provided a connector. By cutting green spaces, it has further advanced global warming by reducing the natural carbon sinks of trees and plants, and has contributed to the heat island effect. Cities and suburbs can gain 2-10 degrees F due to heat island effect. It is caused by black pavement absorbing light from the sun and emitting it back as heat. “Elevated temperatures can impact communities by increasing peak energy demand, air conditioning costs, air pollution levels, and heat-related illness and mortality.”

(Environmental Protection Agency, 2006)

Congestion is also a major problem on the interstates today. Part of the original goal of the interstates was to alleviate the traffic congestion that was plaguing cities across the United States. Congestion is a perfect example of the tragedy of the commons

because the highways are a common resource, and in most major cities, they are overused. Though some congestion has become normal, the population of the United States continues to grow; this will inevitably lead to more automobiles on the road. The Federal Highway department predicts enormous increases in the amount of congestion that the country will experience over the next 20 years. (See graph f) Obviously, a gridlocked system is uneconomical and inefficient.

Since the interstates have largely been unsuccessful at 'building our way out of congestion', transportation experts have debated whether possible to alleviate traffic by building more roads. However, in a 2002 report, "Building our Way Out of Congestion" that was released by the Minnesota department of transportation, it was stated that, "If local interests are strong enough, then 'building our way out of congestion' may become *de facto* policy," (Davis, 2001) and said that in the past, building new roads has been the number one choice of residents who are considering the options for improved transit. However, another study performed earlier this year, in March 2006, the Twin Cities Metrocouncil, the planning and development council in the Twin Cities that is responsible for regional transportation planning, concluded that 46% of those surveyed responded that they would like to see improved public transportation, while only 15% said they would like to see more construction of new roads. (Metropolitan Council, 2006)

Building public transportation is not in the best interest of the nation with the current tax structure, because 24.3 cents of every gallon of gas helps to pay for the road network. This means that if Americans stop driving, there will not be as many funds from gas taxes, and the federal government will not be able to pay its share of infrastructure maintenance. Ultimately, this is how the transportation system in the

United States has remained financially sustainable for the past 50 years. Better fuel efficiency in cars will break down this system, ultimately creating a loss of funds to the Highway Trust Fund, therefore it is in the best interest of the federal government to encourage driving even in the face of global warming.

Economic actors also have an incentive to maintain the current transport system – big automotive and oil companies for one, but also the rental car companies, of which two are in the top 25 largest private companies in the United States, (Forbes, 2006) the millions of jobs tied to the automotive and gasoline industries. Even as consumers in this economy there is very little choice but to support this system, as the American livelihood now depends it not only for personal transportation in most areas, but for the consumer goods that come from it.

#### Conclusion:

In the post war years, Eisenhower and the Federal Government made the decision to aggressively push the development of the nation's road networks in order to increase the efficiency of the nation's economy, and facilitate the movement of goods from producer to consumer. However, in creating the interstates, it created large scale socio-economic divides along lines of geography as it allowed those who could afford to move to the edges of cities to own their own piece of property, while increasingly excluding those in cities who were unable or unwilling to buy an automobile. Public transit was left unfunded or had great reductions in funding in many cities across the country, and in the mid-fifties forcefully removed by public policies at the expense of transit owners.



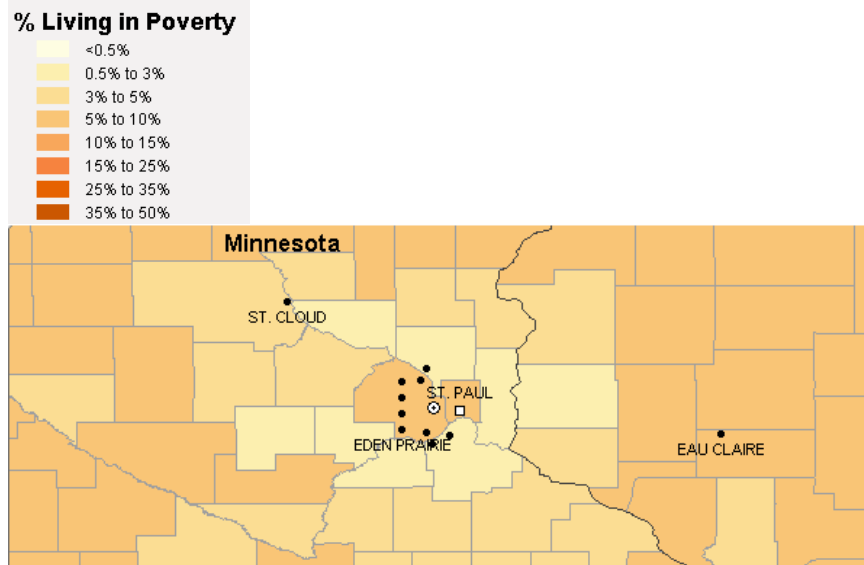
By providing financial incentive to post-war families through mortgage insurance, at the same time as the population boomed, it created a surge of new family homes in the suburbs and a decentralization of cities. When opposition to new growth and sprawl policies arose, public awareness campaigns pushed the idea of suburbanization, and car companies aggressively lobbied the government and advertised to America. This resulted in a mass increase of people living in metropolitan areas who worked in service and managerial type jobs, and who became consumers of goods rather than producers. As the interstate highways became the major link between the producers and the consumers of goods in metropolitan areas, it also became an essential part of American livelihoods.

In the face of global warming, it is essential that the nation create a plan for reducing the carbon dioxide that is entering the atmosphere. By using the framework of both fiscal and environmental sustainability, the nation will be able to step towards a change in the built environment that has created a system that necessitates the automobile as the major form of transportation. However, this change must occur by including individual actors on a local scale to ensure that social marginalization does not occur, as it did during the top-down approach used in the construction of the interstates.

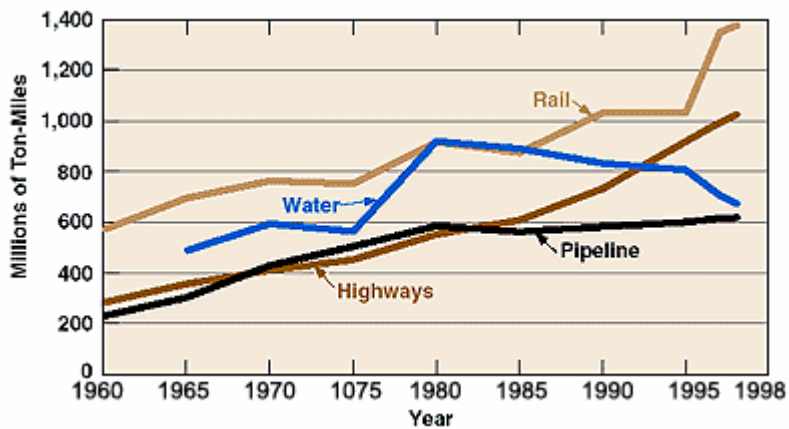
It becomes important to understand the role that the federal government and the global market economy has played in promoting and financing the interstates, when we realize that major changes will occur in the next centuries in American transportation. By examining the socio-economic forces that drove the government to fund the interstates, it creates a greater understanding of how the United States became a metropolitan state, and why environmental and economic inequalities in the landscape exist. With the growing interest in political ecology to understand consumption and its relations to production, it

becomes necessary to understand the political and economic forces that created the built environment that has allowed Americans to become bigger consumers. Therefore, it is my conclusion, that the important links of transportation must be studied in political ecology so that a comprehensive understanding of the global marketplace will be achieved.

Graph a: <http://www.socialexplorer.com/pub/maps/map2.aspx?MapSN=C2000Tract>



Graph b: (DOT, 2006d)

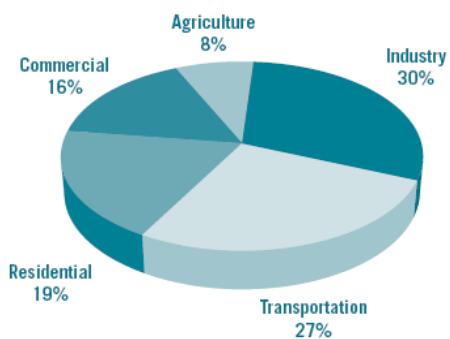


Graph c: (Bureau of Transportation Statistics, 2002)

	Per 100,000 U.S. residents	Number of fatalities
Air	0.21	609
Railroad	0.33	951
Transit	0.10	285
Waterborne recreational boating	0.29	826
Pipeline	0.004	11
Highway	14.87	42,815
<b>Total</b>	<b>15.80</b>	<b>45,497</b>

Graph d:

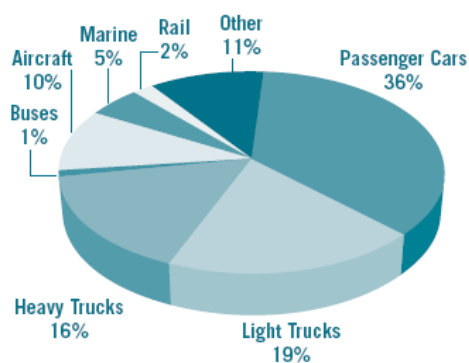
**Transportation Share** of U.S. Greenhouse Gas Emissions, 2000



Source: U.S. EPA, 2002, ES-5.

Graph e:

**Transportation GHG Emissions** by Mode, 2000



Source: U.S. EPA, 2002, Table 1-14.

Graph f: Predicted Increases in Congestion 1998



2020



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