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From "Silent Spring" to "Noisy Summer": Globalization of Industry as a Mitigant of Domestic Environmental Problems and the Attraction of Knowledge Workers

David Fogarty, MBA, Ph.D.
University of Phoenix, Phoenix, Arizona, USA

**Corresponding Author: David Fogarty; Email:* dfogarty2@gmail.com

Abstract: Globalization of industry is a key topic in today's economy and is of interests to governments, multinationals and their domestic competitors. One of the drawbacks of rapid globalization being discussed are the environmental problems are created in the countries being globalized. However, this paper explores the hypothesis that these environmental problems are not actually increasing but instead are being transferred to economies experiencing rapid industrialization thus providing economic benefits for these countries (at the cost of their environment) and also improving the quality of life in the post-industrialized countries enabling them to better transition their economies, wealth and quality of life.
Keywords: Environment, Globalization, International, Industrial, Post-Industrial, Economies, Services, Knowledge-Workers

INTRODUCTION

Rachel Carlson with her book "*Silent Spring*" is largely credited for starting the environmental movement with her observations on abnormalities linked to chemical pesticides which first showed up in the wildlife while she was still associated with the Fish and Wildlife Service.

Below in an excerpt from "*Silent Spring*":

"These sprays, dusts, and aerosols are now applied almost universally to farms, gardens, forests, and homes—nonselective chemicals that have the power to kill every insect, the "good" and the "bad," to still the song of birds and the leaping of fish in the streams, to coat the leaves with a deadly film, and to linger on in the soil—all this though the intended target may be only a few weeds or insects. Can anyone believe it is possible to lay down such a barrage of poisons on the surface of the earth without making it unfit for all life? They should not be called "insecticides," but "biocides.""
"……how could intelligent beings seek to control a few unwanted species by a method that contaminated the whole environment and brought the threat of disease and death even to their own kind? Yet this is precisely what we have done…"

Carson was born in 1907 during the height of Industrial Revolution in the town of Springdale, Pennsylvania which is around 20 miles from Pittsburgh on the Allegheny River. The billowing smokestacks of factories less than a mile away could be viewed from her bedroom window. The smell of from these factories was so rank that is reported to have prevented the 1,200 Springdale's residents from sitting on their porches in the summer evenings. On the flip side Carson was known for spending a great deal of time exploring the forests and tributaries to the Allegheny River and it was written that the two of her consuming passions were the nature surrounding her hillside home and her writing. What a great setting for the mother of the environmental movement in the US to enjoy nature and yet be so close to the cornerstone of America's Industrial power [1-2].

With the introduction of DDT as an effective chemical pesticide in 1945 Carson's concern was brought to the forefront. Carson being brought up on a small farm had been familiar with the dangers of chemical pesticides for quite some time but was also aware of the tradeoffs with the agricultural community, who needed these chemical to increase crop yields. Knowing she would do economic damage to the farming community she revealed later that she hoped that someone else would expose the dangers of DDT but finally realized after a great deal of reflection she had the unique background as well as the financial security to accomplish this task. She also knew that in the long run the farming community would benefit from a health perspective. Only after years of research across Europe and the US and with the help of Shirley Briggs, a former Fish and Wildlife Service artist and editor of an Audubon Naturalist Society magazine called Atlantic Naturalist, and Clarence Cottam, another former Fish

and Wildlife Service employee, who also provided Carson with support and documentation on DDT research conducted but not generally known to the public did Carson made the decision to produce "*Silent Spring"* [1-2].

After the publication of "*Silent Spring"* Carson was subject to a series of personal attacks on her professional integrity. Despite the fact that given her agricultural roots Carson did not recommend completely banning pesticides but rather find safer alternatives to dangerous ones like DDT the chemical industry nonetheless mounted a lobbying campaign to discredit her. However, Cason's work prevailed with the federal government then ordering a complete review of its policy on chemical pesticides. Carson was asked to testify before a Congressional committee along with other witnesses. DDT was then banned as a direct result of the study. Carson is now being credited with launching the contemporary environmental movement and awakening the concern over the environment in the US with her critical work leading to the publication of "*Silent Spring"* [1-2].

One of the first major news stories associated with globalization and the environment was with the Union Carbide (UCC) disaster in Bhopol, India in 1984 where at least 3800 people were killed and many more injured over the long-term from a gas leak at a pesticide plant [3]. The history around this disaster is linked to the Indian government who in the 1970's encourages FDI and approved a proposal for UCC to build a plant for the production of chemical pesticides in a suburb of New Delhi. While the site was not zoned for the manufacturing of hazardous materials given its proximity to human populations and was only initially approved to produce components of the pesticides competitive pressures resulted in the company eventually producing the entire product within the plant. With decreased demand for pesticides in 1984 the plant was operating at below capacity and failed to maintain proper safety procedures. The local government was aware of safety problems at the plant but hesitated to enforce any actions due to fear about the loss of industry and subsequent jobs. The description of the disaster is described graphically by Broughton[5] below-

"At 11.00 PM on December 2 1984, while most of the one million residents of Bhopal slept, an operator at the plant noticed a small leak of methyl isocyanate (MIC) gas and increasing pressure inside a storage tank. The vent-gas scrubber, a safety device designer to neutralize toxic discharge from the MIC system, had been turned off three weeks prior. Apparently a faulty valve had allowed one ton of water for cleaning internal pipes to mix with forty tons of MIC. A 30 ton refrigeration unit that normally served as a safety component to cool the MIC storage tank had been drained of its coolant for use in another part of the plant. Pressure and heat from the vigorous exothermic reaction in the tank continued to build. The gas flare safety system was out of action and had been for three months. At around 1.00 AM, December 3, loud rumbling reverberated around the plant as a safety valve gave way sending a plume of MIC gas into the early morning air. Within hours, the streets of Bhopal were littered with human corpses and the carcasses of buffaloes, cows, dogs and birds. An estimated 3,800 people died immediately, mostly in the poor slum colony adjacent to the UCC plant. Local hospitals were soon overwhelmed with the injured, a crisis further compounded by a lack of knowledge of exactly what gas was involved and what its effects were. It became one of the worst chemical disasters in history and the name Bhopal became synonymous with industrial catastrophe.

'Estimates of the number of people killed in the first few days by the plume from the UCC plant run as high as 10,000, with 15,000 to 20,000 premature deaths reportedly occurring in the subsequent two decades. The Indian government reported that more than half a million people were exposed to the gas. Several epidemiological studies conducted soon after the accident showed significant morbidity and increased mortality in the exposed population".

In the days following the disaster, UCC began the campaign to shift responsibility for the gas leak legally to its subsidiary and fabricated sabotage and conspiracy theories. Furthermore after UCC discontinued operations at the plant following the disaster it did not clean up the industrial site completely. The plant continues to leak several toxic chemicals and heavy metals that have found their way into local aquifers [5]. A recent documentary on the disaster showed children from the very settlements where people were killed playing in the abandoned factory site.

The events in Bhopol exposed the world to the link between globalization and the environments and suggested that there was a double standard with how multinational operated in host countries. Moreover, the actions of Union Carbide to avoid responsibility after the event served to enforce this view. While there can be no positive short-terms benefits associated with a disaster like that which occurred in Bhopol, India hopefully there are long-terms lessons to be learned. Union Carbide are now a wholly-owned subsidiary of the Dow Chemical and have divested much of their former assets like their industrial gases business which was a spinoff which occurred in 1992 to an independent company renamed Praxair. While there was no doubt many lessons learned from this tragedy the catastrophic consequences prevented researchers from finding any positive benefits to globalization and the environment.

The relationship between globalization and the environment is an interesting one which I think is relevant to the study of global business management given that in addition to maximizing the value for the stakeholders firms are also obliged to be responsible global citizens and should do their own part to protect the environment. From a macroeconomic perspective Jorgensen and Kick [4] take a world-systems approach and argue that globalization has a detrimental impact on the environment and living conditions of human populations across the globe through the nature of how global organizations are structured and increasing scale and intensity of global processes happening within and between these organizations. There is a growing literature that globalization has positive benefits to the environment. Boyce [5] views globalization from the framework of economic integration that embraces governance as well as markets. Their theory concludes that globalization could lead to worldwide convergence toward environmental quality which can be higher or lower. Alternatively, they point out that globalization may lead to environmental polarization in which the 'greening' of the global North is accompanied by the 'browning' of the global South. They furthermore point out that the outcome will depend on how the opportunities created by globalization alter balances of power within countries and among them rather than being dictated by an inexorable logic. Ghemawat [6] discusses how globalization plays a more minor role in the environment than most people think arguing that most ecological problems are still local rather than global. Ghemawat's main thesis is that activities like international shipping only creates 2-3% of the total energy related carbon emissions. He also makes the case that with FDI multinationals are pressured by their stakeholders to "clean up their act" in foreign countries. Furthermore, he charges that in order to gain a more balanced view any environmental failures associated with globalization should be weighed up with gains from cross-border integration Christmann and Taylor [7] also argue that although critics assert that globalization is detrimental to the environment it may also have a positive aspect due to the fact that global relationships are related to increase self-regulation on firms in low-regulation countries.

ANALYSIS AND DISCUSSION

Rachel Carson's passion for the environment was born through spending a good deal of time exploring the forests and tributaries to the Allegheny River growing up on a farm in a small rural Pennsylvania community. As a young child, it is said that Carson's consuming passions were the nature surrounding her hillside home and her writing. My passion to write this article is similar to what was Rachel Carlson's in terms of my experience growing up in the Housatonic and Naugatuck River Valleys, spending much time exploring the forests and tributaries to these great rivers and witnessing firsthand the destruction of the environment and human lives through industrial growth and a rebirth with globalization. Unlike Carson I am not a biologist but instead a global business practitioner and scholar who understands the firsthand benefits and drawbacks of globalization. However, like Carlson with her link with farming I realize that even though my life is dependent on globalization I am in a unique position to observe and discuss this phenomenon and to evaluate its unique economic impact.

This researcher grew up in the Naugatuck Valley area of Connecticut. My family besides being among the first European settlers of the United States and Connecticut having participated in the Great Pequot War in addition to the whaling industry also participated in the Industrial Revolution which took place in Connecticut in such former great industrial cities as New Haven, Waterbury and Bridgeport. My family started in America with the arrival of the pilgrims in Western Rhode Island/Connecticut in the 1600s and moved slowly to the West of Connecticut rarely straying more than 10 miles from the coast. For example my great-uncle joined the Connecticut State Police in 1942 then later became the first Chief of Police in Guilford, CT, establishing the town's first professional police force. Guilford is a coastal town in the middle of the Connecticut. My grandfathers and great-grandfather worked in the factories along the Naugatuck and Housatonic River Valleys, Bridgeport and in New Haven producing a variety of goods from brass parts for the great world wars, clocks and timers to garments for college students. Other relatives lived in towns such as Woodbridge, Trumbull and Stratford, Connecticut. My father was the first generation to work in the post-industrial age starting at Bunker-Ramo a famous early computer company started by George R. Bunker and Simon Ramo which developed among other things the electronic stock-ticker for the NYSE in Trumbull, Connecticut. In the Naugatuck Valley water power started the industrial revolution as this was needed to run the mills. These main rivers were fed from the Appalachian Mountains which cross into Northwestern Connecticut and Massachusetts. These mountains are known as the Berkshires. The Naugatuck River has its source in the upper part of Connecticut near New Preston and the Housatonic River starts in Massachusetts above Pittsfield at the foothills of the Green Mountains. My home growing up was on tributary to the Housatonic river called the Far Mill River which was lined with mills during the start of the industrial revolution. The Far Mill River starts in the marshlands of Southern Monroe, CT just above Route 111 and is fed by a major tributary which is the Means brook which has a source in the marshlands of Northern Monroe, Connecticut. These marshlands which have now been destroyed through residential developments used to be teaming with biodiversity including many rare amphibians. The two rivers meet in Huntington, CT. in land which was once owned by the Bridgeport

Hydraulic company now known as the Aquarian Water Company and now has been designated as Green Space. The space is known as the Gristmill Trail and contains remnants of several old mill dams. Both of these rivers are used for drinking water sources with the Far Mill Reservoir in Monroe and the Means Brook Reservoir in Shelton. The Aquarian Water Company also operates a major reservoir and water purification facility near this river known as the Trap Falls Reservoir I used to excavate the ruins of the Star Pin Company along the riparian near my house. The Star Pin Company which was reliant on water power from the current. Some of these mills were quite innovative in terms of the way they utilized the flow of water current to derive power. Later as Edison and Tesla created the electrical grid the rivers were converted from the use of power to the dumping of industrial wastes. It started way upstream in the Housatonic River with GE dumbing PCBs at one of their Electrical Distribution and Control Plants in Pittsfield Massachusetts. Downstream you had factories like the Hull Dye works also dumping byproducts of creating dyes and colorings for the garment industry. The water was also filthy when we used to swim at a beach along the river at Indian Wells State Park in Shelton. For years it was not recommended that any fish be consumed which were caught in the Housatonic River because of the accumulation of PCBs (a carcinogen) in their bodies. When we would catch fish we would have them throw them back. The grey area was around the tributaries to the Housatonic River which were generally clean but unknown whether the fish swam upstream from the Housatonic River and what this meant in terms of exposure to PCBs.

The town I grew up in was Shelton, Connecticut and this town had its own industrial history with the BF Goodrich Sponge Rubber plant being the main employer of the town. With Uniroyal and BF Goodrich both being located in the Valley there was a rubber industry concentration happening not unlike the Silicon Valley of today. The United States Rubber Company was founded in Naugatuck, Connecticut in 1892 and later became Uniroyal in 1961. Uniroyal was later acquired by Michelin in 1990. The famous artificial leather material Naugahyde which was invented and produced in Naugatuck is named after the town. One of the main thoroughfares in Naugatuck, Connecticut is known today as Rubber Avenue. When I took my 8-year old daughter there to purchase a vehicle recently she inquired as to why they names the street Rubber Avenue since there is no trace of rubber factories still in Naugatuck.

Naugatuck was originally a farming community as settlers could capitalize on the rich soil in the flood plain of the Naugatuck River. Given its proximity to the river the industrial revolution in the US transformed the economy of Naugatuck from agricultural to industrial. The United States Rubber Company which was renamed Uniroyal in 1961 was first founded in Naugatuck. US rubber is famed for the synthetic leather product Naugahyde named after Naugatuck. Also, the sneaker company Keds also manufactured footwear in Naugatuck [8].

Chemicals were needed to make rubber more serviceable and US Rubber developed a core competency around developing chemicals to manufacture rubber. Because of this and also due to its close proximity to the Waterbury Brass Mills the United States Rubber company set up a subsidiary known as the Naugatuck Chemical company which supplied chemicals as a separate P&L to not only the local rubber manufacturing industry but also to the brass mills up the road in Waterbury. This company was quite innovative an made a number of consumer, industrial and military products up until the 1970's when many of the plants were closed for environmental and economic reasons [8].

Until this time, the Naugatuck River was subject to many pollution discharges from the cities and industries along its banks. The Sewage Commission for the State of Connecticut said as far back as 1890 that the river was already polluted to its maximum limit. Industrial waste from Waterbury's brass mills, Naugatuck's chemical and rubber companies, and metal-working factories in the lower Naugatuck Valley was dumped into the river for over a century.

Smoke and foul odors contaminated the air around the river. In the 1960s the river often changed color from the dyes used to color Keds sneakers [8]. I can remember driving up Route 8 as a child and watching the water cascade off the various dams with a different color every day. I can also remember my parents telling me to stay away from the river as it was known as one of the most polluted in the world.

If someone wanted to leave one rubber factory for better opportunities they could always head North or South on Route 8 for 20 or so miles . I can remember driving home with my mother as a child seeing the flames shoot out from the flare stacks at the Shelton B.F. Goodrich plant which would light up the night sky in the downtown Shelton, Connecticut area. Anytime one sees flare stacks it's an automatic clue of heavy industry in the area. This was characteristic of the Naugatuck Valley at the time. The Shelton, Connecticut neighborhood we lived in which was located in the White Hills area was built upon a large rubber dump that the BF Goodrich plant used to dump its waste materials when making mattresses. I can remember in certain places where the rubber was exposed we used to jump out of trees onto the sponge rubber itself. The houses were built at the bottom of the dump with the hill from the landfill in the back. Most of the hill in the back was fill but as mentioned previously there were some exposed rubber waste. There were also several

dirt roads when the dump trucks would bring the rubber waste which had since become a wooded area. When we would explore these woods as kids we would see 55 gallon chemical drums sometimes popping out of the ground. Furthermore all the wetlands which surrounded this dump had a red ooze at the bottom. When these houses were built it was probably assumed that the rubber scraps were harmless. However, as we learned from Baptista, [8] chemicals are a fundamental component of manufacturing artificial rubber. These houses contained artesian wells and the chemicals eventually leaked from the drums entered the aquifer and eventually people and animals started getting cancer. It seemed at one point that ever other house in our neighborhood had a cancer case. Finally after an investigation benzene which is a carcinogen was found in the well water. The entire dump eventually became an EPA Superfund site where the government puts money aside to clean up industrial wastes that the individual firms responsible could not handle. However, the lives which were destroyed or changed forever from living on the dump without prior information is not insignificant. The BF Goodrich plant eventually burned down on 1975 in the largest case of industrial arson ever recorded. The owners of the plant were eventually arrested for the crime. In the end they tried to collect insurance money for a plant which could no longer run profitably based on increasing government regulation related to pollution control. If these factories couldn't dump their waste into the rivers then they ceased to become profitable hence creating an opportunity for businesses overseas who didn't have the same level of environmental scrutiny. The BF Goodrich Plant like its sister company Naugatuck Chemicals up north were among many companies in the Valley which succumbed to environmental regulations which prevented dumping wastes in the rivers. The Naugatuck Valley was not the only place dumping took place in these rivers. Its important to note that industrial plants in the Valley are not the only ones to pollute these rivers. For example, GE Industrial Distribution and Control also dumped PCBs into the Housatonic in Pittsfield, Massachusetts.

Thus the two principal rivers of the Valley, Housatonic and the Naugatuck¸ represented the dumping grounds for heavy industrial waste for many years. Companies up until the late 1970's were not heavily regulated by the EPA and therefore treated the rivers as a cesspool. One could not even imagine eating or catching fish from these rivers when I was growing up in the 1970's and the 1980's.

Today, most of the factories are boarded up and closed, with some sites converted to strip malls, petrol stations and even neat housing in the form of loft apartments. The Naugatuck Chemical is deserted, with some of the smokestacks serving as ghostly relics of the Valley's once mighty industries. EPA pollution regulations mandated pollution controls on municipal and industrial discharges, and the closure of the factories helped the Naugatuck River and Housatonic Rivers fully recover. Wildlife has returned and amazingly there are no health warnings for the entire 39-mile length of the Naugatuck River watershed [8]. When I was on assignment in Hong Kong returning to Connecticut for business I had a double-take last spring when I saw fly fishermen wading in the Naugatuck River. They would have been dubbed insane for doing this when I was growing up.

Now we travel overseas to India. One would think after a disaster such as with Union Carbide discussed in the previous section this it would be a wake-up call for regulators and citizens alike. However, industrialization in India has increased very rapidly and widespread degradation of the environment and its subsequent effect on health is more prevalent than ever.

In late 2013 I had a chance to drive to the Indian Statistical Institute in Bangalore to deliver a lecture on "BIG DATA" when I observed the Vrishabhavathi River which runs adjacent to Mysore Road on the way to the ISI campus. You can really visualize the health of the water when viewing it from small dams which crop up along the waterway used to collect water for mills or industrial cooling and the like. The greenish color of this river running reminded me of the Naugatuck River of my childhood which had the same polluted look. Here is I was 40 years later and people were fishing in the Naugatuck and it struck me that the now booming city of Bangalore had the same environmental problems as the Naugatuck Valley did many years ago. Furthermore, what was very interesting is about the time when I was unable to enjoy the Naugatuck River due to its highly toxic state the Vrishabhavathi River was relatively clean. One Indian Blogger commented:

"It was once a serene river flowing across many localities of Bangalore. Till the 1970s, the river was a source of livelihood for hundreds of Bangaloreans and also a place for river water swimming and lazing around. The Vrishabhbavathi, as it was known, was a small stream that meandered around the city of Bangalore. It had its origin in the small hillock near the Dodda Ganapathi Temple on Bull Temple Road in Basavanagudi.

All this changed when several industries and business establishments came up on the banks of the Vrishabhavati. In just a matter of months the river lost its pristine quality and turned into a " mori" which in Kannada means a drain. The pollutants from industries were not the only reason for the river to die. The Bangalore Water Supply and Sewerage Board (BWSSB) connected all the sewer lines to the river.

Today, while motoring down the Mysore road, you can see a frothing mass of water. This is not the drain as is commonly believed but the Vrishibhavathi river. The river runs parallel to Mysore road for several kilometers. It flows near the Gali Anjeneya after touching areas like Guddadahalli, Bapujinagar and RR Nagar. Near Kengeri, locals call it Kengeri Mori as the water here is totally filthy and unfit even for fishes and marine life.

Even today, people living around Mysore Road and near Rajarajesharinagar recall how the river carried pure water and watered the coconut grooves. The river water also provided us with vegetables and fruits of the local variety.

This river was a small yet vital tributary of the Arkavathy. The irony is that both the tributary and the river are in dire straits. If the tributary has virtually died up, the Arkavathy is in the process of drying up. The priests of the Gali Anjeneya Temple on Mysore Road and Shiva Temple in Kengeri will tell you that till the mid-1970s they used the river water daily for religious purposes. But no longer. The Vrishabhavathi at the Gali Anjeneya Temple is filthy and at the Shiva Temple it is unpotable.

Apart from this river, even the Arkavathy now carried the bulk of the City's garbage and waste. In the early years of Bangalore (in 1922) , it had a sewerage system covering 215 kms and this was separated from the riverine system. Thus, waste water never mingled with the river water. This changed with Independence.

First the civic authority and next the BWSSB effectively killed the tanks and then targeted the river system. They permitted effluents and sewage to flow into the rivers, tanks and water bodies, polluting them to such an extent that even marine life died.

The Vrishabhavathi became a sewage river, tanks dried up, other water bodies were breached and tank bunds and catchments areas were encroached upon and construction allowed. Naturally, the water bodies became septic and the Vrishabhavathi became nothing more than a huge cesspool. Experts are puzzled at the lack of planning by the City fathers in protecting the water bodies. They say Bangalore north is on a flat terrain except for the Doddabettahalli ridge which is the highest point. This ridge runs north-north east-South-south west and Doddabettahalli is 1062 metres high.

Bangalore south has more of an undulating terrain with hills and valleys. It is in one of the small hills here that the Vrishabhavathi takes birth. The Arkavathy and Vrishabhavathi rivers were interconnected to the many lakes and tanks of Bangalore from the time of Kempe Gowda. If one tank overflowed, the water would percolate to the other. Thus, there was no flooding till a few decades ago. The river today is a potential carrier of epidemic and villagers downstream have complained of diseases and health hazard arising out of acute pollution and filthy water. Residents of Byramangala, Chowkalli and Gopalli have complained of health related diseases and studies by several scientific and academic institutions have pinpointed the polluted Vrishabhavathi as the reason. Even the waters of the wells and borewells around the course of the river are highly polluted. Studies conducted by many research institutions have identified water from the lake as well as open and bore wells in the area as non-potable, with high levels of fecal coliforms making them unfit for human consumption or even for use by animals or in agriculture".

At first blush it may appear that the US has lost all the manufacturing jobs and simple transitioned its pollution problem to other countries like India. This is the typical view held by those opposed to globalization and environmentalists. However, I will present an alternate hypothesis that the transition is actually good for the United States in the long run and perhaps will be the same for India and other developing markets over time.

My first evidence for this is when I analyze the current State of the Housatonic and Naugatuck River Valleys. Shelton Connecticut today is a model of transition to the post-industrial world. Shelton has attracted several large Fortune 500 companies including Perkin-Elmer, GE, ITT and United Technologies through a combination of municipal tax and development policies. Even the old factories along the Housatonic River are now being converted to really neat and affordable luxury loft apartments as already mentioned above. While Naugatuck and Waterbury are still struggling to find their way I believe with strong policies like those put in place in Shelton that are favorable to businesses that they should be able to achieve similar results.

My second evidence comes from numerous studies which have demonstrated that knowledge workers which are a necessity for cities to properly transition into a post-industrial economy are attracted to areas with a clean environment and low levels of pollution [9-13]. Moreover, Berry [14] along with Bontje and Musterd [15] have cited traditional worker considerations such as housing affordability are of a lesser factor in attracting knowledge workers.

My third evidence points to the pay differences of knowledge worker jobs to manufacturing jobs. The

link between education and pay levels was firmly established and modeled by Mincer [16]. This has been further corroborated in later years by various researchers across the globe including Marin and Psacharopoulos [17]; and Yue and Liu [18].

Therefore, given the evidence gathered I hypothesize that moving manufacturing jobs which pollute the home country overseas results in an economic gain over time to the home country in the form of clean living environment which is a key criteria for attracting knowledge workers and subsequently higher paying jobs. I further hypothesize that the same transition will occur in the developing markets as these manufacturing jobs shift to other countries or their B and C cities.

CONCLUSIONS

Taking all of the above knowledge into account suggests that globalization of industry has a negative effect on jobs during the transition period but for every job lost there is a gain to the environment. This is an intuitive hypothesis based on the research on what it takes to attract knowledge workers, the pay differentials between knowledge and manufacturing workers and from the case studies above on towns within the /Housatonic and Naugatuck River Valleys. Moreover, the Shelton, Connecticut transformation to a post-industrial service oriented economy suggests that it a requirement to clean up an environment in order to attract skilled knowledge workers who will always have a choice in terms of where they work and live.

Given the increased focus on the loss of jobs to globalization in the US and a focus on China and India being the source of the job loss this research represents takes an interesting look at the economic factors involved and when taken from these lens suggests that the loss of industrial jobs while negative in the short term may not be a potential future economic benefit considering the health, well-being and sense of security of the towns affected.

All the new theories on growth point to the fact that that human capital accumulation embodied in knowledge workers is essential for sustained growth and economic development of a city. City planners have therefore become increasingly focused about attracting and retaining knowledge workers in their cities. The literature review completed for this study indicates that one of the most effective ways to attract knowledge workers and promote economic development is the creation of a clean and pollution free environment.

Therefore, the movement of polluting industries from the developed world to the developing world paves the way for the developed to create the wealthier service-oriented economies and improve the wellness and longevity of its citizens while allowing the developing countries to develop their economies and middle class with the manufacturing jobs.

Of course, it would be good to quantify this economic benefit. However, this is beyond the scope of this study and is therefore suggested as topic of future research.

One limitation of the study is that as a case study it is concentrated in the Housatonic and Naugatuck River Valleys and therefore should be expanded to similar areas affected economically to ascertain if the model holds true in other cases.

In conclusion, we credit Rachel Carlson for starting the environmental movement. However, if the hypothesis above proves to be valid over time Ms. Carlson will have started something even more valuable when viewed from an economic perspective. This work is a tribute to her life and persistence.

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