

Does A Cleaner Environment Mean More Jobs?

*An Empirical Analysis of
the Positive Relationship
Between Jobs, Environment
and the Economy*

Dr. Paul H. Temple

Although this article does not discuss pesticide issues specifically, its implications for pesticide regulation are clear: stricter controls on pesticide use do not necessarily mean that people will lose jobs or that the economy will falter. That was the message that Dr. Paul H. Temple delivered when he spoke at the National Coalition Against the Misuse of Pesticide's annual conference in Washington in March. This article is adapted from that talk.

Do we have to sacrifice a clean environment to create jobs? The traditional answer is yes — that environmental quality and resource con-

servation are adversarial and contradictory to job creation and economic development. Indeed, this view has achieved the power of myth (which the Webster dictionary defines as "any fictitious story, or unscientific account, theory, belief, etc...").

This myth may originate in developing economies, where increasing pollution and an improving economy can coexist.¹ In developed nations such as the United States, however, there is a substantial and growing body of empirical evidence which demonstrates that, in fact, economic development and job creation are positively correlated with a clean environ-

ment and good environmental management. In short, the evidence suggests that a cleaner environment means more jobs.

The Emissions-To-Jobs Ratio

To examine the relationship between the economy and the environment, in the early 1990s I created a measure called the "Emissions-To-Jobs Ratio" (E/J).^{2,3} The E/J is calculated by dividing the toxic emissions for a sector of the economy by the number of jobs in the same sector. For example, if an industry sector created 200 pounds of toxic emissions per year and employed 10 people, its E/J would be 20.

The E/J is a measure of relative risk — that is, a manufacturing industry with a high E/J is considered to be inherently riskier than one with a low E/J. In 1990, for example, the chemical industry — with 1,859 pounds of toxic emissions per job — was relatively riskier than the printing industry, which had only 28 pounds of toxic emissions per job (see Figure 1).⁴

Figure 2 shows the E/J earned by each of the 50 states in 1990. Vermont, with only 23 pounds of pollution emissions per job, had the lowest E/J; Louisiana, with 2,469 pounds of pollution emissions per job, had the highest.

There are a number of possible causes for this wide variation, including differences in emission levels, energy use and efficiency, state and corporate policies, and industry structure, such as the level of automation.

A leading cause of a high E/J, however, is underspending on pollution control by the emitting industries.⁵ For example, many of the states with high E/Js have chemical industries that underspend on pollution control (relative to the national average for a particular level of emissions).

In these states, the costs of pollution are often "externalized." This means that the polluting industry transfers the costs of pollution — such as health prob-

What I have observed is that poorer economic conditions exist where environmentally risky activities are more intense. The data show that higher unemployment and poorer economic conditions exist in those states where pollution levels and the Environment to Jobs Ratio are higher. In fact, a strategy of allowing more pollution appears to result in fewer jobs and even more pollution — a lose-lose situation.

lems or environmental damage — to someone else, such as individual citizens. At the same time, since the polluting industry is avoiding spending money to prevent pollution, it is essentially collecting a "hidden" subsidy.

The question for public planners and managers is this: Is there a benefit to a municipality or state for the cost of assuming the risk? Or, to put it another way, is this risk related positively or negatively to economic welfare and job creation?

What I have observed is that poorer economic conditions exist where environmentally risky activities are more intense. The data show that higher unemployment and poorer economic conditions exist in those states where pollution levels and the E/J are higher. In fact, a strategy of allowing more pollution appears to result in fewer jobs and, of course, even more pollution — a lose-lose situation.

For example, a 50-state statistical analysis I have conducted shows that as state pollution levels rise, income per capita drops, poverty, unemployment and energy use increase, and environmental indicators reveal a poorer environment.⁶ And a more detailed analysis shows that poor environmental conditions, weak environmental policies, and high E/Js are all linked to poor economic welfare.⁷

Economic development indicators also drop as the E/J rises. The Corporation for Enterprise Development, for example, uses over 70 indicators to rank and grade states on their economic performance, business vitality, and development capacity.⁸ I found a significant *inverse* relationship between this economic grade and a state's E/J: as E/J increased, the economic performance grade decreased. This may be because those states that allow pollution to be excessively externalized find themselves less attractive to prospective businesses — not more attractive as they might have hoped. A polluted environment appears to act as a *de facto* barrier to new businesses entering the market-

place and results in a less diversified economy.

The statistics suggest that new businesses aren't the only ones affected by a poor environment, however: a state's E/J is also positively related to the failure of *existing* businesses. As the E/J rises, so do business failures.

A note of caution is in order: statistical analyses such as these do not establish the direction of causation — they do not tell us whether increasing pollution causes the economic problems, or whether economic problems cause increasing pollution. But such analyses do indicate the compatibility of a healthy economy and a clean environment and suggests how we can have both.

Lest the reader think I am promoting the E/J as the indicator to end all indicators, let me also say that E/J is probably tracking a larger measure of economic and environmental interactions and externalization. One way for an individual or firm to increase profits is to externalize costs, that is, to pass them on to something or someone else. An externalized cost generally results in a subsidy, sometimes hidden, which accrues to

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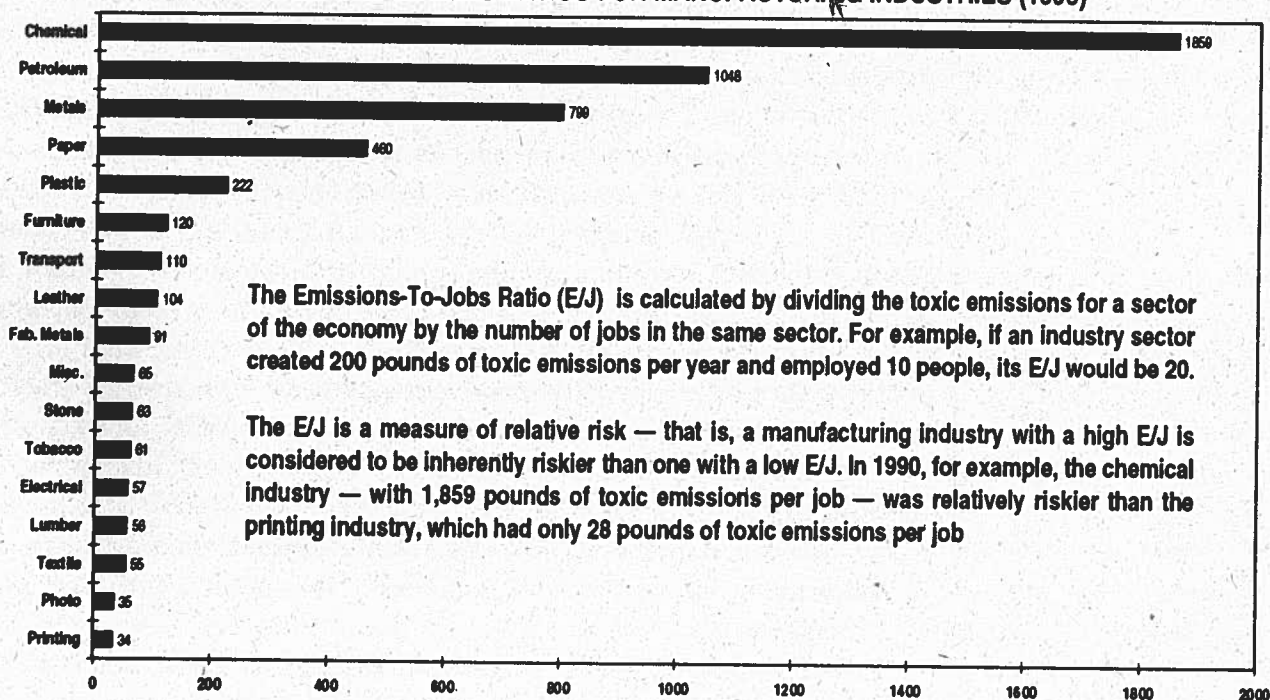
whomever is doing the externalizing.

Pollution is an example of a cost that is passed on to the environment and ultimately to the people of an area while the avoided pollution abatement costs (the subsidy) are gained by the polluting industry. Other examples of externalized costs are regressive taxes and low energy costs which provide an implicit subsidy for one economic sector while other sectors and the public bear the cost.

How do externalized costs relate to environmental health and economic activity? To find out, for each state I calculated the 1990 subsidies attributable to pollution, regressive taxes, and energy pricing. Then, I compared these measures to other indicators of a state's general welfare.⁹ Generally, as the hidden subsidies increased, socioeconomic, energy, environmental, and economic development measures all worsened.

I also found that high subsidy states had poorer "political health," meaning that their federal representatives received, on average, lower scores from the

**FIGURE 1
EMISSIONS-TO-JOBS RATIOS FOR MANUFACTURING INDUSTRIES (1990)**



**FIGURE 2
EMISSIONS-TO-JOBS RATIOS
FOR THE 50 STATES**

STATE	E/J (lbs/job)
VT	23
MA	39
HI	41
CO	41
NJ	41
CA	46
RI	52
NY	53
CT	62
MD	76
WI	82
PA	88
NH	90
SD	99
DE	100
OR	105
WA	113
IL	118
NV	128
ND	129
MI	131
MN	132
GA	138
ME	144
NC	149
KY	152
OH	155
MO	163
NE	175
IA	177
SC	183
VA	188
ID	190
OK	198
FL	214
AR	264
IN	274
AL	306
AZ	398
TE	412
MS	444
TX	444
WV	465
KS	471
NM	818
WY	1135
UT	1236
AK	1513
MT	2134
LA	2496

League of Conservation Voters, which scores members of Congress on their environmental voting records.¹⁰

This finding suggests that special interests could be promoting subsidies — through campaign contributions and other means firms can influence the voting patterns of elected representatives to promote externalization. (The political science literature exhibits considerable diversity on the issue of whether campaign contributions influence voting and there does not seem to be a consensus.¹¹)

I found that as subsidies rose across states, campaign contributions to federal elections, and presumably state election campaigns, increased¹² while the voting records of members of Congress declined (from an environmental perspective). Campaign contributions (total Democratic and Republican party contributions) per candidate have a significant negative relationship with congressional environmental voting scores. In 1990, contributions per candidate were 62 percent higher in high subsidy states, despite lower incomes and higher poverty in these states. Environmental voting scores averaged 31 percent lower in the high subsidy group.

One other troubling result from a political health perspective is that voting participation by citizens in federal elections declines significantly in states with high subsidies. In the 1988 federal elections, for example, there was a 15 percent average lower voter participation in the high subsidy states. Perhaps citizens in high subsidy states perceive that special interests command elected representatives attention and that voting won't change anything, i.e. voters feel disenfranchised. This analysis does not establish cause and effect relationships between campaign contributions, congressional voting, and citizen participation in elections — but this appears to be a fruitful area for future political science research.

Louisiana Case Study

If, as I propose, there are positive economic effects from environmental improvements, there ought to be cases where it can be demonstrated. Indeed there are.

In Louisiana, for example, new environmental laws and regulations, rigorous enforcement, and new policies and programs brought emissions down some 50 percent between 1988 and 1992. Over the same period, investment in Louisiana increased two and a half times and unemployment dropped from 12 percent, the nation's highest rate, to about 6 percent, the nation's average. In Louisiana, cleaning up the environment occurred concurrently with more investment and more jobs.

Why did this happen? The connections between economy and environment are often subtle, indirect and difficult to quantify. What, for example, is the effect on economic development of the "Cancer Alley" label applied to the industrial corridor along the Mississippi River between Baton Rouge and New Orleans? Undoubtedly, having that kind of reputation is detrimental to development — even if the label isn't deserved — but it's difficult to put a dollar value on it.

One direct economy-environment connection that can be demonstrated

and quantified in dollars, however, is that of spending on pollution control¹³ and its affect on job creation. The primary reason there was a 50 percent reduction in toxic emissions in Louisiana between 1988 and 1992 was that the state's manufacturing industry increased its capital outlay spending on pollution control from about \$144 million per year in 1988 to about \$1.09 billion in 1992 — greater than a seven-fold increase. The impetus for increased spending was environmental laws passed by the Congress and the state legislature and agency regulations and programs designed to bring Louisiana's pollution in line with national averages.

Concurrent with the increased spending, employment in the manufacturing sector increased by about 14,000 new jobs by 1991, excluding construction and contract jobs. In the chemical industry, each new job has been estimated to create 4.6 related jobs¹⁴ — meaning that the pollution control spending helped create an additional 64,000 new jobs in Louisiana.

Pollution control spending creates jobs; the US average is 23 new jobs created for each \$1 million spent.¹⁵ In Louisiana, this means that pollution control spending would have created 21,000 new direct jobs and approximately 96,000 indirect jobs by 1992. Thus, at least one of the direct connections between reduced pollution and jobs is apparent and positive. Because of the increased pollution spending by industry portions of Louisiana are now experiencing a "mini-boom" in employment.

Other Studies

The relationship of environment and the economy has attracted considerable interest of late. Stephen Meyer of the Massachusetts Institute of Technology, for example, has found that, over time, those states with good environmental programs have better employment, productivity and economic growth than poor environmental states.¹⁶ He noted that "states with stronger environmental policies consistently outperformed the weaker environmental states on all the

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economic measures."

A study done at the Bank of America has found similar results.¹⁷ It concluded that states ranked "strong" environmentally had higher economic growth rates and lower rental vacancies than states ranked "weak" environmentally. The growth rates were a 14-year average so the differences were very significant when compounded over the 14 years. The Bank of America study gave three reasons why a clean environment is good for business:

1. *The Quality of Life Is Improved.* Providing an improved

environment is similar to providing any consumer good or service: it fulfills the needs of the citizens and improves the quality of life.

2. *Resources Are Better Managed.* Environmental regulations allow for the side effects of using resources. For example, if a factory pollutes a river, and water quality is not enforced, the water in the river may be unsuitable for use by other factories and cities downstream. Regulating pollution enhances overall economic efficiency and productivity.

3. *Long-run Growth Is Maintained.* Environmental protection will sustain long-term economic growth. Short term exploitation of resources can result in unsustainable growth because current market prices do not take future resource limitations into account. Only specific environmental protection can insure that resources will be available for sustainable economic growth.

Another recent study — *Green and Gold*, by Bob Hall of the Institute for Southern Studies — investigated the relationship of economy to environment by ranking states according to both their economic and their environmental health using 20 indicators of each.¹⁸ The 20 economic indicators emphasized job opportunities, working conditions, protection for disabled or unemployed workers, and job creation. The 20 environmental indicators focused on toxic emissions, recycling efforts, and state spending to protect natural resources. The state rankings on the two lists

were remarkably similar. Louisiana was last on both lists and southern states and those reliant on mineral extraction generally ranked low on both. The New England and Scandinavian influenced states rank best on both set of indicators.

Sustainability

When taken together with other evidence, these studies make it clearer that a clean environment is a necessary condition for a good economy, at least when the long term is considered. That brings us to the concept of sustainability.

"Sustainable economic development" is a term that has been in limited use since the early 1970s. More recently, the term was popularized by the 1987 *Our Common Future* report issued by the World Commission on Economic Development.¹⁹

Sustainable economic development is usually defined as a means of satisfying the needs of today without sacrificing the needs of future generations. Although the concepts of sustainable development are in the process of being developed, economist Herman Daly has proposed some operational principles.²⁰ For example, Daly believes that to adequately protect the environment, the scale of economic activities must be appropriate to the surrounding environment, waste emissions must stay within the assimilation capacity of the environment, and harvest rates must be equal to natural regeneration.

Is sustainable economic development at the state level enhanced or retarded by externalities such as high pollution levels? To find out, I statistically compared total subsidies per capita, and our externalities measure discussed above, with a wide range of variables, such as personal income, income disparity, hazardous waste generation, and the unemployment rate.

I also used a "Green Index" scoring system developed by Bob Hall and M.L. Kerr.²¹ The Green Index uses 256 environmental indicators to measure a broad range of environmental conditions and policies across

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states. One group of indicators (179) represents "conditions," while another group (77) represents "policies." The final Green Index score is a combination of the two group scores. In my experience, Green Index scores adequately reflect the general environmental quality of a state.

In general, I found that sustainable economic development is better satisfied by *low* subsidies per capita, i.e. low externalities. Low externalities means lower pollution levels, less reliance on regressive taxes, and more equitable energy prices. Decreases in poverty, income disparity, inefficiency of resource use, resource throughput and unemployment — which are all necessary for sustainability

— occur with *decreases* in subsidies per capita. Environmental quality, as measured by the Green Index, also improves with decreasing subsidies.

One disturbing result of large externalities — increased income disparity — deserves further comment. Income disparity is the difference in average income between the top 20 percent of wage earners and the bottom 20 percent. It increases significantly as externalities and subsidies increase. In fact, the gap between rich and poor has been increasing in the U.S. for some time. During the 1980s, the gap widened in 43 states. In 27 of those states, the average income of the bottom fifth *declined* while the top fifth increased.²² The widening gap indicates that externalities are increasing over time in the US and that is unfortunate for a developed country. Large income disparities are usually a characteristic of a developing country.

Louisiana's income disparity is the highest in the U.S. Between 1979 and 1989, the lowest income 20 percent of Louisiana citizens *lost* \$2,789 (or 31 percent of their income), while the top 20 percent *gained* over \$11,500 (or 15 percent) in annual income.

Competitiveness

Some economists worry that spending on pollution control, and preventing externalities in general, is

not a good investment and may make our industries less competitive. Their concern is not well-founded. One of the benefits of environmental regulation apparent from this analysis, which is rarely if ever acknowledged, is that environmental strategies like waste reduction will require more cooperation, integration and diversity of industry and will increase industrial efficiency and competitive advantage.

A 1993 study by the Organization for Economic Cooperation and Development (OECD) has shown that competitiveness is not affected by pollution control spending, primarily because pollution control spending is such a small part of total industrial sales or expenditures.²³ In addition, the OECD found that there are offsetting positive and negative effects and that environmental policies *may spur innovation, improve efficiency and confer competitive advantage*. I have found the same effect in this study and in a study of how economic systems change over time.²⁴

Recommendations

A number of specific policy or management recommendations are suggested by these analyses.

1. *A state should set ambient environmental standards based on the assimilation capacity of the environment.* Since assimilation capacity is difficult to determine, we can use the relationship of ambient pollutant concentrations to federal or state standards, or a standard based on health risk, to assess whether an area has exceeded its capacity. For example, if an area exceeds a federal ambient standard or health risk standard then we can assume that the assimilation capacity has also been exceeded and emissions should be reduced. In deciding which types of facilities should reduce their emissions, the U.S. average E/J ratios for various industry types can provide guidance. (E/J ratios are available for many manufacturing classifications and can point policy makers in the direction of those dischargers which exceed U.S. average emissions/job by the widest margin). Rigorous enforcement of the standards is necessary but flexibility at the firm level is important. That flexibility should include economic incentives.

2. *Use direct control (command and control) to maintain a threshold level of ambient standards but use economic incentives to achieve the facility discharges determined by E/J ratios i.e. a hybrid regulatory system incorporating both command and control and economic tools, at least for the*

transition to a purely economic system. Examples of economic pollution control tools are the emission tax, tradable permits, or the environmental scorecard concept implemented in Louisiana for one year which conditioned tax exemptions on environmental compliance and the E/J ratio.²⁵

3. *An emissions tax, if used, should at least equal the pollution subsidy.*²⁶ Both the tax and the subsidy can be converted to a \$/lb. figure which would then be assessed so that the cost of the tax is the same as the cost of avoided pollution control at the margin. This means that each states' emission tax would vary depending on the size of the subsidy relative to the US average. Those states which currently grant large pollution subsidies and have high emission levels would have relatively high total emission taxes, though the tax may not be high on a per pound basis. This should eliminate the wide variance in E/J across states, which is not envisioned by federal law, and addresses the equity issue. It would also give some flexibility to states and allow an emissions reduction program to be tailored for a particular state situation, within limits.

4. *Combine or link state environmental quality functions (or agency) with the state economic development agency.* Since these two functions are related, having them together would insure consistent policies. Set a goal for both functions based on reducing the E/J ratio. Decreasing emissions, the function of the environmental agency, and increasing jobs, the function of the economic development agency, will both reduce the E/J ratio.

5. *Reduce a state's energy usage and encourage efficiency.* This will reduce costs and pollution and increase competitiveness. Reasonable prices for industrial energy should be set and maintained. A reasonable energy price for industry relative to residents will promote efficiency and conservation; the US average energy ratio can provide a guide. State policies should encourage conservation, efficiency and alternative renewable energy sources for all sectors. The energy intensity (energy to generate one dollar of Gross State Product) of a state or economic sector is a useful measure of efficiency. A tax incentive system to promote energy efficiency would help reduce pollution and improve a states' public welfare.

6. *Eliminate direct tax subsidies designed to attract industry.* These analyses indicate that they won't work and

may be harmful.

7. State tax policies should reflect a reasonable balance of progressive and regressive taxes — use the US average tax ratio as an example.²⁷

8. It is unlikely that all state political structures can withstand a determined effort by transnational corporations to externalize their costs. To help prevent undue influence on state policy and processes, preventive measures should be enacted or strengthened. Campaign reform including term limits, public financing of campaigns and a public initiative process by ballot seem to be useful ways to limit unhealthy political influence which negatively affects the environment and the economy.

Conclusion

It has become abundantly clear that there is little or no supporting evidence for the supposition that progressive environmental policies are detrimental to a state's economy. There is substantial and growing evidence, much of it practical empirical evidence, that

the converse is true, i. e. that a clean environment not only is good for business, but is probably a necessary condition for a healthy economy over the long term.

The efforts we make to improve our environment can only benefit our quality of life, including our economic life, and improve our chances of being sustainable. A sustainable society follows a path which includes low pollution and conserved resources with more equity leading to a higher quality of life for all of its citizens.²⁸

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Readers interested in a longer version of this paper (23 pages with all graphs and tables) can order it from NCAMP; send \$4.00 for postage and handling to NCAMP, 701 E St. SE, Suite 200, Washington DC 20003.

Readers interested in the author's other technical articles can contact him at 42 Atkinson Hall, Baton Rouge LA 70803; (504) 388-6428; (fax) 388-4286.

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