

WILL RHODE ISL

BE THE FIRST GREEN STATE?



Newport Bridge crosses Narragansett Bay.

**By Harold R. Ward
and Robert W. Kates**

Rhode Island, the last of the 13 original states to ratify the U.S. Constitution, could become the first of the 50 states to adopt a comprehensive program to clean its air and water, recycle and reduce waste, conserve energy and water, preserve natural places and spaces, and share both the environment and environmental risk equitably among its

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STOCK NEWPORT—ONNE VAN DER WAL

people. Probably no U.S. state can achieve true “sustainability,” but becoming “green” might be comparatively easy for Rhode Island because its size is small, its vistas are beautiful, and its citizens are not only innovative but also committed to cleaning up their state. Those were the authors’ assumptions when, in April of 1990, they invited six colleagues to gather and con-

sider how Rhode Island could become a green state. (One ranking of states’ “greenness” is shown in Figure 1 on page 12.) In addition to both authors, members of the Green Rhode Island (GRI) discussion group included Robert L. Bendick, director of the Rhode Island Department of Environmental Management; Sean Coffey, an attorney and state senator; Caroline Karp, director of the state’s Narragansett Bay Project; Mary Kilmarx, director of energy policy at the Public Utilities Commission; and Curt Spalding, acting director of Save the Bay. After Bendick became deputy commissioner of the New York State Department of Environmental Conservation and departed from the group, Judith Benedict, chief of planning and development for the Rhode Island Department of Environmental Management, and Ancelyn Lynch of Brown University joined the group.¹

This article presents the conclusions of the group, including its criteria for judging a green state, the specific measures advocated for use in Rhode Island, and the political and economic realities that need to be addressed to carry such an environmental program from conception to reality. Ideally, the group might have arrived at these conclusions in a neat, deductive, and serial fashion by first defining the criteria a green state must meet; second, setting goals whose achievement would satisfy the criteria; and third, beginning the political process to achieve those goals. Instead, in the weeks that followed the first group meeting, discussions wandered among

considerations of what the state already had accomplished, what other states were doing, what Rhode Island could do, and what it would take to encourage the implementation of new environmental practices. Out of that creative process, a few rules and assumptions emerged.

The GRI discussion group decided that the claim to be a green state should rest on solid achievement rather than good intentions, future plans, or the existence of state laws. (See the box on page 13 for criteria used by other groups to rank states.) The group decided that a plan to achieve green status should be comprehensive—embracing the major areas of environmental concern—and capable of moving the state toward long-term sustainability of a healthy environment. At the same time, goals should be credible, lying within the state’s prerogatives (see the box on page 14), and based on innovative programs or concerns already in place or on technologies or institutions that work well in other states. A plan to become a green state also would have to be politically comprehensive; simple and clear enough to be understood by all interested Rhode Islanders; challenging to the leading political and economic interests of the state; and novel

HAROLD R. WARD is an environmental lawyer, professor of chemistry and environmental studies, and director of the Center for Environmental Studies at Brown University in Providence, Rhode Island. **ROBERT W. KATES** is a geographer, university professor, and director of the Alan Shawn Feinstein World Hunger Program at Brown University.

enough to attract the attention required to earn a place on the public agenda.

The discussion group divided Rhode Island's environmental concerns into five areas within the state's purview: waste reduction efforts; conservation of water and energy; preservation of species, natural areas, and open spaces; equitable use of and access to environmental resources; and restoration of the unique Rhode Island resource, Narragansett Bay. For each concern, the group set a major goal to be achieved within a 5- to 10-year period, a goal that could be reached by building on an already existing set of programs or by using the best available techniques. (The goals chosen by GRI are shown in the box on page 34.)

Hazardous and Solid Wastes

With slightly more than 1 million people in its 1,200 square miles, Rhode

Island is the smallest of the United States, the second most densely populated, and the third most urbanized. In 1988, U.S. residents generated on average 4 pounds of solid waste per person per day. In contrast, Rhode Islanders in 1990 are expected to produce 509,000 tons of residential solid waste (2.8 pounds per person per day) and 465,000 tons of commercial solid waste.² And each year, Rhode Island industries release or transport more than 33,000 tons of hazardous waste, and a major portion of the released waste is emitted directly into the atmosphere.³

Rhode Island has made such substantial progress toward integrated solid waste management that it received the 1989 Best Regional Program Award given by the National Recycling Coalition. Currently, 24 Rhode Island communities are recycling at least 14 percent of their residential waste, and, by the end of 1991, all 39 communities in

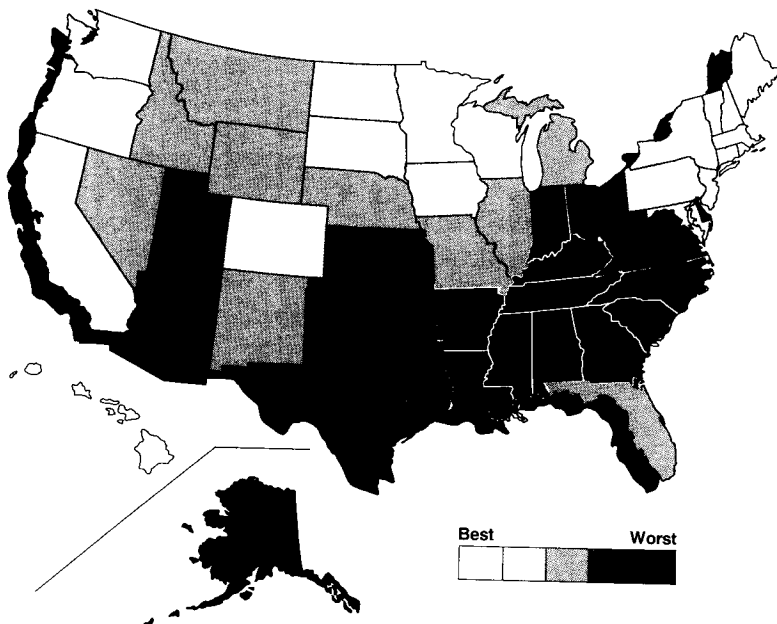
the state are scheduled to be recycling. Commercial waste generators already are required to recycle paper and beverage containers, and organizations with 100 or more employees must prepare and implement waste reduction and recycling plans (see the box on page 37).

The Hazardous Waste Reduction Program, although it is in an early stage of development, has won the Friends of the United Nations Environment Programme 1990 Award for Innovative Programs. This waste reduction program offers technical assistance and low-interest loans to hazardous waste generators who need help to decrease the environmental impacts of their operations, but limited resources have delayed development of a comprehensive program.

In the future, Rhode Island probably can reduce the amount of solid waste requiring disposal by at least 50 percent. To achieve this reduction, however, all residents and businesses must confront the true costs of properly managing the waste they produce, and the state must provide viable and attractive alternatives to the creation and disposal of waste. Currently, most residential solid waste management is funded through property and income taxes, with some subsidization through commercial waste disposal revenues. There is no connection between the amount of waste discarded by a resident and that resident's contributions to the cost of waste management. A number of U.S. cities have implemented user fees based on the amount of waste discarded, but thus far no state requires such a fee. After a user fee was implemented in Seattle, Washington, waste discarded per household decreased by 24 percent. In the year following the implementation of a user fee in Perkasio, Pennsylvania, 40 percent less waste was brought to the transfer station.⁴

Rhode Island could institute a simple one state/one rate user-fee system by requiring residential waste to be discarded in special garbage bags. The revenue from these bags, sold in local stores for a modest profit, could fund the entire residential solid waste man-

FIGURE 1. An environmental scorecard for the United States.



Note: The ranking is based on scores given to each state for 35 environmental indicators.
SOURCE: The Institute for Southern Studies, Durham, North Carolina, April 1990.

agement system, including composting, recycling, and source reduction programs. Implementing such a program would also entail doubling the capacity of recycling facilities, increasing the number of materials accepted for recycling, creating central composting facilities, and encouraging both backyard composting and household hazardous waste reduction.

Commercial generators of solid waste already pay for waste management, but often these costs are not visible to financial managers. Disposal costs are often concealed inadvertently within housekeeping or building management budgets and are not included in the cost accounting for the process that generates the waste. When required to acknowledge these costs directly and to explore alternatives in the process of preparing a comprehensive waste management plan, many Rhode Island businesses have been able to reduce waste and save money. The GRI discussion group believes that, if small businesses were required to design similar waste management plans and were supported by a strong state technical assistance program for the segregation and marketing of recyclables and development of waste reduction strategies, small businesses could reduce the waste they discard by more than 50 percent.

The discussion group's hazardous waste reduction strategy is a direct copy of the state's commercial solid waste planning requirement. While industrial generators of hazardous wastes, such as the solvents and oils used in manufacturing, often pay a significant price for disposing some (but not all) of their wastes, these costs are not always assigned directly to the processes that produce the wastes. The GRI strategy would make top managers sign statements that acknowledge the kind and amount of toxic substances released into the environment and list alternative methods for reducing the volume of these releases. Experience with pilot programs in Rhode Island, North Carolina, Georgia, California, and Minnesota suggests that toxic releases are sometimes reduced after chief executive officers are made aware of the

costs of current waste production and of options for avoiding or reducing those costs. When hazardous emission volumes are reduced by decreasing the amount of toxics used in industrial processes, workers' exposure to toxic substances also may be reduced or eliminated.

Hazardous waste reduction planning and reporting could be required as soon as 1991 for all Rhode Island businesses that release significant amounts of toxic materials into the air or water or ship hazardous waste for disposal elsewhere. Toxic air emissions could be reduced by

regulation; no new laws would be required. A planning and reporting requirement does need to be supported by a technical assistance program to provide generators with information on waste avoidance options. Such a program could achieve at least a 60 percent reduction in toxics released and might result in significant cost savings as well.

Water and Energy

Rhode Islanders use about 150 million gallons of freshwater per day, four-

HOW DO THE STATES COMPARE?

Recently, there have been two comprehensive evaluations of the United States that judged each state on various environmental criteria. The first group of studies, conducted by Renew America (RA) in Washington, D.C., ranked the states on five different general categories each year from 1987 to 1989.¹ The more recent comparison, by the Institute for Southern Studies (ISS) in Durham, North Carolina, is "a report card on the nation's environment," based on 80 "green index" indicators and 25 "policy snapshots."² The ISS green rank scorecard is shown in Figure 1 on page 12.

In both cases, states are ranked on criteria that can be categorized roughly as descriptions of

- trends, such as growth in carbon emissions from 1966 to 1986, change in energy consumption from 1960 to 1986 (ISS) and 1987 (RA), wetlands lost since 1780, population change from 1960 to 1987, change in urban land area from 1960 to 1980, number of farms gained or lost from 1974 to 1987, and change in forest acreage from 1982 to 1987;

- current status, such as cropland erosion, number of Superfund sites, total toxics release, total water consumption, and river miles not meeting federal water quality standards; and

- policies and programs, such as the number of curbside recycling programs, air pollution control program budgets, legislation requiring plans to protect groundwater, state spending on parks per capita, and number of woodland

owners assisted by state forestry programs.

ISS used 5 trend criteria, 59 status criteria, and 41 policy criteria to rank the states, while RA used 3 trend criteria, 35 status criteria, and 36 policy criteria. ISS sums rankings on individual indices to generate a total ranking over all indices. As such, status and policies together account for 95 percent of the scores, completely overwhelming measures of trends.

Renew America describes its method of converting the individual measures into rankings only qualitatively. In other words, one measure is described as being given "greater weight" and another "less weight," so it is difficult to know how strongly each of the three categories influenced scores.

Based on 35 ISS indicators, Rhode Island ranks 4th but is tied with 3 other states for 14th place in the 1989 RA rankings. However, both of these organizations used only a few measures of achievement. In the opinion of the Green Rhode Island discussion group, a state's degree of greenness should be evaluated by its actual achievement of environmental progress (i.e., by demonstrable trends), rather than by the numbers of environmental laws on its books or unexecuted environmental plans on its agenda.

1. Renew America, *The State of the States 1987* (Washington, D.C.: Renew America, 1987); idem, *The State of the States 1988*; and idem, *The State of the States 1989*.

2. Institute for Southern Studies, *1990 Green Index: A State-by-State Report Card on the Nation's Environment* (Durham, N.C.: Institute for Southern Studies, forthcoming).

fifths of which is from public supplies and slightly more than half of which is for domestic use. Overall, freshwater withdrawals have remained fairly constant for 20 years, as a shift away from water-intensive industry has been balanced by modest growth in population size and the number of households. A redistribution of population within the

state, however, has caused a mismatch of supply and demand, which could be alleviated if overall water use were decreased by 20 percent. Citizens' concern for the quality and maintenance of existing water sources, reluctance to lose wetlands to create additional sources, and desire for better drought management also increase the need for

water conservation. This September, the state government acted to realize such a goal by revising the plumbing code to require all new construction and renovation to include water-conserving toilets, showers, and faucets. This requirement alone will lead to an estimated 10 percent decline in per capita residential water use.⁵

A recent water supply analysis concluded that protecting existing water supplies and adopting water conservation measures would cost significantly less (between \$100 and \$300 per million gallons) than developing new supplies (from \$300 to \$1,000 per million gallons). Implementation of the conservation and protection options would provide an adequate safety margin of water supply in all parts of the state. Specific suggestions for saving water include

- an aggressive retrofit program for sanitary devices that could save 5 million gallons of water per day at a cost of \$200 per million gallons;
- leak detection and repair that could save 8.6 million gallons per day at a cost of \$350 per million gallons; and
- technical and limited financial assistance to industrial and institutional users, which could save as much as 3.5 million gallons per day at a cost of \$175 per million gallons.⁶

These conservation programs can be encouraged by increasing block rates, by pricing water seasonally in accordance with demand, and by combining the billing for water with that for wastewater treatment. The protection and maintenance of existing water sources could preserve a supply of about 25 million gallons per day, which otherwise would be at risk from wellhead and watershed contamination or because local supplies would not be maintained when communities shift to larger, central water supplies.

Rhode Islanders are relatively thrifty in energy use, with the lowest per capita energy consumption and the lowest per capita carbon emissions in the United States.⁷ Energy conservation is widely practiced in Rhode Island. Even before

WHAT STATES CAN AND CANNOT DO

A state's green goals, while ambitious and challenging, must lie within reach of the legal and economic authority of the state. Some potential state actions clearly are preempted by federal authority or by the U.S. Constitution; the Constitution's commerce clause, in particular, limits the ability of states to insulate themselves from the environmental impacts of neighboring states' activities. Other state actions may be legal but ineffective because of the limited economic influence of an individual state, especially one as small as Rhode Island.

Without some compelling and legitimate purpose, states cannot interfere beyond certain legal limits with interstate commerce. For example, the commerce clause prevents states from excluding out-of-state solid waste from privately owned landfills. Also, a state's ability to tax at a very high rate any undesirable activity originating in another state may similarly be limited by the commerce clause.

When federal regulation is sufficiently comprehensive, it may preempt closely related state regulation, as it does in the case of nuclear power plant operation. Most federal environmental regulations, however, allow states to set regulations that are more stringent than federal standards. But there are physical limits to regulation as well. Theoretically, Rhode Island could eliminate emissions of the precursors of tropospheric ozone but still fail to meet ambient ozone standards because of air pollution transported from Connecticut.

State initiatives that rely on product bans, heavy taxes, and strict standards may pass legal tests but fail economically. When a state attempts to require modifications of products, national and international manufacturers may find it cheaper to abandon their markets in that

state than to conform to the regulations. Consumer pressure to retain product choice may defeat the initiative as well.

Large states have an advantage in regulating products. For example, California has succeeded in regulating stringent automobile emission standards. Small states offer smaller markets and have more permeable borders because their residents can more easily purchase banned or heavily taxed products in neighboring states. To overcome these problems, some states have formed coalitions that, by achieving regional uniformity, seek to build economic power and reduce the reasons people cross borders. The diversity of state regulations motivates manufacturers to seek preemptive federal regulations, which may improve the environmental quality nationally but are often less stringent than regulations that a green state would adopt.

Apart from legal and economic restraints, state action generally is limited only by political will, creativity, and economic resources. Some actions are effectively symbolic, serving to point the society in a new direction, rather than actually achieving the desired end. For example, Vermont has passed legislation to ban the use of chlorofluorocarbons in automobile air conditioners, but the ban will not go into effect until a future date. Social reform often begins in this way.

The economic downturn currently affecting New England and economists' fears that businesses will seek more forgiving locations in other states and countries are factors that tend to temper or delay state actions that protect the environment. But on balance, localities that encourage a clean environment and environmentally responsible businesses are attracting economic development because industries prefer the clean and beautiful locations where their executives want to live.

the 1973 oil embargo, Rhode Island had the lowest annual growth rate in energy consumption (1.6 percent) of any state since 1960. Between 1973 and 1986, energy use per capita declined by 1.2 percent annually because of economic restructuring and conservation.⁸ More than 39,000 homes and 2,500 businesses have installed energy conservation measures, and more than 19,000 low-income households have been weatherized. Today, energy consumption divided by sector is about 30 percent residential, 30 percent transportation-related, and 40 percent commercial and industrial.

Electric utility officials' attitudes toward energy conservation in Rhode Island and in New England as a whole could be called enlightened relative to attitudes in other areas of the country, except perhaps the Pacific Northwest. After the Conservation Law Foundation of New England, a public-interest intervener, demonstrated to the Rhode Island Public Utility Commission that conservation was the least costly strategy, the commission began to order detailed conservation studies and found that, indeed, it could justify authorizing a higher rate of return on utilities' investments in conservation than on investments in energy production. (For more on this subject, see Eric Hirst's article, "Demand-Side Management: An Underused Tool for Conserving Electricity," in the January/February 1990 *Environment*.) In Rhode Island, the current policy calls for a 20 percent reduction in projected peak demand (which otherwise is expected to rise at a rate of 1.9 percent per year) by the year 2000. To achieve that reduction, Narragansett Electric, a major Rhode Island utility, has embarked on extensive programs to provide consumers with more efficient electrical devices. In return, the Public Utilities Commission has authorized incentive payments that will allow utilities to profit from the substitution of conservation for new supplies as an energy resource. An overall reduction of 20 percent in energy consumption can be achieved by aggressively pursuing the existing strategies, which include accelerating the in-

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RHODE ISLAND DEPT. OF ENVIRONMENTAL MANAGEMENT



Rhode Islanders currently generate 2.8 pounds of solid waste per person per day—30 percent less than the average U.S. resident. A user fee that tied the cost of waste disposal to the amount of waste disposed might cut that rate in half.

stallation of energy-efficiency measures in homes and businesses; amending the building, plumbing, and lighting codes to incorporate more stringent efficiency standards; and encouraging building practices that minimize energy use through education and rebate programs.

In the transportation sector, the improved automobile mileage mandated by national standards may lead to significant reductions in gasoline use, but these standards could be reinforced by imposing a graduated car registration fee; owners of new cars with low gas mileage would pay the highest fees. Additional energy conservation could be achieved through improved automobile inspection and maintenance programs. Over time, Rhode Island could reduce gasoline consumption by 20 percent if the present average car's consumption rate of 12.6 miles per gallon were increased to the national average of 14.2 miles per gallon.

Open Spaces

Densely populated and highly urbanized, Rhode Island is not only the 12th most forested state (60 percent) but also the state with the highest pro-

portion of inland waters (13 percent, including Narragansett Bay). Some 100,000 of the state's 675,000 acres of land (about 15 percent) are protected as open space (see Figure 2 on page 35). These protected areas include 56,000 acres of state-owned land; 1,000 acres of federal land; 31,000 acres of local parks, open spaces, and water supply lands; and 10,000 acres held by private conservation organizations. To date, the purchase of development rights by the state has protected 1,500 acres of farmland. Also, about 25 percent of the state's riverbanks are protected, including more than 33 percent of the banks of the Blackstone and Queens rivers and 25 percent of the banks of the Wood and Pawcatuck rivers. Some riverbanks are owned by nonprofit conservation organizations, such as the Audubon Society of Rhode Island.

A 1988 scenic landscape survey identified 135 sites of "distinctive and noteworthy" landscape quality. These sites include approximately 100,000 acres, many of which are not protected. Another state-run project, the Natural Heritage Program, has identified 302 plant and animal species as being "endangered," "threatened," or "spe-

(continued on page 34)

Rhode Island

(continued from page 15)

cial interest or concern." The habitats of about 40 percent of the rare species in Rhode Island currently are protected.⁹

The GRI group did not conclude how much land should be preserved as open spaces or natural areas but, instead, concentrated on equity, protection, and linkage of green spaces. Over time, an additional 10,000 to 15,000 acres ideally should be acquired to protect distinctive landscapes and the habitats of rare species; to consolidate and link existing public land holdings; and, most important of all, to provide equity for all state residents in gaining access to the state's scenic, recreational, and natural areas. A green Rhode Island

would use a combination of land acquisition and regulation to tie open spaces together and create a statewide system of "greenways." The discussion group believes that no Rhode Islander should live more than 15 minutes away from a greenway or park—whether by automobile for rural residents or by walking for urban residents.

Since 1985, voters have approved issuance of four bonds totaling \$92 million to provide funds for land acquisition and farmland preservation. These bonds represent the highest per capita spending on open space protection of any state in the country. Even so, Rhode Island still needs to provide sufficient permanent state and local sources of funding for open space acquisition so that, for 7 to 10 years, the amount of protected land can increase annually by approximately 1,500 acres of open space and the development rights to 500 acres

of farmland can be acquired each year. New legislation is needed to protect river corridors, to double the number of protected riverbank miles from 65 to 130, and to preserve enough critical habitats that the number of protected rare and endangered species will double. Equitable and convenient access to the coast for all Rhode Islanders could be ensured by the state's acquiring more shoreline property, identifying and maintaining legal right-of-ways, and requiring that, in all new shoreline construction, developers preserve public access to beaches.

Environmental Risks

There is significant environmental risk in Rhode Island, and its burden falls unequally on segments of the population. Risks are generally high in urban areas, especially for people who live near highways or near industries that use solvents. A 1988 study by the U.S. Environmental Protection Agency (EPA) evaluated 24 sources of environmental threats to public health in New England.¹⁰ The study concluded that the greatest cancer-causing threats to humans are posed by radon gas and pesticide residues in food. The greatest noncarcinogenic threats are posed by lead, which can cause chronic poisoning, and by high exposure to ground-level ozone in the summertime. The discussion group's analysis of environmental risks in Rhode Island generally concurred with EPA's rankings except that it gave a higher rank to the risk from airborne toxic substances. EPA conceded that this risk may have been underestimated because of a lack of data. The discussion group ranked pesticide residues as a lesser threat, based on the results of 1989 tests on grocery store produce conducted by the Rhode Island Department of Health. In these tests, no significant violations of pesticide regulations were detected.¹¹

GRI group members concluded that it was important not only that Rhode Island make significant reductions in the magnitude of environmental threats to its people, but also that it apportion the residual risk fairly. Thus, just as

ACHIEVABLE GOALS FOR RHODE ISLAND

The following is an excerpt from the position paper, "Goals for a Green Rhode Island," written by the Green Rhode Island discussion group.¹

By the year 2000, the state can:

- *Reduce and recycle hazardous and solid waste.* We already have the best solid waste recycling programs in the country (1989 Award for the Best Regional Program by the National Recycling Coalition) and awards from the United Nations and from the National Environmental Awards Council for our hazardous waste reduction program. We need to reduce the amount of waste disposed by landfilling or incineration to less than 50% of the amount currently generated and to minimize the use and to reduce the release of hazardous substances by 60% from current levels.

- *Conserve our energy and water.* We already have a state energy plan for reduction in projected peak electrical demand and a [Public Utility Commission] ruling providing utilities with incentives for conservation programs. We need to reduce the consumption of electricity, fossil fuels and water by 20% from current consumption levels.

- *Preserve and link our open space to*

provide accessible greenways. We already have the highest per-capita expenditure for open space preservation in the nation. We need to preserve an additional 15,000 acres of land to protect important natural and cultural areas and link open space together in Greenways. No Rhode Islander should live more than 15 minutes from a Greenway.

- *Reduce environmental risk equitably.* We already have one of the best risk-based air toxics programs in the nation. We need to reduce sources of environmental risk so no Rhode Island resident must tolerate more than a minimal risk (1 in 100,000) from involuntary exposure to toxic substances.

- *Enhance the quality of Narragansett Bay.* We already have one of the healthier, best-used estuaries in the populated Northeast Corridor. We need to eliminate 100% of the discharge of untreated sewage to protect recreational and commercial uses of the State's waters and to protect aquatic habitats.

1. Robert L. Bendick, Judith Benedict, Sean Coffey, Caroline Karp, Robert W. Kates, Mary Kilmarx, Curt Spalding, and Harold R. Ward, "Goals for a Green Rhode Island" (Unpublished position paper by the Green Rhode Island group).

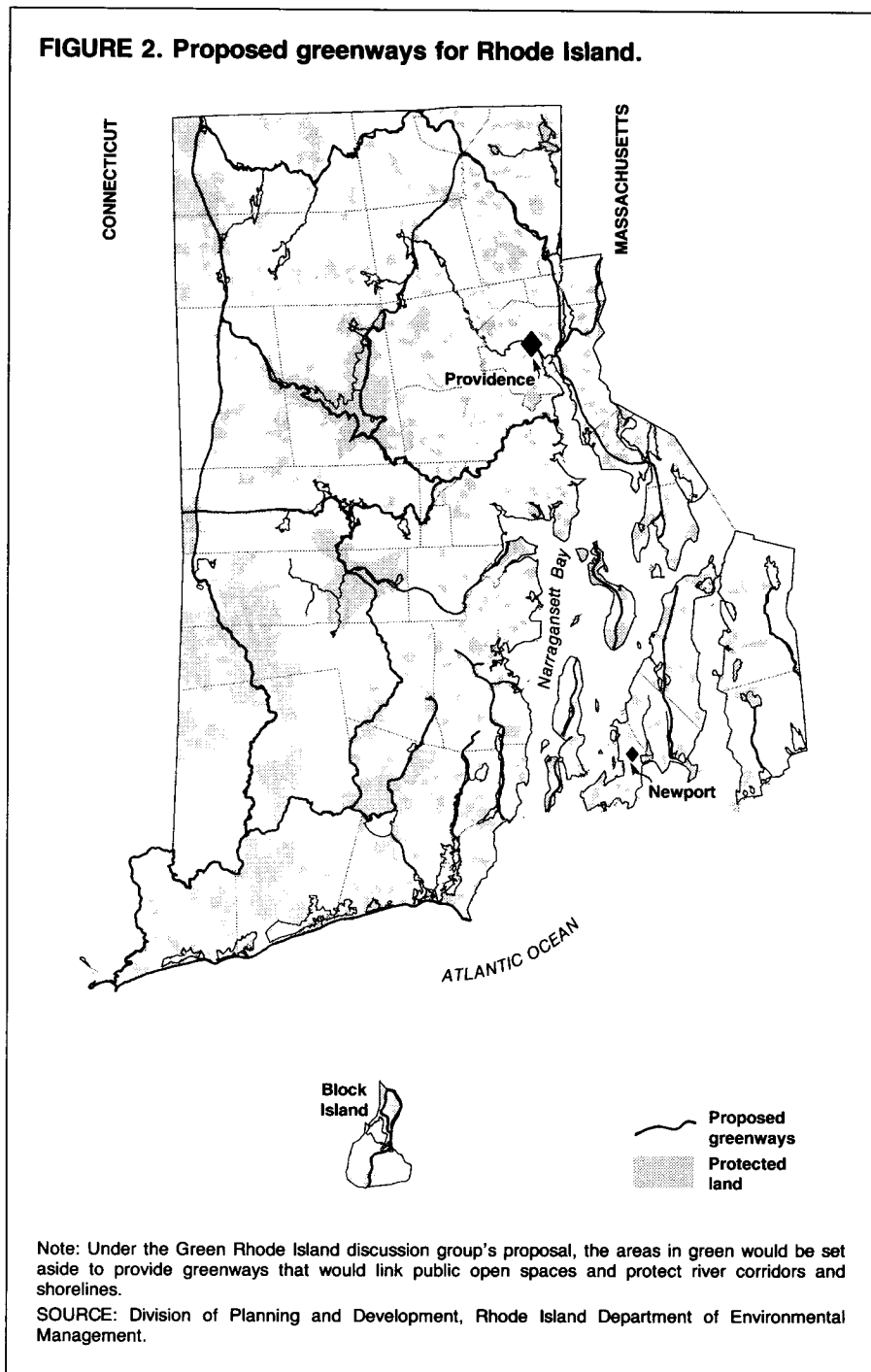
there should be equity in gaining access to the pleasures of the natural Rhode Island environment, there should be fairness in exposure to its hazards. The GRI group adopted as an overall standard of permissible risk that no Rhode Islander should be exposed to an average increased risk of death greater than 1 in 100,000 caused by lifetime nonoccupational exposure to toxic substances. Maintaining such a standard is important for a state that ranks sixth in the incidence of cancer.¹² A 1989 EPA study of 5 unspecified cities indicated that an average lifetime cancer risk of 4 in 10,000 results from exposure to toxic air emissions and that more than half of this risk stems from road vehicle sources.¹³

The greatest airborne cancer risks, however, are actually inside the home, particularly in states like Rhode Island, where the decay of uranium in underlying granitic rock generates significant amounts of radon. Indoor levels of radon gas in approximately 70,000 (20 percent) of Rhode Island homes exceed the EPA safety limit guidelines for indoor radon. In a population the size of Rhode Island's, this level of exposure is expected to result in more than 35 deaths per year from cancer of the lung and bronchus, which would account for nearly 6 percent of the total incidence of lung cancer.¹⁴ The next most significant cancer risks are those posed by the more than 33,000 tons of toxic chemicals emitted each year into the air of Rhode Island.

The major risk from a nonairborne, noncarcinogenic substance is the risk of chronic exposure of urban children to lead—mostly lead in old paint. Approximately 17 percent of children from 6 months to 5 years old in the greater Providence metropolitan area are thought to have lead levels of more than 15 micrograms per deciliter of blood—a level believed to cause neurotoxic effects. Black children and children of low-income parents have a much higher probability of exceeding this level.¹⁵

Airborne pollutants also cause serious noncancerous illnesses. Approximately 4 percent of the population is

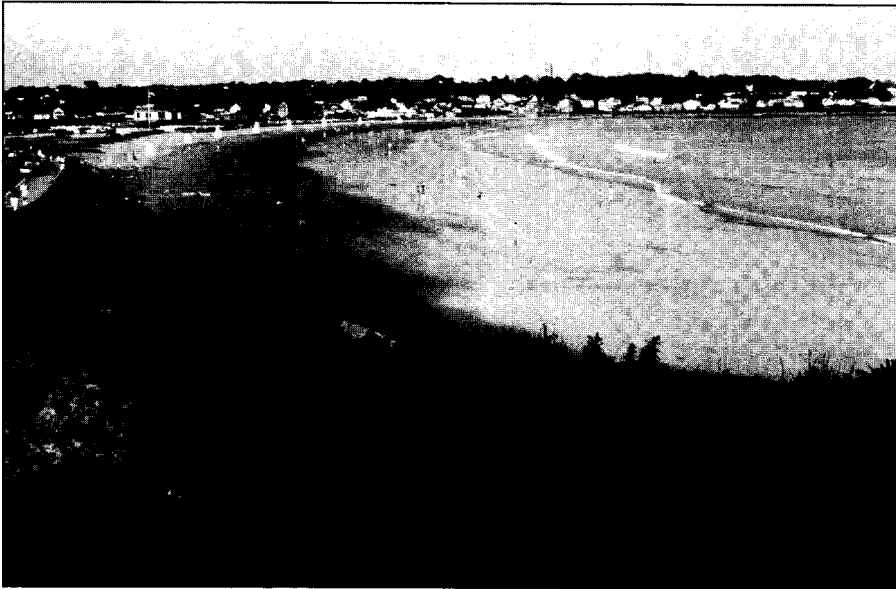
FIGURE 2. Proposed greenways for Rhode Island.



asthmatic and prone to have attacks during the half-dozen days every year when ambient urban ozone levels exceed the permitted standard.¹⁶ Many other people without asthma, particularly the elderly, also are forced to restrict activity on such days.

Looking to the future, a green Rhode Island would minimize the environ-

mental risk to all its citizens by reducing radon, airborne toxics, lead, and ambient ozone levels. Rhode Island already has one of the few risk-based air toxics regulations in the country. No Rhode Island industry is allowed to impose a risk of more than 1 in 100,000 on people outside the industrial facility by releasing into the ambient air any of



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Rhode Island calls itself the Ocean State. For sports and recreation, residents take advantage of the Atlantic beaches as well as the 13 percent of the state's total area that is inland water.

the 40 most common toxics. To date, the Rhode Island Hazardous Waste Reduction Project has provided audits to 32 companies. Over time, all new construction should incorporate radon-proofing features; retrofitting with radon protection should be linked to weatherization of window and door leaks; and radon should be reduced in water from private wells. The Rhode Island air toxics regulations should be extended to cover additional toxic substances, hot spots for air toxics should be identified and scheduled for priority action, and the efforts described above that are required to reduce hazardous waste should be implemented. Unfortunately, Rhode Island cannot solve its ozone pollution problem by itself, but the state could be a leader in the regional effort to reduce emissions of ozone precursors. The existing program for environmental lead removal could be strengthened by passage of new legislation to require the removal of lead-containing paint from surfaces where it poses a significant risk.

Narragansett Bay

Narragansett Bay is the centerpiece of Rhode Island's natural resources. Its shoreline and 147 square miles of water

are used heavily for recreation. In a 1985 survey, 85 percent of the public said that they used the bay for sightseeing and walking along its beaches, and 64 percent said that they used it for more active recreation, such as swimming, fishing, or boating.¹⁷ The bay contains Bay Island Park and was one of the first bays to be named to the National Estuary Program. It also is the receiving water for 1,657 square miles of watershed (645 of which are in Rhode Island; the rest are in Massachusetts).

Thirty-two publicly owned sewage treatment plants in the Narragansett Bay drainage basin discharge more than 200 million gallons of treated sanitary and industrial wastewater into Narragansett Bay each day. These plants effectively disinfect for enteric bacterial contaminants in dry weather.¹⁸ However, in wet weather, 116 sewage overflows discharge a combination of untreated sewage, industrial wastewater, and storm run-off into Narragansett Bay. These sewer overflows and the flows that bypass treatment plants when plant capacity is exceeded contribute 95 percent of the fecal coliform entering the bay. (The level of this benign intestinal bacterium is used to indicate the probable amount of human waste present.) The remainder comes

from treatment plants, boats, and failing septic systems. Forty percent of Rhode Island households rely on on-site septic systems to treat residential wastewater, and such systems have an estimated failure rate of 3 percent.

These significant discharges of sewage into Narragansett Bay translate into differing assessments of the bay's water quality. Visually, the upper bay water quality has improved in recent years. Twenty years ago, the entire upper bay was closed to shellfishing because of treatment plant failures and bacterial contamination. Although permanently closed areas remain, most areas now are closed only when water quality is threatened. Oysters have begun reappearing in the Providence River. Sediment core samples indicate that heavy metal contamination has been reduced; nickel, copper, and lead concentrations have decreased significantly. Concentrations of organic pollutants, such as petroleum hydrocarbons and polycyclic aromatic hydrocarbons, also are declining. A dramatic decrease in polychlorinated biphenyl (PCB) levels has occurred in the Blackstone and Pawtuxet rivers. A recent assessment by the Rhode Island Department of Environmental Management stated that 95 percent of the state's estuarine waters meet federal "fishable-swimmable" standards.¹⁹

Much of the upper bay remains closed to body-contact recreational activities, and shellfishing is restricted in 43 percent of the bay. To many Rhode Islanders, the availability of the quahaug, the state shellfish, symbolizes the quality of the bay's waters. In 1988, some areas were closed to shellfishing for 196 days, or 54 percent of the year. Shellfishing standards are the most demanding of marine water quality standards. This stringency reflects the unique role of the bay and the strength of the effort to protect it.

The highest priority for Narragansett Bay should be the elimination of the untreated sewage discharges from sewer overflows, treatment plant bypasses, failed septic systems, and boats. Enforcement of existing regulations could reduce the discharge of sewage

into storm sewers. Wet weather flow could be stored and subsequently treated. Existing treatment plants' capacities could be increased, and infiltration and inflow could be decreased, so that plants' capacities are exceeded much less frequently. Septic system failures could be reduced sharply by enforcing existing regulations, ensuring regular maintenance, and requiring installers to post bonds as an incentive to design and install new systems properly. Provision of convenient pump-out facilities for boats could be combined with strict sanctions against direct sewage discharge to curtail pollution from marine sources.

A cleaner bay is a prerequisite for a healthy aquatic habitat. When the ecological balance is restored, native species such as Atlantic salmon, striped bass, and eels can be reintroduced to bay tributaries. Fish and wildlife habitats could be expanded by an aggressive program of coastal wetland restoration and by preventing reconstruction of coastal structures damaged or destroyed by storms.

Making Rhode Island Green

The GRI group's initiative to make Rhode Island the first green state is emerging from the early stages of discussion, research, and formulation of policy options. As a broad spectrum of leaders are asked to endorse the initiative, it is entering into the political and social life of the state. Efforts are under way to make the plan public and will culminate in a pre-election drive to elicit the opinions and enlist the support of the gubernatorial candidates. It is too early to tell whether Rhode Island's environmental issues will be featured on the public agenda, but the state's model recycling program and some of the green issues presented here may inspire other states to explore what would be required to become green. To rephrase Kermit the Frog's famous song, "it's not easy *becomin'* green."

It is the genius of the U.S. federal system that 50 experiments in governance might be undertaken simultaneously.²⁰ Historically, as new standards

THE UNIVERSAL BLUE BOX

Rhode Island was the first state to require recycling of both residential and commercial solid waste. Key to the Rhode Island approach is that 89 percent of the state's trash goes to a single state-owned landfill, access to which can be controlled to mandate recycling. Currently, 16 communities use the "blue box," a household receptacle for weekly curbside collection of recyclables, and residents of 8 more communities bring recyclables to trash transfer stations. In this way, an average of 14 percent of all trash from these communities is segregated by recycling. Plastic milk and soda containers (made from high density polyethylene and polyethylene terephthalate), aluminum cans, glass containers, and tinned steel cans are rinsed and placed commingled in the blue box. Newspapers are bundled or put in brown paper grocery bags on top of the containers. Recyclables are collected by special trucks on the same days as trash is picked up.

The Rhode Island Materials Recovery Facility (MRF) was, until recently, the largest facility in the country and is now operating at capacity. Each month, 3,000 tons of recyclables are processed at MRF. Shortly after construction of the second MRF is completed in August 1991, all of

the state's communities will be recycling. Then, the list of materials being recycled will be extended to include corrugated paperboard, rigid plastic containers, and mixed paper. Yard waste will be accepted for composting, not for disposal.

Collection and transportation of recyclables, at \$95 per ton, are more expensive than they are for trash, at \$50 per ton, but net processing costs of \$21 per ton are partially offset by the sale of collected materials—even with the currently depressed markets for recycled materials. These net processing costs compare quite favorably with the \$80 per ton net cost anticipated for incineration.

Commercial trash brought to state-owned disposal facilities may not contain more than 20 percent by volume of materials on the list of commercial recyclables. This list includes office paper and corrugated paperboard, in addition to all the materials on the residential list. Commercial operations with more than 100 employees must prepare a waste reducing and recycling plan based on an official waste audit. Each year, the companies must report how much waste has been reduced and recycled and what attempts are being made to reduce the remaining amount.



A "blue box" of recyclables sits at the curb for collection.

RHODE ISLAND DEPT. OF ENVIRONMENTAL MANAGEMENT



A salt pond sits among green fields on Block Island off the coast of Rhode Island. Four bonds totaling \$92 million have been issued to fund land acquisition and farmland preservation in Rhode Island.

RHODE ISLAND DEPT. OF ENVIRONMENTAL MANAGEMENT

of social responsibility and new needs for social organization were recognized, some states took the initiative to create options and explore innovations. In recent years, only half a dozen states have shown consistent leadership in creating innovative approaches to resolving the complex issues of environmental protection, equity, and sustainable development. Rhode Islanders' attempt to establish the first green state is only one of several state initiatives under way. Extensive education and exhortation will be required before the necessary regulation and legislation become realities. Bond issues will be needed to improve water quality and preserve open spaces. Meanwhile, environmentalists across the nation will follow election results to see whether Californian voters approve the initiative called "Big Green" in November. (See John Mark Johnson's "Citizens Initiate Ballot Measures" in the September issue of *Environment*.)

From space, Rhode Island appears as a green kink in the Atlantic coastline. Its automobile license plates proclaim Rhode Island to be the Ocean State because one-eighth (150 square miles) of its total area is saltwater. Because so much of the state is already blue, aspiring metaphorically to be green as well is surely a bit of hubris; it

stretches the prism of visible light as well as the concept of sustainable development. This idealistic aspiration already has encouraged many of Rhode Island's environmentalists to consider a broad spectrum of environmental problems and needs, to define what these mean for the state, to link them to measurable goals for improvement, to identify practical ways to achieve these goals, and to begin rallying the needed public support and political will.

NOTES

1. The conclusions of the Green Rhode Island group have been summarized in an unpublished position paper, "Goals for a Green Rhode Island." The group was assisted by Ken Nikolai of the Narragansett Bay Project and Kevin Brubaker of Save the Bay. All of the group members participated as private citizens meeting after working hours. None of the products of the group's deliberations, this article, nor the position paper, necessarily reflect the opinions and judgments of the organizations with which the group members are affiliated. This article draws heavily on group members' views and knowledge, but only the authors are responsible for its content.
2. Roy F. Weston, Inc., and SCS Engineers, *Rhode Island Solid Waste Composition Study*, draft report (Providence, R.I.: Rhode Island Solid Waste Management Corporation, June 1990); and U.S. Environmental Protection Agency, Office of Solid Waste, *Characterization of Municipal Solid Waste in the United States: 1990 Update* (Washington, D.C.: U.S. EPA, June 1990).
3. Center for Environmental Studies, *Hazardous Waste Reduction Strategies for Rhode Island*, vol. 1 (Providence, R.I.: Brown University, November 1987).
4. Lisa A. Skumatz and Cabell Breckinridge, *Variable Rates in Solid Waste: Handbook for Solid Waste Officials*, vol. 1, Executive Summary, EPA report no.

910/9-90-012a (Seattle, Wash.: U.S. Environmental Protection Agency, Region 10, June 1990); and Lisa A. Skumatz, conversation with the authors, 14 September 1990.

5. Arthur D. Little, *Water Supply Analysis for the State of Rhode Island* (Draft report to the Rhode Island Water Resources Coordinating Council, Providence, R.I., June 1990, Photocopy).

6. Ibid.

7. Energy Information Administration, *State Energy Data Reports* (Washington, D.C.: U.S. Department of Energy, April 1990); and Sheila Machado and Rick Piltz, *Reducing the Rate of Global Warming: The States' Role* (Washington, D.C.: Renew America, November 1988), 19.

8. Richard Magder, *Growth and the Environment Focus Paper* (Washington, D.C.: Renew America, February 1989), 16.

9. The Scenic Landscape Survey and the Natural Heritage Program are run by the state of Rhode Island and funded by both state and private funds.

10. U.S. Environmental Protection Agency, Region 1, *Unfinished Business in New England: A Comparative Assessment of Environmental Problems; Public Health Risk Work Group Report*, EPA report no. 901/7-89-002 (Boston: U.S. EPA, Region 1, December 1988). This assessment discounted, as have many others, the actual threat of such hazards as hazardous waste sites, storage tank leaks, and pesticide applications.

11. Ernest Julian of the Rhode Island Department of Health in a conversation with the authors on 7 August 1990 said that, in 100 random tests conducted by the Rhode Island Department of Health in 1989 on fruit and vegetable samples from grocery stores, only one violation of pesticide regulations was detected, and it was a misapplication rather than a health hazard.

12. Institute for Southern Studies, *1990 Green Index: A State-by-State Report Card on the Nation's Environment* (Durham, N.C.: Institute for Southern Studies, forthcoming).

13. U.S. Environmental Protection Agency, *Analysis of Air Toxics Emissions, Exposures, Cancer Risks and Controllability in Five Urban Areas*, EPA report no. 450/2-89-012b (Springfield, Va.: E. H. Pechan Associates, Inc., April 1990). The locations of these cities are not reported.

14. Maria Christina Payan, "Radon: A Framework for the Future" (Senior thesis, Center for Environmental Studies, Brown University, May 1990).

15. Karen L. Florini, George D. Krumbhaar, Jr., and Ellen K. Silbergeld, *Legacy of Lead: America's Continuing Epidemic of Childhood Lead Poisoning* (Washington, D.C.: Environmental Defense Fund, March 1990), A3 and 7.

16. U.S. Environmental Protection Agency, note 10 above.

17. Marcia Brown, Lee Kossin, and Harold Ward, "Narragansett Bay Issue Assessment: Public Perceptions" (Report to the Narragansett Bay Project, Providence, R.I., January 1987).

18. Narragansett Bay Project, "Sewage Contamination: Pathogens Briefing Paper" (Narragansett Bay Project, Providence, R.I., 1990, Photocopy). Recent evidence indicates that disinfection with chlorine is ineffective at controlling the viral contaminants that cause hepatitis, acute gastroenteritis, swimmer's ear, and swimmer's itch.

19. Rhode Island Department of Environmental Management, *The State of the State's Waters* (Providence, R.I.: Rhode Island Department of Environmental Management, Division of Water Resources, April 1990).

20. It is also the drawback of the U.S. federal system that great inequities in social responsibility are long tolerated. The comparative study of state environmental policies by the Institute for Southern Studies (see note 12 above) seems to have been undertaken to illustrate just such regional gaps in environmental protection and preservation.