

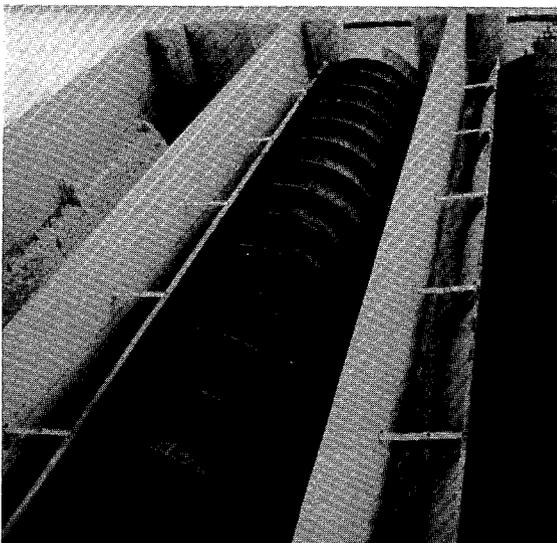
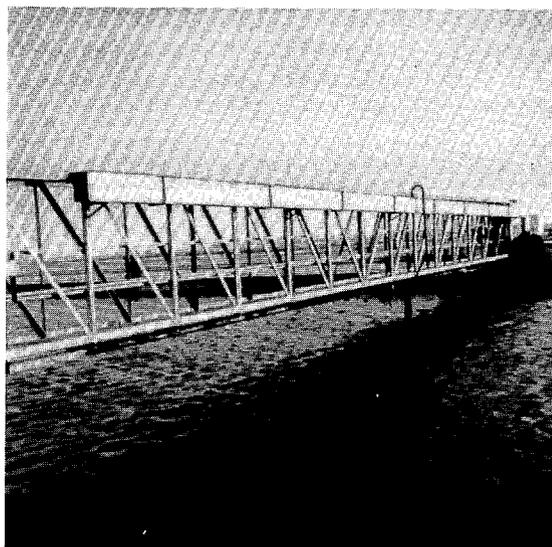
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Project in Development and the Environment

Workshop Report

**Community Prosperity Through Pollution Prevention:
Opportunities for Women and NGOs**



**Sfax, Tunisia
September 19-21, 1994**

The objective of the Project in Development and the Environment (PRIDE) is to help the U.S. Agency for International Development (AID) design and implement programs that foster the agency's environmental and natural resources strategy for sustainable economic growth in the Near East and Eastern Europe.

PRIDE provides AID and participating countries with advisory assistance, training, and information services in four program areas: (1) strategic planning, (2) environmental policy analysis, (3) private sector initiatives, and (4) environmental information, education, communication, and institutional strengthening.

The project is being implemented by a consortium selected through open competition in 1991. Chemonics International is the prime contractor; subcontractors include RCG/Hagler, Bailly, Inc.; Science Applications International Corporation; Capital Systems Group, Inc.; Environomics, Inc.; Industrial Economics, Inc.; Lincoln University; and Resource Management International, Inc. In addition, AID has entered into a cooperative agreement with the World Environment Center to support implementation of PRIDE.

The opinions expressed in this paper are those of the author(s) and do not necessarily reflect the positions of the sponsoring agency or contractors.

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**Community Prosperity Through Pollution Prevention:
Opportunities for Women and NGOs**

Sfax, Tunisia
September 19-21, 1994

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Project in Development and the Environment (PRIDE)
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Environmental Pollution Prevention Project (EP3)

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OVERVIEW

Economic and industrial growth has contributed in many ways to the prosperity of communities worldwide but, in other ways, has undermined it. The unfortunate by-products of industrializing societies have included air and water pollution, depleted and damaged resources, and a proliferation of solid waste. These environmental impacts represent high costs to individuals, business, and government.

Awareness of environmental issues has grown in recent years, but action often takes the form of addressing problems after they arise instead of preventing them in the first place. Finding ways to reduce and prevent waste at the source is at the heart of pollution prevention approaches.

To help facilitate the shift from pollution clean-up to pollution prevention, a workshop on "Community Prosperity Through Pollution Prevention: Opportunities for Women and NGOs" was held in Sfax, Tunisia, September 19-21, 1994. The workshop was organized by the Tunisian Chambre de Commerce et d'Industrie du Sud (CCIS) in collaboration with the Project in Development and the Environment (PRIDE), and the Environmental Pollution Prevention Project (EP3). It was held under the auspices of the Ministry of Environment and the U.S. Agency for International Development. More than 100 participants from North Africa, the Middle East, and the United States attended.

The workshop was designed to help participants:

- Explore the difference between pollution prevention and pollution control, because it costs a community less to prevent pollution than to clean it up.
- Link pollution prevention to economic prosperity, because pollution prevention

activities create jobs, increase income, and reduce production costs.

- Facilitate networking among environmental NGOs to strengthen their role and activities.
- Share ideas about what NGOs can do at the local level without waiting for international or national programs.

The workshop opened with remarks by its organizers, sponsors, and hosts, including Barry Hill, Environmental Officer, and James Graham, Director, of USAID/Tunisia; Mohamed Rachdi, Governor of Sfax; Mohamed Mehdi Miika, Minister of the Environment, Mohamed Ammous, President of CCIS, and Rachid Nafti, Director of EP3/Tunisia. All noted the need for a workshop on pollution prevention to provide NGOs with opportunities to share experiences and lay the groundwork for future collaboration. They further acknowledged that finding solutions to environmental problems would require the participation of all elements of society: NGOs, government, industry, academia, and women, men, and youth.

During the three-day workshop, NGOs presented and discussed ten case studies of pollution prevention programs in the industrial, small business, agricultural, municipal, and household sectors. Following the case studies, participants met in smaller working groups to examine lessons learned and develop new approaches linking environmental protection with economic development.

At the end of the workshop, the groups reported their findings and conclusions and discussed plans for follow up. They expressed the hope that their work together would be the first of many such exchanges and the beginning of a fruitful and long lasting collaboration to address environmental issues.

CASE STUDIES

Promoting Pollution Prevention in Metal Finishing

by Jo Patton

NGO: Center for Neighborhood Technology, Chicago, Illinois

Sector: Small Business

For 16 years, the Center for Neighborhood Technology, an NGO based in Chicago, has developed creative ways to link environmental protection and economic development. The center's projects have successfully combined public policy advocacy with technical demonstrations to promote industrial policies that can retain jobs and protect the environment.

Problem. Between 1979 and 1986, Chicago lost 114,000 manufacturing jobs. The center was concerned about the loss of these jobs because they represented the best hope for good-paying positions among low- and moderate-income residents with limited skills. The center developed a strategy that targeted the metal finishing industry, because problems facing Chicago's metal finishers cut across key environmental and job retention issues.

Finishing is a process that alters the surface of metal or plastic to protect it or improve its appearance. It is an essential service in many industries, including electronics, automotives, and machinery. In 1986, the metal finishing industry employed more than 5,000 people in Chicago; another 25,000 jobs depended on its services.

Metal finishing operations pose significant public health and environmental problems. Large volumes of acids and other hazardous solvents and dissolved metal salts are used in finishing. Pollution from this industry takes the form of contaminated wastewater, hazardous waste sludge, and toxic air emissions. Exposure to wastes from metal finishing can cause cancer, birth defects, and developmental and

reproductive damage. Irresponsible handling of these wastes results in public health costs as well as costs to municipal sewage treatment systems that struggle to remove the wastes discharged into the system.

These problems have brought greater environmental regulation of metal finishers. Yet metal finishers have had a limited capacity to respond to increasing environmental regulation. Most operate small shops with fewer than 50 employees and have limited resources and expertise in pollution prevention. A 1984 study estimated that 2,000 Chicago-area metal finishing jobs would be lost as a result of enforcing new regulations on water discharges.

Process. To address these problems and retain jobs in metal finishing, the center launched the ground-breaking Chicago Metal Finishers Assistance project. The first step was to educate metal finishers. The industry had been trying to block the new regulations through legal actions. The center worked with the trade association to help metal finishers recognize the futility of continued legal battles and the importance of moving ahead with pollution control and prevention.

To address the technical and resource issues, the center worked with seven NGOs that offer services to community industries. The center supported engineers who provided technical assistance in environmental compliance, pollution prevention, and energy efficiency. The pollution prevention remedies focused on solvent and product substitution (for example, substituting trivalent chrome for the more toxic hexavalent chrome).

The project also included an effective public policy advocacy component, working closely with the metal finishing trade association. Efforts focused on educating environmental regulators and the general public about the need for flexibility in achieving pollution prevention.

Results. The project reached 100 metal finishers and provided consulting services to 40. In a follow-up survey, the majority of these firms had implemented at least some recommended pollution prevention measures. However, the survey also revealed that several metal finishers had difficulty in obtaining financing for pollution prevention improvements. The center continues to work on improving small manufacturers' access to financing for pollution prevention.

While the metal finishing industry has experienced a loss of jobs nationally, Chicago-area firms have fared somewhat better. Area metal finishers are estimated to employ more than 4,000 people. The costs to the sewage treatment authority are less than if the metal finishing firms had not reduced their hazardous waste emissions, and there continue to be opportunities for progress in this area. Finally, Chicago residents' exposure to these harmful wastes has decreased, an important step toward the center's goal of a healthy urban community.

Association Je Recycle

by Janan Benabud

NGO: Association Je Recycle

Sector: Small Business

Organizations working to protect the environment face the challenge of raising public awareness of environmental problems and promoting solutions that will gain public acceptance. To this end, and in the absence of an integrated approach to waste management, Association Je Recycle works to reduce pollution at the source and to promote recycling, including composting.

Garbage and paper collection. Approximately 220 tons of waste are collected per day in Rabat. This includes household, commercial, industrial, medical, and other wastes. The waste goes either to the municipal dump site or to the compost plant. About 65 percent of the waste is organic, 5-20 percent is paper, 5-7 percent is construction and demolition waste, 5 percent is glass, 2.4 percent is rag, 1.5-2.6 percent is plastic, and 1.2 percent is metal.

The formal paper collection sector consists of large paper manufacturing companies, which have their own system of collection, as well as small and large wholesalers, which purchase paper from the informal collectors. The informal sector sells to small wholesalers or to the paper manufacturing companies through their dealers and provides employment to unskilled labor. On the average each collector collects between 110-120 kilos of paper per day and earns approximately \$4 per day, which is slightly lower than minimum wage. Paper collection contributes to the economy and is environmentally sound.

Association Je Recycle began in 1992 and is the first and only non-governmental, non-profit organization in Morocco that collects paper. The association evolved in just 10 months from a small secondary project supported by Peace Corps Morocco into a full-fledged Moroccan association. The majority of its founding members are women who have been and continue to be its driving force.

The association seeks to involve individuals in recycling and change their perceptions of waste. They not only gain an appreciation of the resources used to manufacture the discarded paper, but they begin to realize the potential of individual participation in environmental protection. By participating in the program, individuals are also assisting informal garbage collectors, who are marginalized individuals.

The association's original plan was to contact offices and ask them to set aside recyclable paper. At the same time, it contacted as many collectors as possible and persuaded them to participate in the program to increase their income by having a large, reliable source of waste paper. The association hoped this would result in a system whereby collectors would be matched to certain offices.

This approach failed because, among other reasons, some collectors did not collect the paper when they were supposed to and offices were often hesitant to give the collectors their paper

for reasons of confidentiality. Now paper is collected from over 50 offices weekly in the Rabat area and sold to a paper manufacturing plant. The proceeds provide the association with its only source of income other than membership dues and rare donations. The money is used to pay for:

- Rental of a small pick-up truck, its driver, and a helper. Since the pick-up trucks are hired from the central market, they do not always have the same driver. Therefore, the helper plays a key role because he knows where all the offices are located.
- Office supplies and miscellaneous expenses, such as stamps.
- Interest-free micro credits to enable informal garbage collectors to purchase their own carts. By having their own carts, the collectors don't have to rent them and are not obliged to sell their paper at a reduced rate to the wholesaler who lent them the cart. Some collectors have purchased larger carts so they can collect more paper. Others have used the micro-credit to purchase a second cart to employ a relative or other individual.
- Outfits for collectors consisting of a pair of gloves, a pair of boots, and a raincoat.
- Distribution of information through schools and other channels, for example, on ways individuals can reduce their paper consumption.

The association ensures that the paper will be destroyed (used as pulp) and can provide an attestation from the paper manufacturing plant if the contributing business wishes to have one. Je Recycle is in the process of setting up a recycling program in Casablanca with assistance from the Centre de l'Entreprise du Maroc. The center will be a drop-off point for those interested in participating in a recycling program. Pick-up will be made weekly by a small wholesaler.

Collector profile. Interviews with collectors have revealed that the average collector is a male over 50 years of age who is married with five

children. His town of origin is usually in the southern or southeastern part of the country. He came to the capital in search of employment but, failing to find it, became a collector and has been one for more than ten years.

The average collector has little or no education or marketable skills. However, as a collector he makes an average of \$4 a day. Although society looks down on him, he is aware he is involved in an activity beneficial to society and to the economy as a whole, because it preserves natural resources, creates employment, keeps the city clean, and provides low-cost items such as jars and bottles for reuse as storage containers.

Collaboration with other organizations. The association works closely with:

- Peace Corps Morocco.
- Centre de l'Entreprise du Maroc to explore potential markets for other types of recyclables, such as plastic and glass.
- Local NGOs, some of which are paper donors.

The recycling program has had the following impact:

Paper collected	30 tons in six months
Trees saved	510
Water saved	795,990 liters
Pollution prevented	34 kilos of carbon dioxide

Other benefits, such as reducing soil erosion, providing shade, etc.

Farm Co-Composting

by Cary Oshins

NGO: Rodale Institute, Kutztown, Pennsylvania

Sector: Agriculture

Problem. The pollution of ground and surface water from livestock manure is a serious problem in the highly productive agricultural areas of southeastern Pennsylvania. Around 15 million

tons of cow, horse, chicken, and swine manure are produced annually, much of it in barns on small family farms that have no manure storage capability and so spread their manure on the ground year round. This has numerous negative consequences. When spread on the ground, the manure can be carried away by rain or melting snow to pollute surface water. This pollution harms, among other things, the shellfish harvest in the bays where it ends up. The fields closest to the barn are prone to over-fertilization, causing nitrates to leach into the groundwater. Excessive nitrates end up in well water, causing sickness in people and animals that drink the water. Other problems with manure spreading include soil compaction and decreasing crop yields.

Southeastern Pennsylvania is home to more than five million people, putting many farms in the area under increasing pressure of suburbanization. New non-farm neighbors are coming into close proximity with the farms, and spreading raw manure often brings previously unheard-of complaints of odors and flies from these neighbors. The problems have increased social and regulatory pressure on the farms to manage their manures in a more environmentally sound and socially acceptable manner. However, improving manure management is costly to farmers, many of whom are already in marginal economic situations.

Process. The Farm Co-Composting project links farms and communities so they can manage biological wastes in more environmentally sound and economically viable ways. Started in 1991 by the Rodale Institute, a research, education, and communication organization, the project is working to overcome barriers to composting livestock wastes. Composting, the controlled accelerated breakdown of organic wastes, could remedy many of the problems associated with raw manure use. The nutrients are converted to organic, slow-release forms that are much less likely to leach into groundwater. The use of compost increases the water infiltration rate and overall soil tilth, reducing the potential for erosion and pollution while maintaining or increasing yields. Compost does not smell or attract flies, resulting in fewer complaints

(although the composting process can cause odors and must be carefully managed, lest complaints increase rather than decrease).

However, for efficient composting, most farms need high-carbon materials, such as leaves, food processing wastes, non-recyclable paper, and industrial by-products to balance their high-nitrogen manures. Many municipalities and industries, however, which are the sources of these materials, are not used to working with farms, and regulations can make it impractical for farmers to accept their materials.

The Farm Co-Composting project uses a change-facilitating model to work with stakeholders to identify barriers and potential solutions, support local initiatives, and develop regional institutions that can sustain the momentum. The project is working with a variety of public and private organizations to address the reasons farmers are not composting. It is using a process that includes education/research, networking, and advocacy.

Education begins by identifying farmers and communities as case studies. The farms agree to try composting and to research different problems. One identified farm was the Great Bend Organic Farm, which raises swine. The farm was trying to compost its manure, but was spending a lot of time and money to add the necessary materials. The village of Hamburg, a few miles away, was facing increasing solid waste disposal costs. Linking Hamburg with the Great Bend Organic Farm became a case study. Both the farm and the garbage hauler saved money through the arrangement. Other educational activities have included holding workshops, conferences, and field days, and developing newspaper stories and printed fact sheets.

Project staff have found that for farmers and communities to work together efficiently, some person or organization needs to be a "network agent" to link them together. It is too costly for each farm interested in finding off-farm materials, and for each source of these materials, to work independently. Rodale Institute has filled the role by advertising for interested farmers and

communities, maintaining a database, and helping to negotiate arrangements. In other areas, the networking has been done by state or local governments, private businesses, or other NGOs.

Another important element is advocacy. Two types of advocacy are needed. First, the farmer needs an advocate to ensure fair treatment. This means making sure the farmer is compensated for his or her work and not taken advantage of by the government or garbage hauler. Second, the regulations need to be modified to encourage, not discourage, these types of arrangements. Rodale Institute is still working with state regulators to make it easier for farms to access off-farm materials.

Benefits. The farms benefit from lower manure management costs, increased revenues (both by getting paid for off-farm “wastes” and by selling finished compost), and lower fertilizer and chemical costs. Both the farms and the surrounding community benefit from reduced odors and fewer complaints. The larger community also benefits from reduced pollution of surface and ground water, which translates into better health. Finally, the waste generator/hauler benefits from reduced transportation and disposal costs by working with local farms rather than more distant landfills or incinerators.

Prevention of Agricultural Pollution: Strategic Considerations

by Alon Tal

NGO: The Israel Union for Environmental Defense

Sector: Agriculture

Introduction. Nitrates from fertilizers, pesticides, and runoff from animal waste are the primary sources of water pollution in Israel and probably in Jordan and the West Bank. These contaminants not only degrade scarce surface and ground water, but also damage recreational resources central to the region’s tourist industry.

There are two basic approaches to NGO involvement in preventing pollution by the agricultural sector:

- Education and technical assistance
- Promoting regulation and compliance

Lacking the manpower to effectively reach and teach thousands of farmers, NGO activity focuses primarily on the second approach, the “watchdog function” of trying to enforce environmental standards.

Adam Teva V’din, the Israel Union for Environmental Defense (IUED), is a public interest environmental law and science organization that has made water quality protection its highest goal. Having focused primarily on industrial and municipal wastewater treatment for its first four years, the organization is currently designing a strategy to confront the agricultural problem. Efforts from 1992 to 1994 have been limited to filing legal actions against specific polluting farms such as dairies and goose feedlots.

This approach, however, has not been overwhelmingly successful in preventing pollution. Trials at the Magistrate Court level are subject to innumerable delays. Because farmer cooperation in implementing technical solutions is limited, the only remedy is often to close down operations. It is difficult to find a judge sympathetic enough to order such an injunction. Ultimately, the overall impact of these cases has been extremely local at best, with little environmental gain on a national level. Hence, alternative forms of action that address the issue on a macro or regional level are more promising. The following case suggests some of the benefits of this approach.

The Kinerret watershed basin. The Kinerret lake, or “Sea of Galilee,” provides drinking water for the northern third of Israel and, as the country’s only fresh water lake, has a key recreational role. The rivers that feed into the Kinerret are linked to numerous hiking trails and are frequented by thousands of visitors annually. The mountains to the north of the lake are inhabited primarily by agricultural settlements, kibbutzim (large collective farms) and moshavim (smaller private ones). Because of the cool climate and relative abundance of water, a booming dairy and cattle business has emerged

there. Roughly 16,000 beef cattle and 8,000 dairy cows are raised in these settlements. Yet, with inadequate infrastructure to capture and treat the animal wastes, these agricultural operations constitute a formidable environmental hazard, endangering the area's tourism and development.

Alarmed at a government plan to expand the region's dairy industry and subsidize 40 new operations, concerned residents brought the matter to the attention of several Israeli NGOs. Ultimately, the Society for the Protection of Nature in Israel (SPNI), the largest Israeli environmental NGO, took the lead. With observer status on Israel's Northern Region Planning Committee for Water Quality, the SPNI was aware of the plan and suspected that existing dairies were already causing severe pollution in the streams and rivers of the Kineret Basin. SPNI paid a laboratory to take samples, which showed high levels of contamination. For instance, while the swimming standard is set at 200 fecal coliform per 100 ml. of water, in certain cases SPNI measured levels as high as 100,000. While there were no documented cases of illness associated with the contamination, the Ministry of Environment expressed deep apprehension about potential exposure as a result of recreational swimming and drinking water. Armed with clear documentation of water quality violations, the SPNI launched a campaign to reduce the pollution.

The farmers, while not recalcitrant, were not enthusiastic. In principle, they did not object to control measures, yet perceived treatment options as economically unsound. The Regional Council and the local government, which has extensive enforcement authority in the area of sanitation, also did not object to promoting water pollution controls as long as the costs did not fall on the farmer. Rather, they insisted that the costs be covered by subsidies from the national government or granting agencies. They saw the initiative as an opportunity to spur additional investment in infrastructure and strengthen regional agriculture and tourism at the same time.

With neither farmers nor local government willing to address the problem, and with general

disinterest by the representatives of the central government on the Water Quality Committee, SPNI turned to the press. The findings were printed in several high-profile pieces in national newspapers, with criticism focused on the positions of the relevant government agencies. The response was dramatic. Annoyed government representatives on the committee disqualified SPNI from future participation as an observer, but also began to take the problem seriously.

Toward a solution. In this case, very minimal (and inexpensive) NGO measures succeeded in leveraging government activity. The Ministry of Health, which is responsible for water quality and human health, immediately undertook a series of tests that confirmed the fairly primitive results published in the press. The ministry issued an order restricting swimming in the contaminated streams. This triggered concern among tourist and recreational authorities, who pushed further for a solution to the problem. Faced with growing public pressure, the Jewish agency sponsoring dairy development was forced to designate funds for pollution reduction. Thus far, \$1.1 million in funds have been directed to the problem, primarily funding "rotor strainer" separation systems and paying for sewage links from the dairies to the local sewage treatment system.

Results. Today water quality surrounding the dairies has improved. More important, given the press and national attention devoted to the problem, local farmers are more aware of the implications of their polluting activities. Cooperation to maintain the pollution control systems is crucial for ensuring their ongoing efficacy, and today farmers are willing participants. As on-site benefits become clearer, farmers may be even more likely to support pollution prevention. Manure separated by the new systems has a clear market value of roughly \$7 per cubic meter, with an average dairy cow producing roughly 10 m³ per year. The potential reuse of wastewater for agriculture has clear benefits as well.

As the peace process progresses, tourism promises to become not only a major source of

revenue and foreign currency for Israel, but for its neighbors as well. NGO activity in this case proved crucial in changing government priorities, even though the technical capabilities of the NGO in designing and implementing the solution were extremely limited. Strategically, focusing on off-site, regional impacts served to stimulate action more effectively than attacking the on-site activities of individual polluters. It is a lesson that should be applied across the country in confronting agricultural pollution.

Good Neighbor Agreement with Shell Oil Martinez

by Denny Larson

NGO: Citizens for a Better Environment, San Francisco, California

Sector: Industry

Overview. Citizens for a Better Environment (CBE) has operated in the San Francisco Bay and Los Angeles areas of California for 16 years. Its mission is to prevent toxic pollution of the urban environment by encouraging government and industry to enforce and obey environmental laws and policies. Its focus is on protecting and improving public health by preventing pollution from major industrial and municipal sources. CBE has a paid staff of 15 scientists, community educators/organizers, and attorneys. Its funds come from foundation grants and 15,000 members who donate \$25 a year.

Background. Air pollution is a major health problem in the Los Angeles and San Francisco Bay areas, California's largest urban centers. Car emissions are responsible for much of the pollution. In 1990, the state of California adopted a regulation requiring oil refineries to reformulate their automobile gasolines to produce fewer toxic air pollutants (benzene and other hydrocarbons, etc.) in tailpipe emissions. Refineries that want to sell gas in California must make major changes to their plants. Someday refineries all over the U.S., and perhaps the world, will be required to make the same changes.

Problem. When the Shell Oil refinery in Martinez, California, proposed a \$1 billion

expansion to make the new gasoline, concerned neighbors of the plant, CBE, and Communities for a Safe Environment, a Martinez environmental group, launched a campaign to make sure the project would be environmentally acceptable. In reviewing environmental impact studies for the project, it became apparent that although the expansion would benefit the economy by creating jobs and reduce air pollution by lowering tailpipe emissions, it would also increase local toxic pollution unnecessarily.

The project would increase by 326 tons a year emissions of Volatile Organic Compounds (VOCs), which include many chemicals known to cause cancer, birth defects, and serious respiratory problems. Most of this dangerous pollution is emitted from leaking valves and other equipment, and is released at ground level, directly exposing workers and entering the community environment. The health care costs associated with increased toxic pollution would be significant to local residents and workers alike. Such costs to local government and taxpayers would be high as well, because many residents directly downwind of the refinery are low income and do not have adequate health insurance. Increased health problems among workers would also lower productivity at the refinery.

Being able to adequately monitor actual—as compared with estimated—increases in pollution was of significant concern to the community. Air pollution monitors at the refinery can track only a limited number of chemicals and have limited range, so pollutants can miss their small target and not be recorded. Better monitoring could reduce the pollution that already concerns neighbors.

Being able to address problems that might arise after the project was approved was also important to the local community. They wanted a firm commitment to work out those problems directly with Shell officials.

Opportunity. The Shell refinery expansion represented a great economic opportunity for the local area. The five-year construction project would directly create at least 2,000 jobs.

Millions of dollars in direct tax revenue would be generated for the county government. Several thousand jobs would indirectly be created to provide goods and services to the new employees in the area. In addition, the new cleaner-burning gasoline would reduce air pollution in the region by several hundred tons a year.

Process. Any large project such as Shell's requires an environmental review involving detailed written studies, including estimates environmental impacts, followed by public review and comment, and a decision by an elected body to approve, deny, or modify the proposal. That decision may also be appealed to the courts.

First CBE and some of the neighbors analyzed the draft environmental study in detail to determine problems and solutions to the project's negative impacts. Second, CBE established a dialogue with various sectors to educate them about its concerns and learn about theirs:

- Shell company officials (to convince them CBE was serious and discuss its concerns).
- Shell workers (to attempt to gain their support).
- Martinez local environmental group (to seek support and volunteers).
- Other refinery neighbors (to seek support and volunteers)
- Media (to promote press coverage of CBE's campaign)
- Government officials (to convince them CBE was serious and discuss its concerns.)

Third, CBE intervened in the government's public permit process through public hearings and written comments. Fourth, it began direct negotiations with Shell Oil to seek a written, legally enforceable agreement that addressed its concerns. These negotiations involved members of the local environmental group, CBE's technical and community organizer staff, Shell

union employees, and top members of Shell management.

CBE's role. CBE's role was to:

- Provide technical assistance in identifying problems and solutions through scientific reviews and networking with other pollution prevention experts.
- Research legal leverage possibilities.
- Research strategies/tactics for encouraging Shell to improve the project.
- Assist in raising awareness and mobilizing "people power" through the media and grassroots education that included:
 - Reducing lengthy technical comments to easily understandable flyers.
 - Distributing information person to person through door-to-door contact, mailings, and phone calls.
 - Producing "action alerts" with a "what you can do" section.
 - Holding house meetings with neighbors to explain and answer questions.
 - Encouraging attendance at important hearings or meetings to show support.

Solution. As a result of everyone's combined efforts, Shell Oil entered into a written, legally binding agreement with CBE and its neighbors that committed the company to install leakless valves at the existing plant to offset the planned increase of 326 tons of harmful VOC air pollution. The company also agreed to install new remote-sensing air pollution monitors that use laser beams to track more pollutants over a range of 300 meters. Finally, the company agreed to meet every three months with CBE and its neighbors to address problems that might develop throughout the 30-year life of the project.

Pollution Prevention at the Jordan Cement Factory

by Mahmoud A. Al-Khosman

NGO: Jordan Environment Society, Amman, Jordan

Sector: Industry

Since its establishment in the 1950s, the Jordan Cement Factory (JCF) in the town of Al-Fuhais (20 kilometers northwest of Amman City) has caused devastating environmental impacts. Agricultural land is the main victim of JCF operations.

The Al-Fuhais/Mahes area is a fertile and productive agricultural land and home to about 20,000 people living and working in agriculture, small industries and businesses, and civil jobs. Large areas of land have been exploited as limestone and mark quarries or destroyed by the huge trucks and machines used for handling and transporting raw materials. Surrounding lands have been damaged by dust and other air pollutants, and in some cases wastewater discharges have caused further problems.

The main economic and social consequences of the pollution problems include:

- A drop in the price of land and real estate because of deteriorating land and air quality.
- High cost of health care for those who have suffered from illness and chronic diseases related to air pollution. At least 10,000 people are estimated to have suffered from pollution (ranging from discomfort to asthma and lung cancer).
- Loss of productivity among those who have suffered from illness and disorders.

In 1992, the Jordan Environment Society (JES), a non-profit, non-governmental policy and education organization, initiated and designed the Rhus Forest project to help the factory and Al-Fuhais/Mahes community resolve their disputes over environmental issues. JES aims to increase social pressure on JCF to manage its operations in a more environmentally sound and socially

acceptable manner. At the same time, JES has dealt with JCF as a partner rather than an opponent. This approach has helped facilitate project implementation.

The Rhus project includes planting a pilot forest of Rhus trees to form a bio-fence between the factory and the surrounding community on a rehabilitated and graded quarrying site. The main objectives of the project include: (1) introducing an endangered species (Rhus tree) to its original environment; (2) rehabilitating an abandoned quarry (combating soil erosion and enhancing the landscape); (3) providing an example of constructive cooperation between community and industry; (4) demonstrating the fundamental and integral role of women's societies and the local community in solving environmental problems; and (5) producing Rhus spices and using the revenues to expand the project.

JES has carried out this project in cooperation with the following parties:

- **Local NGOs**, represented by Al-Fuhais and Mahes Housewives Societies.
- **Government**, represented by the Ministry of Agriculture. The ministry has agreed to provide the Rhus seedlings and assign an experienced agricultural engineer to the project.
- **Private sector**, represented by JCF. JCF management has shown a responsible commitment toward this project by allocating nine acres of land on which to establish the project, providing machines (bulldozers, tractors, etc.) to prepare the site before planting the seedlings, and contributing financially to the project.
- **Research institutions**, represented by the Faculty of Agriculture at the University of Jordan. A researcher from this faculty has worked with JES part time to monitor project implementation and advise on technical issues.

JES has used its existing programs for information and public awareness (i.e., the National Environmental Information and

Education Programme and the Environmental Forum) to promote the project and its objectives throughout the country. In addition, meetings and symposiums were organized by the Al-Fuhais/Mahes JES branch to familiarize the local community with environmental issues that affect their lives and to make them aware of their role in pollution prevention and control.

The efforts of JES and the commitment of JCF management have helped bring about a substantial change in JCF's environmental performance. The following technical solutions were considered and implemented, or are soon to be implemented:

- Cover the raw material belt conveyors and reclaimer to reduce blown dust.
- Install more electrostatic precipitators and bag filters to reduce dust emissions.
- Purchase newly designed clinker trucks to prevent leaks and blown dust during transportation.
- Improve monitoring techniques, especially the performance of the rotary kilns and air purification equipment.
- Change quarrying methods; every exploited quarry will be directly reclaimed, rehabilitated, and planted with suitable trees and grass.
- Extend the Rhus Forest project to other abandoned quarries and plant a new multi-row fence of trees around the factory.

The project's direct results have not yet emerged because the Rhus trees are not yet mature, but project activities such as public education and assistance by JES have helped the factory:

- Reduce air emissions (dust, gases, etc.) from Al-Fuhais Plant.
- Improve monitoring and housekeeping at the plant.

- Establish an Environmental Services Unit and assign a senior staff member to manage it.
- Increase the green cover around the plant by planting more trees.

Finally, the main economic benefits of the project have included: (1) restoring abandoned land to agricultural productivity; (2) producing Rhus spices, which have a high market price and generate income for further projects managed by the local women and welfare societies, and (3) possibly raising the price of surrounding land after rehabilitation of the exploited and abandoned quarries.

The Slow Death of Man and Agriculture

by Elias Dabis

NGO: Land and Water Establishment, Jerusalem
Sector: Industry

Geshurei Industries, a chemical factory that produces fertilizers and pesticides, used to operate in Kfar Saba in Israel. Due to its negative impact on the people, land, and agriculture of Kfar Saba, the people obtained a court order to shut the plant down. In 1987 the factory moved to the Occupied Territories. Even though a court order from Kfar Saba stated that the factory discharged hazardous by-products and should not operate near a residential or agricultural area, the factory operates freely in the Tulkarem area of the West Bank. It directly affects 144.1 denims (one denim is 1,000 square miles) of prime agricultural land planted with vegetables and fruit and causes substantial damage to public health.

Damage to soil, vegetation, water, and public health includes the following:

- Around two and a half denims of adjacent land have become unsuitable for cultivation. Analysis of soil samples has revealed a high sodium content.
- A white powder (chemical dust) covers vegetation in the area and a liquid substance leaves a calcium-like residue on the land.

Both substances are dangerous, prohibit normal growth, and sometimes burn or dry the leaves. This white precipitate also acts as an insulator on green houses and prevents heat and sunlight from reaching the vegetation, causing it to die.

- Analysis of ground water samples reveals the presence of sulfamic acid, an ingredient in an herbicide used as a weed killer. The presence of the acid is clear evidence of the improper disposal of wastes and by-products by the plant.
- A high ratio of health-related problems among farmers and people living around the factory has been documented. The problems include severe headaches, pruritis, itchy and watery eyes, spastic and chronic cough, and bronchial asthma.

Land and Water Establishment (LAWE) is pursuing every legal avenue to close the factory or at least protect the area and the people living there by proper disposal of wastes, emission controls, and compensation for damages. LAWE has faced many problems in bringing the case to court:

- It has been hard to convince the Tulkarem residents and factory workers to request protection for their health, land, and water because they lack environmental awareness.
- Evidence of damage caused by the factory has been difficult to obtain because of the lack of technical equipment for analyzing water and soil samples.

To tackle the environmental awareness problem, LAWE organized a public hearing that included representatives of the Tulkarem municipality, the local farmers union, and landlords of surrounding farms. A three-person committee was elected to carry out an environmental awareness campaign. This committee contacted various environmental protection institutions, women's institutions, health NGOs such as the Union of Palestinian Medical Relief Committees, and the Palestinian Agricultural Relief Committee to help organize the campaign. The campaign

included lectures, workshops, presentations in schools, films, media articles, and distribution of brochures and pamphlets to area residents.

LAWE sent letters to the Ministry of Interior and the legal counselor asking for a halt to the environmental damage caused by the pollution and compensation to the farmers. A report on damages caused by the factory and on the results of soil, wastewater, and blood analysis was presented to the court. The court ordered that the workers wear masks, prohibited the factory from producing some "toxic materials," and forced it to use filters, but fell far short of closing the factory as in Israel.

LAWE sent a letter to factory officials listing the farmers' demands to stop polluting and asking for compensation for the damage. Officials have agreed only to pay the farmers compensation.

Total financial losses to the farmers during the period 1987-1992 are estimated at \$266,024. However, the actual damage might be far greater. The cumulative damage to the soil from increased and continued dumping of wastes may soon render the land unfit for agriculture. The high cost of repairing the damage to the soil must also be taken into consideration.

The City of Cambridge Recycling Program

by Natalie Roy

NGO: Cambridge Recycling Committee,
Cambridge, Massachusetts

Sector: Municipal

Background. In 1989, the recycling committee of Cambridge, Massachusetts, initiated a recycling program. Cambridge has a population of approximately 90,000 people and very diverse demographics. Two major universities—Harvard and the Massachusetts Institute of Technology—are located in Cambridge. The city has sizeable middle income and wealthy neighborhoods. Except for a newspaper drop-off center in a nearby town and the state's returnable bottle bill law (which targeted only 3-4 percent of the waste stream), recycling was nonexistent.

Earlier, the state of Massachusetts had announced it would build a recycling facility in Cambridge for the state's northeast region. Unfortunately, the state had financial problems and the recycling center was delayed. In 1989, it was unclear when or if the state recycling center would be built.

Solid waste management crisis. The city was very concerned about the following solid waste management issues:

- Too much garbage
- Diminishing landfill capacity
- Difficulty in siting new landfills because of public opposition
- Environmental impacts linked to burning garbage
- Skyrocketing costs of garbage disposal

Costs. The city faced the following cost issues:

- Cambridge was paying \$70 per ton to dispose of its garbage.
- Overall, Cambridge was paying \$110 per ton for solid waste disposal, which included transportation and labor.
- The city was paying \$5.1 million to manage about 47,000 tons of garbage a year.

Initial steps. The Cambridge Recycling Committee, comprised of volunteers, had been active during the 1970s and early 1980s, but had long since disbanded. In 1989, not wanting to wait for the state to build its long-promised recycling facility, the committee again convened a meeting. The committee hoped to encourage the city to develop and implement a recycling program on a faster timetable.

The group was made up of interested residents and included a representative of the city manager's office. The immediate objective was to help the city establish a successful recycling program that would eventually lead to a modern curbside collection program of recyclables

throughout the city. The group wanted to propose a program that would be cost-effective and have enough community support to convince the city to go forward.

Development of a draft plan. The Cambridge Recycling Committee met monthly. A recycling plan was prepared and presented to the city listing recycling program options and projected costs. It explored the following key components:

- Costs
- Markets
- Site selection-location
- Frequency of collection
- Publicity and public education
- Equipment and supplies
- Transportation
- Post-collection duties

Mobile drop-off recycling center. Within six months, the city had adopted the committee's proposal for a monthly mobile drop-off recycling program. This option, outlined in the plan, was cost-effective and easy for the city to implement. Space was assigned for the recycling station, which the Cambridge Recycling Committee staffed. The city also decided to limit the materials it would collect. It decided to start with newspaper and glass since both materials had a nearby market, making the program more cost-effective.

The recycling station generated amazing community response. Within the first three months, 1,346 households brought in their recyclables. During the same period, this limited volunteer program saved the city almost \$7,000 by avoiding conventional disposal costs.

Program expansion. Cambridge soon added another recycling station in another part of the city. Aluminum cans were added to the list of materials, increasing the revenue generated by the program and making it even more cost-effective.

These successful pilot recycling efforts convinced the city to develop a more comprehensive program. The city made plans to hire a full-time

recycling coordinator and develop and implement a curbside collection program for recyclables.

Cambridge recycling today. Today the city operates a comprehensive curbside recycling collection program. It collects a wide variety of materials, including plastic, glass, newspaper, aluminum, steel, and used oil. It is saving money by avoiding expensive conventional disposal costs.

Selective Waste Sorting: A Pilot Project of El Khadra City

by Aziza Hatira

NGO: Alliance Femmes et Environnement

Sector: Municipal

Due to its demographic and economic growth, Tunisia, like many other countries, suffers the problem of disposing of its solid wastes. To address this problem, in June 1993 the Alliance Femmes et Environnement launched a 22-month pilot project in the city of El Khadra. The alliance had the help of the Union Nationale des Femmes Tunisiennes and financial support from the government of Luxembourg.

Education and outreach. The alliance first sought to elicit public support and promote local participation through a number of education and outreach activities:

- Informational sessions in local forums such as youth clubs to explain the project's objectives and the importance of sorting and recycling waste.
- Presentations at meetings of the Union Nationale des Femmes Tunisiennes to reach and involve as many women as possible.
- Distribution of educational materials such as brochures and stickers to educate people on pollution prevention.
- Door-to-door visits to explain the role that individual residents could play in the project.

Members of the alliance distributed two types of garbage containers to households: a green one

for organic waste and a blue one for non-organic and non-toxic waste.

Municipal authorities are responsible for collecting the waste. The organic waste is taken to a compost center and reused as fertilizer for agriculture; the non-organic waste is taken to a sorting center for recycling.

Conclusion. The project helped make the city cleaner and contributed to reducing the city's volume of solid waste. It would not have been as successful without the efforts of numerous parties, including the Ministry of the Environment, the Municipality, NGOs, and individuals. Because of its success, the project has been extended to other cities in the country.

Household Hazardous Waste Management and Household Battery Collection

by Dana Duxbury

NGO: The Waste Watch Center, Andover, Massachusetts

Sector: Household

Concern about household products that contain hazardous (toxic, flammable, corrosive, and reactive) substances, known in the United States as household hazardous waste (HHW), has led communities to establish education, toxicity reduction, and collection programs for these products. Many paint, automotive, pesticide, and cleaning products fall in this category, as do household batteries, explosives, fluorescent lights, and pool cleaners.

These products lead to economic, health, and environmental hardships. They cause the greatest number of poisonings in the home, damage solid waste and wastewater management equipment, injure workers, and pollute air, water, and land.

Education. HHW management programs educate citizens about HHW, why they should be concerned, and what they can do about it. For example, they can be informed consumers, use and store these products carefully, use them up, give them away, or bring them to a HHW collection facility.

Toxicity reduction. HHW programs inform citizens about alternative products or methods that do not have hazardous constituents and encourage them to buy only as much as they need of products for which there are no alternatives, such as motor oil. The programs also include dialogue with manufacturers to encourage them to reformulate their products.

Collection. Many communities in the United States have established collection programs for these products. Americans may throw away more than 20 pounds of these wastes annually, but they bring an average of 100 pounds to a collection program. This amount includes products they would otherwise throw away as well as products they have accumulated over the years. First, collection program workers determine whether any of the products are reusable, such as leftover paint, or recyclable, such as used motor oil. The rest is sent to a hazardous waste management facility. Collection programs are expensive, costing an average of \$100 per participating household.

Household battery collection programs. The Waste Watch Center (WWC) in Andover, Massachusetts helped establish a collection program for recyclable household batteries (mercuric and silver oxide and nickel-cadmium

batteries). Since these batteries contain toxic heavy metals that can cause birth defects, the community wished to keep them out of its solid waste stream, especially since its waste was incinerated. The incinerator had no air pollution controls for mercury, and the cadmium ended up in the incinerator ash.

The WWC worked with the local recycling committee, which is composed of concerned women from the community and the League of Women Voters, to encourage local officials to support the program. They also enlisted the support of the incinerator company, battery recyclers, and a battery manufacturers' trade association. Both retail and curbside collections were set up. Educational materials were developed and distributed.

The batteries were brought to the WWC, where they were sorted and sent to battery recyclers. This program enabled the community to protect the environment and the public's health, and reduce waste management costs. The incinerator company demonstrated a concern about the impacts of its facility on public health and the environment, and the recycling firms and battery manufacturers showed a commitment to product stewardship. The citizens and retailers felt they, too, were playing a vital role.

REPORTS OF WORKING GROUPS

Participants met in groups during the workshop to discuss the implications of the case studies, share lessons learned, examine problems and potential solutions, and make plans for specific NGO pollution prevention activities in their countries. Four working groups were established by region and sector:

- Maghreb Community
- Maghreb Business
- Mashriq Community
- Mashriq Business

The two Maghreb groups represented NGOs from Algeria, Morocco, and Tunisia. The Mashriq groups included participants from Egypt, Israel, Jordan, and the West Bank and Gaza. The Maghreb Community and Mashriq Community groups focused on ways NGOs can promote pollution prevention in the household, municipal, and agriculture sectors. Maghreb Business and Mashriq Business focused on the role of NGOs in promoting pollution prevention in small business and industry.

The work of the groups centered on addressing specific questions in the context of each country's needs and experience, including:

- What are examples of planned or existing pollution prevention efforts in each sector?
- What new pollution prevention initiatives would be most likely to succeed?
- What are the government, private sector, NGO, and public interest constraints to pollution prevention initiatives?
- What are the elements of a successful initiative?
- What key ideas/lessons learned did you gain from this workshop that could be helpful in implementing future pollution prevention initiatives?

The working groups reported their conclusions in a plenary session on the last day of the workshop. Highlights of their reports follow.

Maghreb community. The group made the following recommendations for priority NGO action:

- Sensitize the general public to environmental problems.
- Consolidate efforts and mobilization of resources.
- Increase attention to rural areas.
- Promote the use of new non-polluting technologies.
- Maximize the efforts of Arab NGOs involved in international programs and avoid creating parallel organizations.

The group's preliminary strategy included the following specific activities:

- Publish a newsletter to inform people about pollution prevention in the Maghreb.
- Create a permanent commission to follow up on executing the recommendations of this workshop.
- Identify sources of funding for pollution prevention projects proposed by the permanent commission.
- Set up a regional contest for high school students involved in pollution prevention initiatives.
- Train trainers and leaders in the pollution prevention field.
- Find funding to promote tannery methods that prevent chromium waste, a common problem in Maghreb communities.

Maghreb business. Group members noted the structural and financial weaknesses of some NGOs in the Maghreb. Other constraints to NGO action include lack of funding and difficulty in mobilizing community participation. The group made the following recommendations:

- Sensitize the public, through information and training, to the importance of recycling and pollution prevention, particularly in urban areas.

- Introduce environmental education at all school levels.
- Create recycling industries as a means of increasing employment.
- Mobilize resources for water purification and increase recycling of water for irrigation.
- Reduce waste as a means of reducing waste disposal and transport costs.
- Adopt the principle of “the polluter pays.”
- Promote the use of “preventive” clean technologies by industry.
- Introduce appropriate legislation to reduce pollution by industry.
- Mobilize financing for pollution prevention projects.
- Increase cooperation between industry and NGOs in pollution prevention efforts.
- Establish a regional network to address environmental problems and increase the exchange of information and lessons learned.

Mashriq community. The group presented examples of a wide range of successful NGO initiatives, including:

- Tree planting as a pollution control activity.
- Sorting and managing household waste.
- Increasing public awareness.
- Recycling plant by-products.

The group adopted tree planting as a good introduction for communities to environmental action because:

- This project is easy to implement on a local and national level.
- NGOs with limited resources could implement such a program.
- Trees act as green belts against sand storms and:
 - Reduce soil erosion
 - Preserve biodiversity
 - Protect watersheds and catchments
 - Curb desertification in semi-arid areas
 - Enhance rangeland area
 - Offer environmental and economic benefits.

The group identified several important elements in the success of pollution prevention activities:

- Raising public awareness
- Training local people
- Having access to experts who can provide technical assistance to NGOs
- Involving women and school officials in programs
- Creating and organizing community committees to work with planning authorities
- Establishing a network of interested NGOs, both at the national and regional levels
- Starting small, with pilot projects

Mashriq business. This group designed a four-point strategy to help NGOs promote pollution prevention in businesses:

(1) Increase public awareness on environmental issues. For example, programs might include:

- Making presentations on environmental issues in schools and integrating environmental issues into primary and secondary school curricula.
- Integrating environmental issues into the higher education curricula (i.e. of law, business, and engineering programs).
- Working with NGOs specializing in environmental education to assist in environmental awareness campaigns.
- Using or adapting existing donor organization resources such as posters and leaflets.
- Approaching businesses to sponsor environmental activities.

(2) Use existing resources, including legal systems and the media, to convince businesses of the benefits and penalties associated with environmental compliance. Special workshops might be held for reporters to stress the potential newsworthiness of environmental stories.

(3) Develop a pollution prevention program for business. Such a program might include an information component, a training component, and an environmental audit. For example, NGOs could create a recycling service that links companies that want to dispose of waste with companies or individuals that could use the waste productively.

(4) Enhance existing regional networks to exchange information on solutions to shared problems. For example:

- NGOs should build their membership.
- NGOs should take responsibility for creating an NGO electronic bulletin board, using

computer networks and existing access points in all major cities with guaranteed access to environmental organizations.

- NGOs participating in this workshop should keep in contact and meet again next year in a workshop organized by NGOs themselves.

CLOSING

The workshop ended with remarks by a number of dignitaries: Barry Hill and James Graham of USAID/Tunisia; Mohamed Ammous, President of CCIS; Faiza El Kefi, President of the Union Nationale des Femmes Tunisiennes; Mohamed Rachdi, Governor of Sfax; and Sadok Feyala, Tunisia's Secretary of State for Foreign Affairs.

The speakers commented on the high level of exchange that took place among participants in the workshop. They echoed the hope that this would be the first of many opportunities to meet and collaborate in addressing the region's environmental problems. Several reiterated the

importance of cooperation among all elements of society, including government, industry, NGOs, and individuals, particularly women who, because of their pivotal role in the family and community, are prime actors in many development programs.

At the close of the workshop, participants sent a cable to President Ben Ali expressing their deepest gratitude for his personal attention to the event, his country's warm hospitality, and the support and interest shown by his regional and national delegates.

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