



Feature Column

Environmental Education Takes Root in Taiwan

The foundations of environmental education are well established from elementary to high school grade levels, and have even extended into other areas of society. After over fifteen years of fostering environmental education, significant achievements are beginning to show. Limited by a lack of staff and resources, it is hoped that the promulgation of the Environmental Education Act works to integrate environmental education into the compulsory education system. The new act will cultivate environmental literacy and instill environmental concepts among the populace with the ultimate aim of encouraging spontaneous environmental habits and behavior.

The EPA has worked since 1987 to establish environmental education in Taiwan, adhering to the policy aim to "strengthen environmental education and research and development." To reach this goal,

environmental education teaching methods have been infused into curriculums at the elementary and secondary grade levels.

centers, develop supplementary environmental education teaching materials, train teachers of all grades, and carry out various environmental education activities. In 1990, the EPA took a step further by working with the Ministry of Education to promulgate a plan to reinforce environmental education in schools. Initial results are now clearly evident after 15 years of actively promoting environmental education in schools.

Environmental Education Established in Elementary through High School Grade Levels

The EPA's first task was to modify elementary and secondary school curriculums and integrate appropriate themes on environmental protection. Since 1988, the EPA has assisted normal colleges around Taiwan to establish environmental edu-

As for environmental education in other areas of society, apart from integrating the resources

In This Issue

Feature Column: Environmental Education Takes Root in Taiwan.....	1
Over-Packaging Restriction Announced Globally.....	3
Use of Illegal Petroleum Products to Be Penalized.....	4
Compulsory Garbage Sorting Policy Reaches 85% Compliance on First Day.....	4
Drinking Water Quality Standards Raised.....	5
Mercury Dry Cell Batteries to Be Restricted in Stages.....	6
Industrial Park Pollution Controls Target Steel, Petrochemical, Construction Industries.....	7
Complete Sorting/Zero Waste Policy Gains High Public Support..	8
CCA to Be Regulated as Toxic Chemical Substance.....	9
Wastewater Discharge Emergency Response Regulations Drafted.....	9
Industry Boosts Investment in Environmental R&D.....	11
News Briefs.....	3
Activity.....	12



Many elementary, junior high, and high schools practice environmental education on campus.

of media groups, NGOs, businesses and environmental volunteers to hold environmental education and instructional activities based on the various needs of each area of society, all levels of government have adhered to *the Environmental Education Guidelines* (環境教育要項) ratified by the Executive Yuan in 1992. The guidelines promote environmental education and foster continual growth of environmental knowledge and awareness among the citizenry.

Concrete achievements in promoting environmental education to date include:

Neighborhood Environment Cleanup Action Plan: Citizens are encouraged to participate in environmental activities through an "action card" reward system launched in 2004. Over 2,568,000 people have participated in this activity, represented by 2,780 government agencies, schools, NGOs and businesses. The activity has resulted in the cleaning of over 560,000 meters of roadway, and the removal of 16,000 tonnes of garbage from Taiwan's beaches, mountains and riverways.

Community Environmental Reform: Community environment reform plans have been promoted from 1997, and assistance has been provided to 630 communities to carry out environmental reforms. Technical service teams were established to provide communities with guidance and consultation. The EPA also worked with county and city environmental protection bureaus (EPBs) to hold special training for environmental volunteers in promoting community environmental actions. Already 110,000 environmental volunteers have received training to date.

Environmental Education Act (draft): Environmental education

takes on many forms and purposes including environmental education for the entire populace, lifelong environmental education, comprehensive environmental education, and environmental education involving technical integration. To achieve the legislative goal of Article 1 of the *Basic Environmental Act* promulgated in 2002, Article nine states that Taiwan will refer to environmental education acts contrived in the US and Japan, as well as consider the national situation and solicit views from all circles in drawing up the *Environmental Education Act (draft)*. The draft was sent to the Executive Yuan in 2004 and is currently undergoing revisions based on the Executive Yuan's review.

School Environmental Education: The EPA actively promoted school environmental education in 2004 through activities such as: 1) the first Green Sprout Award, a contest to award 22 of the nation's best children's environmental education books; 2) the Environmental Vanguard project which provides assistance to 15 college student clubs to promote environmental action on campus; and 3) environmental and sustainable development education seed teacher training semi-

nars to promote the seed teacher teaching implementation plan.

Guidance to NGOs to promote environmental initiatives: The EPA has helped establish 29 environmental protection associations. The Ministry of the Interior approved the establishment of 113 associations under the EPA's responsibility. In addition to strengthening assistance to NGOs in carrying out environmental initiatives, the EPA holds forums with environmental NGOs to strengthen interaction and exchange with civil organizations.

More Environmental Education Manpower and Resources Required

Owing to social and economic development and greater public demand for environmental quality, environmental education in Taiwan currently faces the following challenges:

1. Environmental education is still not listed as a focal theme in the national compulsory education system and is allocated a very low proportion of total budget and manpower. Environmental education is not yet recognized in many circles and lacks long-term support and participation. As a result, environmental education is fragmentary, lacks innovation, and



Cultivating spontaneous environmentalism among the citizenry.

is harder to promote in a comprehensive manner.

2. Due to limited manpower, budget and facilities, there is no way to reach industry, society, schools, families and citizens and address the environmental issues that each group is concerned about or ascertain that each educational activity effectively deepens the public's environmental awareness.

As for the future planning and expectations of environmental education in Taiwan, the EPA's goal is to cultivate spontaneous environmental action among the citizenry and make environmentalism an integral part of people's everyday lives. It is also hoped that environmental behavior and environmental ethics become a natural part of social culture and customs. The EPA will enhance mechanisms for

Plan," which makes best use of manpower, material and financial resources that add momentum to environmental reform.

4. Integrate private resources to establish environmental volunteer teams that assist with the promotion of environmental protection work.
5. Strengthen exchanges with NGOs and help them assist government efforts to promote environmental protection.
6. Strengthen environmental advocacy in the media and use media to convey new environmental policies, measures and achievements; raise citizen awareness, which in turn will lead to environmental action.
7. Encourage environmental protection in all fields, and develop more programs that select and commend groups or individuals for their contributions toward environmental protection, so as to get more people to jointly participate in environmental protection initiatives.

Due to limited manpower, budget and facilities, there is no way to reach industry, society, schools, families and citizens and address the environmental issues that each group is concerned about.

3. Environmental education should be widely promoted, and needs a diversity of people to participate and invest resources. Most environmental education in Taiwan is currently being carried out by various environmental NGOs and lacks ways of tying in with demands of social development. How Taiwan increases the number of environmental education promoters and raises the quality of education has a strong bearing on the future development of environmental education.

citizens to take environmental action, and instill more concern among the general public for the environment. It is anticipated that increased participation will result in better living environments and contribute to a society that recycles its resources.

As for future developments, the EPA strives to promote environmental education in the following ways:

4. Environmental education methods, subject matter and implementation guidelines are the decisive factors controlling the success or failure of environmental education. To more effectively promote environmental education, a stronger emphasis should be placed on evaluating the outcomes of environmental education.

1. Promote the legislation of the Environmental Education Act along with a comprehensive set of measures to facilitate the establishment of a comprehensive environmental education system that fully actualizes environmental education and promotes sustainable development.
2. Actively carry out the "Three-Year Implementation Plan to Strengthen Environmental Education in Schools."
3. Complement the Executive Yuan's "Taiwan Healthy Communities Six Star Plan" through active promotion of the "Green and Clean Communities

EPA Expands Reuse of Incinerator Bottom Ash

In light of difficulties involved in building landfills in Taiwan and the maturation of incinerator bottom ash reuse technology, the EPA invited county and city governments on 1 April 2005 to a briefing on the Plan to Encourage Public and Privately Organizations to Construct and Operate Waste Incinerator Ash Reuse Plants and Final Disposal Sites (鼓勵公營機構興建營運垃圾焚化灰渣再利用廠及最終處置場設置計畫) recently approved by the Executive Yuan. In the future the EPA will extend subsidies to local governments to reuse waste incinerator bottom ash, aiming for a 80% national reuse rate by 2009.

Cultivating Spontaneous Environmentalism

Air Quality

Use of Illegal Petroleum Products to Be Penalized

Vehicle owners who use illegal petroleum products not only emit large amounts of air pollutants but also reduce the lives of their vehicles. The EPA and the nation's environmental protection agencies have made it a focal task to inspect for the usage of illegal petroleum products. Violators could face a maximum penalty of NT\$75,000.

Addressing the pollution problems caused by exhaust from diesel vehicles, this year (2005) the EPA has implemented a sulfur standard of 50 ppmw (parts per million by weight) in diesel fuels. To facilitate implementation of this standard, the EPA is currently revising the draft *Criteria for Penalizing Transportation Equipment Violations of the Air Pollution Control Act* (交通工具違反空氣污染防治法裁罰準則), which will serve as the basis for inspections and disciplinary action.

Revisions to the draft criteria add that penalties for vehicle owners found using gasoline of substandard composition or function should be NT\$5,000, NT\$10,000 or NT\$20,000 for motorbikes, and NT\$10,000, NT\$20,000 or NT\$40,000 for cars based on the number of categories exceeding

control standards.

Tying in with the 2005 implementation of the 50 ppmw standard for sulfur in diesel fuel, the current two-tiered penalty scheme for violators who use diesel fuel with excessive sulfur content has been expanded to four tiers with ppmw brackets set at 50~100, 100~500, 500~1000 and over 1000 ppmw. Small cars shall be fined respective amounts of NT\$5,000, NT\$10,000, NT\$20,000 and NT\$30,000. For larger vehicles the fines are NT\$10,000, NT\$25,000, NT\$50,000 and NT\$75,000, respectively. Current ppmw brackets are 350~1,000 and over 1,000 ppmw, with respective fines of NT\$20,000 and NT\$30,000 for small cars and NT\$50,000 and NT\$75,000 for larger vehicles.

As more and more motorbikes come in for regular inspections—already

69.4% in 2004—and as a result of a measure implemented this year in which new motorbikes are exempt from regular testing for three years, penalties for motorbikes that fail to undergo regular exhaust examination have been dropped from NT\$3,000 to NT\$2,000.

Illegal petroleum products not only discharge more air pollutants but also corrode and clog vehicle fuel supply lines. Fuel with high sulfur content poisons the catalyst material in converters and shortens the lifetime of the vehicle. Therefore, the nation's environmental protection agencies have made it part of their focal work to inspect for use of illicit petroleum products. Violators could face a maximum fine of NT\$75,000. The EPA appeals to vehicle owners to patronize only legitimate filling stations and not risk using illegal petroleum products just to save a few dollars. This not only wears down vehicles and pollutes the air, but also results in more loss than gain through payment of fines.

Recycling

Compulsory Garbage Sorting Policy Reaches 85% Compliance on First Day

The EPA has vigorously promoted the Compulsory Garbage Sorting Policy since last year, and ten counties and cities began implementation this April. The first day of implementation brought good results with waste sorted properly in 85% of cases investigated. Four counties and cities did not even need to issue penalties.

The first stage of compulsory garbage sorting officially kicked off on April 1 (2005). So far, 12,381 investigations have been conducted in



Be sure to buy legal petroleum products at legitimate gas stations.

seven municipalities, namely Keelung City, Taipei City, Hsinchu City, Taichung City, Chiayi City, Tainan City, and Kaohsiung City, as well as Yilan County, Taichung County and Kaohsiung County. Among these, garbage was correctly sorted in a total of 10,612 cases, for an effectiveness rate of 85.71%. Of those cases in which sorting was not up to standards, 1,706 (13.78%) were corrected after instruction provided by sanitation crews. Fines were written up in 63 cases (0.5%). No fines were issued in Taipei City, Hsinchu City, Chiayi City and Yilan County.

On that day, EPA Minister Chang Juu-en (張祖恩) went to Kaohsiung City to meet with Kaohsiung Mayor Chen Chi-mai (陳其邁), and Kaohsiung Environmental Protection Bureau Director Chang Feng-teng (張豐藤) to observe how citizens were sorting their garbage. Minister Chang noted that the statistics speak for themselves, explaining that after promoting the compulsory garbage sorting policy, the amount of food waste recycled in Kaohsiung saw a marked increase of 4.08% during January and February 2005 compared to the average monthly amount collected in 2004. Moreover, twice the amount of resources is being recycled now, attesting to the outstanding success of the policy.

Minister Chang emphasized that it is not penalties but rather promotion and inspection methods that work to cultivate good recycling habits among the populace. The more a country recycles its resources the more civilized that nation is, and complete sorting of garbage for "zero waste" has become the trend of developed nations. The compulsory garbage sorting policy not only saves money for the nation but also helps prevent public nuisances such as pollution. Thus the policy aim is not only to establish consensus among the citizenry,

but more importantly is to change their daily habits.

The EPA explains that if citizens are found violating the three-category sorting policy when handing garbage to sanitation crews or throwing their trash into the garbage trucks, inspectors will first request violators to correct their mistakes right away and sort their waste on the spot before throwing into the trucks. Penalties are issued only as a last resort toward those few individuals who refuse to cooperate with sorting rules.

Water Quality

Drinking Water Quality Standards Raised

Safeguarding the quality of the nation's drinking water, the EPA announced in March that it will tighten standards on potential carcinogens in water to diminish the risk of unhealthy drinking water. Over the next three years drinking water quality standards will control and set maximum allowable concentrations for seven more agricultural pesticides.

Working to ensure safe drinking water, the EPA convened a public hearing on March 16 concerning draft revisions made to drinking water quality standards. The standard value for potentially carcinogenic volatile disinfectant by-product, total trihalomethanes, has been lowered from 0.10 mg/l to 0.08 mg/l and the maximum concentration of disinfectant by-product for newly regulated ozone disinfectant, bromate, has been set at 0.01 mg/l to minimize the risk of cancer. The standards for total dissolved solids and hardness have been adjusted from current levels of 600 mg/l and 400 mg/l to respective levels of 500 mg/l and 300 mg/l. The taste of the nation's drinking water should improve as the EPA strives to keep in step with international trends.

Total trihalomethanes are a by-product of chlorine disinfectants,

The first stage of the compulsory garbage sorting program is being implemented in ten counties and cities, and violators are fined from NT\$1,200 to NT\$6,000. Inspections will be reinforced in community buildings, organizations, and schools in the future. The EPA reminds citizens, communities, schools and organizations that garbage must be properly sorted in order to avoid fines. Questions concerning the recycling policy can be directed to the EPA's toll-free recycling hotline: 0800-085717.

and bromate is a by-product of ozone disinfectants. The EPA states that both substances are already listed as potential carcinogens by the World Health Organization. After investigating the domestic situation, consulting with experts and scholars, as well as referencing the standards of other developed countries, the EPA has decided to adopt the strictest standards in the world to guarantee citizens' health.

Total dissolved solids and total hardness affect the palatability of drinking water and are the only water quality standards that do not adversely affect human health. Drawing on research conclusions and the views of experts, the EPA has set reasonable standards for total dissolved solids at 500 mg/l and total hardness at 300 mg/l. The EPA will continue to track the status of the nation's water quality and will consider citizens' health in

adopting stricter standards for disinfectant by-products, heavy metals and pesticides that affect human health. As for substances that do not directly affect health but are merely taste factors such as iron, manganese, copper, zinc, chloride, total dissolved solids and total hardness, the EPA will continue to make reasonable adjustments after referring to standards set in advanced countries.

The EPA announced that within three years, new drinking water quality standards will be drawn up to regulate and set maximum values for the following seven pesticides: cartap, chlorpyrifos, dimethoate, glyphosate, pentachlorophenol, phorate and terbufos.

The newly added pesticide standards were selected from a careful evaluation made in 2004. The new drinking water quality controls on these pesticides are slated to take effect in 2008. Since 1997, thirteen pesticides have been regulated under drinking water quality standards. In recent years, however, agriculture agencies have approved numerous new pesticides for sale on the market. The above seven pesticides were selected based on usage amounts, toxicity and residues, as well as the WHO's calculation models and accept-

able daily intake (ADI) rates of each pesticide. Preliminary assessments suggested that these new pesticides should be regulated in drinking water and maximum allowable concentrations should be set as listed in table below. These will become the new pesticide standards for drinking water.

In drafting standards for these seven pesticides, the EPA has referenced control standards in the US, Canada, New Zealand, Australia, Japan, and Korea. The EPA will continue to follow management trends of other nations' drinking water quality standards and spur on the maturation of domestic pollution detection technology so as to carry out a timely and comprehensive review of those pesticides prioritized for regulation under Taiwan's drinking water quality standards.

Recycling

Mercury Dry Cell Batteries to Be Restricted in Stages

Given the threat that mercury poses to the environment and human health, the EPA is planning to adopt control methods similar to those used internationally by setting restrictions in stages to control the manufacture, import and sale of mercury dry cell batteries.

Mercury is a significant threat to the environment and human health, and international trends call for gradual restrictions on mercury and ultimately a full scale ban on its use. Japan, for instance, enforced a full scale halt on the production of mercury dry cell batteries, and the European Union has set similar directives, recommending all member nations prohibit the sale of dry cell batteries with over 5 ppm of mercury.

According to the existing *Working Guidelines on Determining Rates for Recycling, Clearance and Disposal and Heavy Metal Analysis of Dry Cell Batteries* (乾電池差別回收清除處理費

The EPA has made a reevaluation of reasonable control standards for pesticides already under control and still in use, such as butachlor (丁基拉草), 2,4-D (2,4-地), diazinon (大利松), endosulfan (安殺番), isoprocarb (滅必蟲), methamidophos (達馬松), methomyl (納乃得), and parquat (巴拉刈). The EPA has considered deleting pesticides with extremely low usage rates or prohibited from use and at lower than detectable limits in Taiwan's water quality monitoring data in the last five years (such as EPN (一品松), lindane (靈丹), monocrotophos (亞素靈), and parathion). This should work to ensure that drinking water conforms to safety and sanitary standards, and to reduce the investment of resources toward regular testing.

率及重金屬含量檢驗作業要點), the standard concentrations of heavy metals in dry cell batteries are set at 5.0 ppm (0.0005%) for mercury, 250 ppm (0.025%) for cadmium, and 4,000 ppm (0.4%) for lead. If analysis results show any one of these heavy metals over 1.2 times the standard concentrations, the responsible entity shall pay quadruple the normal recycling, clearance and disposal fee. If analysis results are close to but not over 1.2 times the standard concentrations, the entity is asked to send in samples for reexamination; if these samples are still above the standard limit, the entity shall pay quadruple the nor-

Regulated substance	MAC (mg/l)
Cartap (塔丹)	0.3
Chlorpyrifos (陶斯松)	0.003
Dimethoate (大滅松)	0.006
Glyphosate (嘉磷塞)	0.9
Pentachlorophenol (五氯酚)	0.001
Phorate (福瑞松)	0.002
Terbufos (托福松)	0.001

Table: Newly regulated substances in drinking water and their maximum allowable concentrations (MAC)

mal fee.

The EPA called for full scale recycling of disposable and rechargeable batteries from 1 November 1999. To make it easier for citizens to recycle, the EPA required all chain mega stores, supermarkets, discount stores, pharmacies and electronics stores where batteries are sold to install recycling facilities and carry out recycling. The EPA will also build on partnerships set up last year (2004) with schools and social welfare groups for the handicapped to strengthen promotion of dry cell battery recycling. Results speak for themselves as 34% more dry cell batteries were recycled through these channels in 2004 compared to 2003. Paving the way for recycling channels, the EPA is drafting regulations regarding facilities of waste dry cell battery recycling organizations, as well as actively guiding recycling organizations to enhance efficiency by setting up domestic battery recycling plants.

Apart from collecting higher recycling and disposal fees from manufacturers of batteries that contain higher amounts of heavy metals, the EPA is currently drawing up restrictions on the manufacture, import and sale of batteries with over 5 ppm of mercury, referring to EU directives 91/157/EEC and 98/101/EC, which call for similar source controls on mercury batteries. The first stage of restrictions has already been drawn up, which prioritizes restrictions on tubular or other non-button cell alkaline or manganese dioxide-zinc batteries. The second stage broadens the scope to include button cell mercury oxide batteries, silver oxide batteries, zinc air batteries and alkaline batteries.

Reduction of mercury usage has become an international trend. Before implementing control measures on mercury batteries, the EPA will convene with the Ministry

of Economic Affairs, manufacturers and importers to discuss this policy and include the views of all affected parties so that the policy

reaches a win-win solution that considers actual usage demand as well as environmental protection.

Waste Management

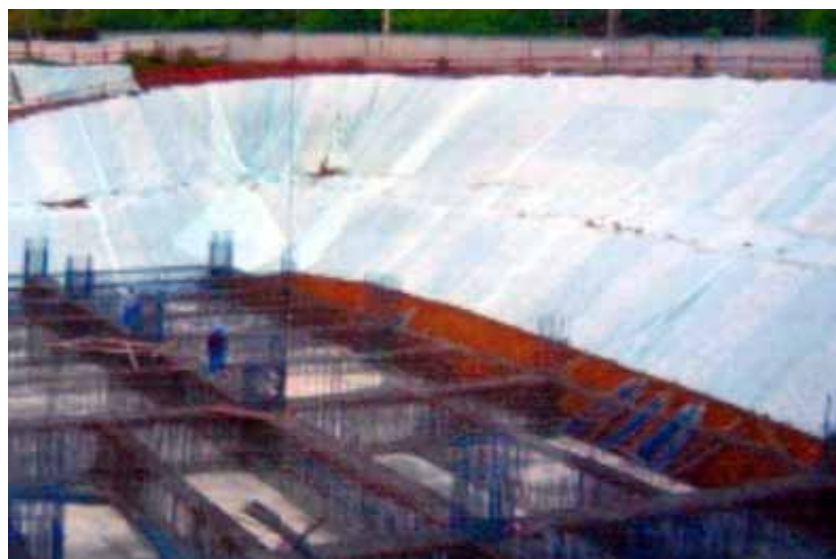
Industrial Park Pollution Controls Target Steel, Petrochemical, Construction Industries

Petrochemicals, steel, cement, fabrics and papermaking industries are largely concentrated in southern and central Taiwan. These traditional industries consume enormous amounts of energy and generate large amounts of pollution, making them some of the top emitters of carbon dioxide. To expedite greenhouse gas reductions, the EPA has focused on controlling pollution emissions of these target industries.

Greenhouse effect mitigation measures are set forth in the *Kyoto Protocol*, which finally took effect on February 16 to extend controls over 55% of emissions from 55 nations. In essence this environmental treaty is the drive behind comprehensive adjustments in many nations' energy structures, industrial policies, and energy conservation initiatives. The EPA's Southern Branch Bureau of Environmental Investigation (BEI) indicates that although Taiwan is not a signatory nation of the *Kyoto Protocol*, given Taiwan's role as member of the global village as well as the cur-

rent state of international industrial competition, it has become imperative to find ways to reduce carbon dioxide and greenhouse gas emissions. Adjustments in energy structure and industrial policy are tasks that require long term planning. Immediate response measures call for controlling air pollution emissions of specific industries.

The Southern Regional BEI indicates that five traditional industries—petrochemicals, steel, cement, fabrics, and papermaking—are backbone industries in Taiwan in terms of output value. However, these industries have



Construction work sites are often the sources of serious pollution.

high energy consumption rates, are high polluting and are the number one domestic emitters of carbon dioxide. The petrochemical industry accounts for 25% of all industrial emissions in Taiwan. Renda (仁大) and Linyuan (林園) industrial parks in southern Taiwan harbor a high density of petrochemical firms and emit a large amount of carbon dioxide and volatile organic compounds (VOCs).

The global demand for steel has increased greatly since last year, triggering a rise in steel industry output. Southern Taiwan is a focal region for domestic steel production. Apart from China Steel Corp, which handles the entire manufacture process from raw material to end product, there

are still numerous medium to small scale peripheral steel industries in industrial parks near the ocean. The pollution generated by these industries during production cannot be overlooked as increases in production capacity or negligence of pollution prevention work usually result in increased environmental loading.

The Southern BEI has therefore focused on waste incinerators, steel, petrochemical, cement, and construction industries this year, carrying out inspections of emission stacks, control of airborne roadway dust, and detection of leaky equipment in the hopes of effectively controlling pollution, raising air quality, and providing the public with a sound living environment.

expressed willingness (including "extreme willingness") to comply with the compulsory sorting policy. To ensure that citizens have the correct garbage sorting habits and to minimize the time required to sort, the EPA will strengthen guidance and instruction efforts and ask for citizens' cooperation.

The EPA's method to implement source reductions involves a series of stages starting with the Restricted Use Policy on Plastic Bags and Plastic (Polystyrene) Disposable Dishware from July 2002. Survey results showed that 92% of the public, 94% of junior college students, and over 90% of high school and junior high school students voluntarily bring their own bags when shopping to reduce the use of plastic bags.

The EPA is also actively promoting food waste recycling efforts with already 254 townships in all 25 counties and cities implementing the policy. Already 1,100 tonnes of food waste are recycled daily in Taiwan, and this is expected to increase to 1,600 tonnes by 2007, as well as generate NT\$2.4 billion in economic benefits.

Survey results revealed that 94% of citizens and 93% of junior college and high school students expressed willingness to cooperate with programs to recycle or compost household, school or neighborhood food waste.

As for the June 2004 implementation of the "no drip" policy to prevent the discharge of air conditioner water into the environment, citizens were instructed to make improvements before July 2004 to avoid penalties. The survey showed that 91% of citizens and 82% of students were aware of this new policy.

Waste Management

Complete Sorting/Zero Waste Policy Gains High Public Support

The EPA has announced the latest survey results of citizens' and students' environmental knowledge, showing that over 90% of respondents comply with measures calling for compulsory garbage sorting, and garbage and food waste sorting and recycling at fast food chains. Already 92% of citizens say they bring a shopping bag with them when going out shopping, and over 90% of elementary and junior high school students say they are doing so as well.

To better understand citizens' and students' awareness of environmental knowledge, policy and education channels, the EPA launched the "Citizen and Student Environmental Awareness Survey" covering 30 topics including "Compulsory garbage sorting," "Penalty for drippy air conditioners," and "Regular cleaning and maintenance of household water purifiers." Collecting such information on people's environmental attitudes and actions will facilitate future planning of environmental education.

The survey was conducted via

telephone from 31 May to 7 June 2004, recording a total of 1,621 valid responses from respondents over 20 years old. Personnel were dispatched to schools to conduct interviews or hand out written questionnaires, collecting a total of 4,829 valid responses from students of junior colleges, high schools, vocational schools, junior high schools and elementary schools. Scores were tallied with a 95% confidence level and $\pm 2.9\%$ sampling error.

As for compulsory sorting of garbage, survey results showed that 95% of citizens and students

Toxic Substance Management

CCA to Be Regulated as Toxic Chemical Substance

Wood processing and building maintenance industries commonly use chromated copper arsenate (CCA) as a wood preservative. However, it has been found that CCA-treated wood releases heavy metals arsenic and chromium, which are carcinogenic to humans. To safeguard human health, the EPA has prioritized listing CCA as a controlled substance. After public hearings and deliberation on the issue, the EPA will officially announce CCA as a toxic chemical substance and restrict its use.

Chromated copper arsenate (CCA), a compound containing chromium, copper and arsenic, is commonly used in Taiwan as a wood preservative as it serves the function of preventing rot and the growth of organisms that thrive on wood, such as mold, fungus, and termites. In the past, the wood in many historic monuments has been preserved through CCA treatment, which extends its lifetime. Treated wood artifacts are known to release heavy metals arsenic and chromium upon exposure to weather, rain and acidic soil. It is now confirmed that hexavalent chromium is a human carcinogen and that arsenic is both an acute and chronic toxin that could endanger human health.

Research abroad shows that children who come into contact with CCA preserved wood on playground equipment receive direct contamination by passing heavy metal toxins to the mouth after touching CCA with hands. Indirect contamination through food and toys also increases the risk of exposure. The EPA advises people to wash their hands after touching wood products to reduce the risk of cancer.

In 1996, Japanese firms voluntarily made gradual reductions in the use of CCA preservatives to treat wood. The U.S. EPA has already

reached an agreement with wood suppliers to stop production of CCA-treated wood for consumption from 31 December 2003. The E.U. placed a full scale ban on CCA-treated wood from January 2003. Denmark, Sweden, Germany, Australia and New Zealand are also planning to strictly regulate the use of this substance.

The EPA remarks that domestic firms still use CCA to treat wood because it is cheaper and durable. Apart from use in restoring and preserving artifacts and historical buildings, CCA is also used in outdoor construction such as pagodas, boardwalks, landscaping, decorative features, utility poles as well as wood furniture. New wood preservatives are available on the international market, such as alkaline copper quaternary (ACQ) and copper azole (CuAz), which do not contain arsenic or chromium and have lower environmental toxicities. Many countries have developed lists of alternative wood preservatives, and domestic firms are advised to use these products instead.

Observing international trends to restrict the use of CCA and reduce the chance of harm to children and the general public due to frequent contact with CCA-treated wood on playground equipment or in the living

environment, the EPA calls on companies to voluntarily reduce the use of CCA-treated wood and consider existing alternative products on the international market. After announcing this restriction measure the EPA will review whether it is necessary to altogether ban the use of this wood preservative.

Water Quality

Wastewater Discharge Emergency Response Regulations Drafted

Working to regulate wastewater discharge and prevent the occurrence of pollution, as well as to adopt clear emergency response measures and delineate authority, the EPA has drafted the *Regulations Governing Emergency Response to Effluent from Industry or Wastewater Sewerage Systems (draft)* to provide the legal basis for emergency response procedures.

To prevent industry or wastewater sewerage systems from discharging effluent that seriously endangers human health, agricultural production or drinking water sources, the EPA has formulated the *Regulations Governing Emergency Response to Effluent from Industry or Wastewater Sewerage Systems (draft)* (事業或污水下水系統排放廢(污)水緊急應變辦法(草案)) .

The EPA states that an incident occurred last year in which improperly treated wastewater polluted a water source, yet no responsible party stepped forward to carry out water pollution emergency response measures. Therefore the EPA has drawn up this draft regula-

tion to prioritize procedures to be taken in an emergency response to pollution discharged from industry or wastewater systems. The regulation clearly indicates the level of responsibility to be taken by the responsible person, representatives, management, constructors, owners, users or landowners (負責人、代表人、管理人、起造人、所有人、使用人或土地所有權人). The regulation also restricts or reduces the range of pollution and prevents pollution from spreading so as to ensure the normal use of water bodies.

The EPA points out that this draft regulation is integral to people's daily lives, especially residents of communities that have their own wastewater sewerage systems. Even though wastewater treatment facilities are a part of public infrastructure, once pollution of water sources occurs due to a breakdown or inability to treat wastewater, neighborhood residents are responsible for emergency re-

sponse measures. Failure to respond means that local competent authorities and industry authorities must respond. In such a case, compensation can be demanded of community residents by law.

The draft regulations stipulate that emergency response must be timely and efficient and the water supply companies downstream should be notified within one hour of the incident to prevent further use of polluted water source cisterns. The local environmental protection agency should be notified within three hours of the incident. In addition to prompt notification, emergency response measures call for blocking off and controlling the source of pollution, as well as monitoring changes in water quality of affected water bodies. Water source quality is thus adequately safeguarded by working through the rights and interests of other people to make best use of

pollution prevention and pollution control services.

This draft regulation is an ordinance of authority, sourced in Article 27, paragraphs 2 and 3 of the *Water Pollution Control Act* (水污染防治法). Article 51 of the same act stipulates that violators must pay penalties between NT\$60,000 and NT\$600,000, and if necessary their effluent discharge permit or simplified discharge permit will be revoked, or strict injunction will be made requiring the business to shut down. An advance notice of related articles has been posted on the EPA website (<http://w3.epa.gov.tw/epalaw/index.htm>).

The EPA requests the cooperation of the responsible persons, representatives, managers, constructors, owners, users, or landowners of industries or sewerage systems to safeguard the water quality of water sources used by the public.

News Brief

Info on Environmental Facilities Accessible Online

The EPA has just finished drafting geographical maps that show 17 categories of environmental protection related information. The maps can be downloaded off the Internet, allowing citizens to check which noise control zone their neighborhood belongs to, as well as the

locations of motorbike exhaust testing stations, waste management facilities, and resource recycling centers. The EPA website (<http://edb.epa.gov.tw/gis>) now makes it easy for citizens to retrieve this information and learn more about their immediate environment. To ensure widespread circulation of the infor-

mation in these environmental maps, the EPA has established an "environmental/geographical map and data public platform" (環境地理圖資共用平台). Apart from providing overlaying maps, previews and download functions, users can also access GIS software to directly read digital map info.

環境資料庫環境地理資訊系統		圖層列表 (共83個圖層)				
	編號	項目	圖層名稱	類型	資料內容說明	地理區位
☐ A_環境影響評估	1004296	A_環境影響評估	環評-水質監測站_121	點	環評水質監測站的地理位置	高雄、高雄、六輕、中興
☐ B_空氣品質	1004298	A_環境影響評估	環評-地下水監測站_121	點	環評地下水監測站的地理位置	中興
☐ C_噪音	1004295	A_環境影響評估	環評-空氣品質監測站_121	點	環評空氣品質監測站的地理位置	高雄、六輕、中興
☐ D_水質及地下水	1004297	A_環境影響評估	環評-噪音監測站_121	點	環評噪音監測站的地理位置	高雄、高雄、六輕
☐ E_土壤污染	1004306	B_空氣品質	地區空氣品質_121	點	台灣本島地區空氣品質監測站的地理位置	台灣本島
☐ F_環境衛生	1004305	B_空氣品質	地區空氣品質_121	點	台灣本島地區空氣品質監測站的地理位置	台灣本島、澎湖
☐ H_廢棄物	1004307	B_空氣品質	地區空氣品質_119	點	澎湖地區空氣品質監測站的地理位置	澎湖
	1004308	B_空氣品質	空氣污染指數區_121	面	台灣空氣污染指數區的地理位置	台灣澎湖
	1004310	B_空氣品質	空氣污染指數區_119	面	澎湖空氣污染指數區的地理位置	澎湖
	1004309	B_空氣品質	空氣污染指數區_121	面	台灣本島空氣污染指數區的地理位置	台灣本島
	1004312	B_空氣品質	空氣品質區_121	面	全省空氣品質區的地理位置	台灣本島
	1004311	B_空氣品質	空氣品質區_121	面	台灣本島空氣品質區的地理位置	台灣本島、澎湖
	1004313	B_空氣品質	空氣品質區_119	面	澎湖空氣品質區的地理位置	澎湖
	1004314	B_空氣品質	空氣品質區_121	面	台灣本島空氣品質區劃分的地理位置	台灣本島
	1004302	B_空氣品質	空氣品質區_121	點	台灣本島空氣品質區劃分的地理位置	台灣本島
	1004304	B_空氣品質	空氣品質區_121	點	台灣本島空氣品質區劃分的地理位置	台灣本島
	1004315	B_空氣品質	空氣品質區_121	點	台灣本島空氣品質區劃分的地理位置	台灣本島
	1004300	B_空氣品質	空氣品質區_121	點	台灣本島空氣品質區劃分的地理位置	台灣本島

The EPA website provides information on environmental facilities nearest to your home.

General Policy**Industry Boosts Investment in Environmental R&D**

Statistics of last year's environmental expenditures show green spending in domestic production increased 15% in 2003 compared to the previous year. There is a noticeable yearly increase in spending on research and development, with three times more spending in 2003 than 2002 and six times more spending than 2001. Investment in pollution control equipment has been waning over the years, signifying that domestic environmental industries are gradually turning toward research and development.

The EPA conducted a survey in June 2004 on environmental spending statistics to get a better understanding of each government department's investments in environmental protection. The results will be helpful in analyzing policy and compiling Green GDP. The survey covered government and industry sectors, including both publicly and privately operated manufacture industries and water, gas and electricity providers.

Based on the EPA's statistical survey of environmental spending, industries spend 15% more on environmental expenses in 2003 compared to 2002. The cost of pollution control equipment operation and maintenance, as well as research and development in environmental protection in the industry sector has increased during the years 2001~2003, with respective spending of NT\$19.5 billion and NT\$800 million in 2001, increasing to NT\$29.8 billion and NT\$5 billion in 2003. Yearly spending has especially increased in the area of environmental research and development, threefold in 2003 compared to 2002, and sixfold compared to 2001. Investment in pollution control equipment is decreasing by the year, from NT\$24 billion in 2001 to NT\$19.1 billion in 2003—a 20% cutback. Survey findings show that equipment purchased by firms in the past is still operational, related operation and

maintenance costs have increased, and companies are increasing spending on research and development.

Survey results show that in 2003, Taiwan's environmental spending was NT\$107.3 billion, eight percent greater than in 2002, and accounting for 1.09% of the GDP. This constitutes an average per capita environmental spending of NT\$4,753, seven percent more than in 2002. Government and industry sector spending accounted for approximately half of all environmental spending. Government environmental work comprises mainly of local agencies' expenditures toward implementing waste recycling, clearance and disposal. Industry expenditures on the other

hand went mainly toward management of wastewater and emissions.

Government expenditures toward environmental protection in 2003 amounted to NT\$52.7 billion, 84% of which went toward local agencies and their projects. Of this, Taipei County and Taipei City together accounted for nearly 40% of local agency expenditures at NT\$11.2 billion and 9.7 billion, respectively. Approximately 51% (NT\$26.6 billion) went toward waste management and 24% (NT\$12.4 billion) went toward water pollution prevention. In comparison with 2002, county and city government investment in wastewater management engineering such as construction of wastewater treatment plants and wastewater sewerage systems, water pollution control expenditures increased by 88% (NT\$5.8 billion) in 2003.

Industry sector environmental expenditures in 2003 amounted to NT\$54.6 billion, showing an increase of NT\$8.7 billion compared to the previous year. Approximately 42% (NT\$22.9 billion) of this went toward treating wastewater, including staffing, water and electricity, medical costs, materials and inspections.

News Brief***Firms Invited to Apply for Openings in Taoyuan and Tainan ESTPs***

Taoyuan and Tainan Environmental Science and Technology Parks (ESTPs) have recently announced a new land sale handbook, and officially began accepting applications from businesses to set up operations within the parks. Many firms have already submitted applications to enter the Tainan ESTP, and the Taoyuan ESTP expects to begin receiving applications in May.

Meanwhile, construction has been completed on experimental factories in the Kaohsiung ESTP. Already eleven firms have set up operations in the Kaohsiung ESTP, and many domestic and foreign companies are inquiring about setting up plants there. The Hualien ESTP is preparing for initial construction, and all four ESTPs are actively soliciting firms to establish operations.

Approximately 36% (NT\$19.5 billion) went toward managing emissions, primarily for procurement of related equipment. Among the industries, electronic component

manufacture industry expenditures were the highest at NT\$19.3 billion (35% of all industries), showing an increase

of about NT\$10 billion compared to last year. This was mainly due to an increase in regular expenditures toward controlling water pollution.

News Briefs

Biodiesel Garbage Trucks Hit the Roads in 4 Counties/Cities

The EPA has provided assistance to the environmental protection bureaus (EPBs) of Taipei City, Hsinchu County, Nantou County and Taichung County to run a pilot project to use biodiesel fuel in garbage and recycling trucks. The trucks took to the streets this March (2005). Some citizens have commented that the biodiesel trucks emit less black smoke and odor—some even say the exhaust has a pleasant smell of fried food. Eager to respond to the *Kyoto Protocol*, county and city EPBs are keen to give the EPA's biodiesel pilot project a try. To date, already 13 counties and cities have applied for and received subsidies. In addition to the four local governments above, Kaohsiung City, Taichung City, Tainan City, Taipei County, Changhua County, Chiayi County, Kaohsiung County, Yilan County and Hualien County have climbed aboard on this initiative to switch to renewable energy.

Over 6,000 Entities Required to Report Waste Online

On July 1 the EPA promulgated a revision requiring 6,000 entities that generate waste types commonly found in illegal dumping incidents (such as construction waste, infectious industrial waste and hazardous industrial waste) to submit online reports detailing the trajectories of industrial waste clearance vehicles. The purpose is to ensure the appropriate clearance and disposal of waste generated by these entities and prevent environmental pollution from careless dumping of such wastes. Entities subject to this new regulation include construction companies, hospitals, labs of junior colleges or academic institutes that generate hazardous industrial waste, photo developing shops with fully automated developing equipment, drycleaners, environmental analysis organizations, plate makers for printing, printers and terminal markets for agricultural products.

Activity

Tanshui River Watch Activities

A group of community college students concerned about the water quality of the Tanshui River has teamed up with others fond of natural water environments to hold a series of "Tanshui River Watch" events for four consecutive weekends in April. The first event included an introduction on the history and traditions along the Tanshui River, a reading on the history of Dahan River wharfs, and a map of river monitoring stations. The event also showed ways people can protect rivers, the current status and vision of sewer systems, and the sources of pollution along the Dahan River. People were invited to walk along the river access corridor on the bank of the Dahan River to get a real feel of river culture and pollution sources. Group discussions and forums were held concerning the river, and river patrol teams shared their experiences and their devotion to protecting the Tanshui River.

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Publisher

Dr. Chang Juu-en, Minister

Publishing Directors

Tsay Ting-Kuei; Lin Ta-hsiung;
Ni Shih-piao

Advisors

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Editor-in-Chief

Roam Gwo-dong

Executive Editors

Y.F. Liang, Chang Shiu-an-wu,
Hsiao Lee-kuo, Lin Char-hung,
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For inquiries or subscriptions to the printed version, please contact:

Environmental Policy Monthly
Environmental Protection Administration
Office of Science and Technology
Advisors

41, Sec. 1, Jhonghua Rd.,
Taipei, Taiwan, R.O.C.
tel: 886-2-2311-7722, ext. 2207.
fax: 886-2-2311-5486
e-mail: umail@sun.epa.gov.tw

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