# 15. THE INTEGRAL URBAN NEIGHBORHOOD

The logical extension of the integral urban house idea is the integral urban neighborhood, which itself leads to the development of communitywide or municipal-scale programs of resource management and local self-reliance. True, it is important to test and perfect the idea on the scale of a single household. But once the technologies have been proven, they ought to be advanced on the neighborhood level and ultimately on the citywide level. The idea of establishing integral urban neighborhoods is not particularly unique. Both private and nonprofit organizations as well as state and federal agencies are exploring the potential for implementing appropriate technologies on the community level. For example, in the Bronx, in New York City, a neighborhood community development association is rehabilitating condemned tenements and installing solar and wind energy facilities. And in Oakland, California, neighborhood community centers are teaming up with governmental agencies in establishing a citywide ecosystem-management program that proposes to integrate programs in waste recycling, community food raising, and housing rehabilitation, the overall goal being improvement of the urban environment and creation of jobs in new businesses for the unemployed.

Just as the home can be interpreted as an ecosystem, so may a neighborhood. Basic life-supporting processes in which resources are consumed and wastes are produced prevail on both scales. As with the individual integral home, the objective of the integral neighborhood is to provide for a high quality of human existence with minimal destruction to the environment. The advantages of a community-scale resource-management project are many. First, several homes and lots taken collectively will yield a high degree of complementarity and diversity unlikely on the individual home basis. One home's yard may be well suited for extensive garden activity, while another, because of shading of trees and adjacent buildings, may be best suited for composting and animal raising. Second, the element of economy of scale becomes apparent when the retrofit of an entire neighborhood of homes is undertaken. Construction materials may be purchased in sufficient quantities to dramatically reduce unit costs. Construction time for the





simultaneous fabrication of three or four solar water heating systems in all probability will not be three or four times as long as for just one. Third, the maintenance of life-support systems may be shared by several families, thus freeing the individuals involved for the imposing responsibility of daily care. This is particularly important in reference to the raising of livestock, the watering of a garden, or the maintenance of a sanitary composting system.

An integral urban neighborhood, as we envision it, would have several components of a comprehensive program of sound resource management: housing weatherization and solarization, community food raising, environmental landscaping, waste recycling, and ecological pest management. The following list presents an idea of the scope of possibilities:

1. *Housing weatherization and solarization:* weatherstripping of windows and doors of the homes, insulation of ceiling and walls, increase of solar gain through skylights and south glass, attached greenhouses to south sides of buildings, installation of solar water and space heating systems, and use of wind power where appropriate.

2. *Community food raising:* jointly maintained vegetable garden, animal raising facilities, and fruit orchards.

3. *Environmental landscaping:* planting of deciduous vegetation along the south-facing sides of homes; utilization of water-conserving mulches on all planted areas; cultivation of low water use and low-maintenance vegetation; minimal use of concrete, asphalt, and other impermeable surfaces for walking paths.

4. *Waste recycling:* community-scale composting projects for garden and household wastes, neighborhood recycling centers.

5. *Ecological pest management:* alternate approaches to pesticide use for the control of indoor/greenhouse and garden pests. The professional phrase for this type of pest control is integrated pest management and is discussed in Chapter 13.

The integral urban neighborhood concept has more than a technological character; it has a social character as well. A community garden links people not only to the soil, but to each other. A municipal composting program not only conserves valuable materials and makes good use of natural resources, but can create new jobs. A citywide program of home weatherization goes beyond the conservation of fuel and materials; it ultimately results in the saving of money.

The authors have had personal experience with three aspects of integral urban neighborhoods: community gardening, municipal composting, and recycling projects. In this final chapter we will report on our experiences in hopes that it will inspire you to go beyond the confines of your individual home and begin thinking about the next step.

## Community Gardening

There are good reasons for establishing community gardens, in areas where the homes are provided with small backyards and, more importantly, where a predominance of apartment houses and other multiple-unit dwellings means many people have no access to outdoor growing space. Working collectively to raise food can make efficient use of tools, seed and water. It can also encourage positive neighborhood interactions in the development of currently unproductive urban open space. The urban community garden can provide a setting in which chronically underemployed groups in the urban society, youth and the elderly, are able to engage in work that enhances both personal and community self-reliance.

**Qualities to look for in urban sites:**

1. Good exposure to sun
2. Access to water
3. Minimal exposure to heavy traffic (to reduce lead, noise, and other pollution)
4. Adequate fencing against potential damage from dogs and vandals, or the potential for being inclosed and/or protected
5. Minimal compaction of the soil
6. Minimal amount of trash (building debris, glass, and so on) mixed with the soil
7. Little or no competition with roots of trees or tall hedges
8. Accessible to a vehicle for hauling supplies such as compost material or lumber
9. Protection from wind, if necessary
10. Owner is supportive of program

Much urban space that might be suitable for community gardening has been overlooked. Besides the obvious vacant lots and parks, there are vast stretches of ornamental lawns supported at great expense on the grounds of hospitals, public schools and colleges, and other municipal, county, and state institutions as well as privately owned, temporarily unused space. It may take two to three years to reclaim the soil in some of these latter spots, and permission to use the site might be granted for one season only, so starting a garden there would not be worthwhile. A three- to five-year agreement regarding use or sufficiently undisturbed soil to start with would make the situation more suitable for a large-scale effort.

The best place to begin looking for available land is your town's housing authority. It is likely that the city government owns small parcels of land that would be suitable for a community gardening effort. The city council or local board of supervisors should be petitioned for the use of public land. Rarely do available sites combine all of the ideal characteristics, but to aid in making a choice, the desirable qualities are listed in the margin.

**Establishing the Garden:** The first step after the site has been selected and permission has been obtained for its use is the development of some protection. Strong fencing is obviously the best, and certainly a must where stray dogs might dig up the seed beds or attack livestock. However, in some situations either the social climate of the neighborhood or the willingness of nearby residents to supervise the area could make fencing less essential. We stress this aspect because we have seen community garden attempts destroyed by low morale when produce is stolen or the garden damaged due to a lack of protection.

The second step is the establishment of a water line. The final details of the irrigation system within the plot itself may have to be worked out after the overall plan for the garden is developed. However, it is essential to make sure that sufficient water at adequate pressure is available to the site itself. Generally, a line pressure of at least 35 psi (pounds of pressure per square inch) is necessary for effective operation of overhead sprinklers, and 2 psi is sufficient for drip irrigation. If the plot is a large one, spigots may have to be established throughout the garden, since long hoses, which tend to damage plants as they are dragged to and fro, are best avoided. Ideally, no area should be more than twenty-five feet from a spigot.

People often wonder about the feasibility of digging a well so that the garden can have its own water supply, perhaps pumped from the ground with a windmill. Considerations in this regard are groundwater depth, water quality (proximity to sewage leaching fields could be important here), and the cost of pumps and well-digging operations. Water needs vary according





to air temperatures, wind, soil type, and plants grown (as well as the techniques for growing them, as described in Chapter 8), but if rain does not contribute substantially to garden watering you may need to plan on pumping in approximately 200 gallons of irrigation water per week for every 300 square feet of garden space. If the community garden is composed of 50 300-square-foot plots (each $15 \times 20$ feet) then an average of 220,000 gallons of water would be required for a 5-month growing season from April through September. Analyze the situation. If the water table is shallow and easily tapped, and the cost of city water is high enough to justify the expense of a well and pump, then a well may be appropriate. Wells become increasingly attractive during periods of acute water shortages when consumption is rationed.

Unquestionably, community gardeners may be tempted to overwater, since individual water use is generally not monitored. The only solution is to encourage conservation techniques by demonstration as well as verbal reminders through whatever type of meeting or media is used to communicate among the participants. In a university-sponsored vegetable garden for married students on the University of California at Berkeley campus a number of years ago, the entire plot was laid out in furrows following the standard agricultural model for this part of California. The garden was then irrigated by university maintenance people on a regular weekly schedule. There are many good reasons for irrigating in this way. Vegetable plants differ in their water requirements, and rarely is one watering schedule suitable for every type of plant. Under the U.C. system, many plants received more water than they needed. Furthermore, the plowing of furrows imposed an arbitrary pattern upon the individual planting schemes, wasted good growing space, and destroyed efforts to mulch, plant intensively, and use other good water-conservation and gardening strategies. It also inadvertently taught people an inefficient gardening style. Regardless, however, we were sad to see this project ended.

**Individual Versus Cooperative Efforts:** A fundamental decision has to be made in the initial planning of the garden: will the land be divided into parcels and distributed to individuals and/or families or will the entire lot be maintained cooperatively? There are advantages and disadvantages to both schemes, and ultimately the choice will be made according to the people involved in each garden, their perception of their individual vs. community needs, the degree of mutual trust they enjoy, and their overall primary objectives in becoming involved in the project.

Gardens encouraged by public institutions will doubtless favor individual plots, since this approach is generally the more familiar (and less threatening) one. As a legacy of the civil rights and anti-Vietnam War movements and as a relative of the gradually evolving anti-nuclear movement, a group that comes together to deal with the problems of increasing neighborhood self-reliance stands a good chance of sharing other common goals that can form the basis for political action by its members. It doesn't take long for members to compare notes and perceive the need to tackle many supposedly individual or neighborhood problems at the higher levels of government and big business where the power ultimately lies. Therefore, it is our

Figure 15-1 **Cleminatina Towers Community Garden in San Francisco**

*The garden is maintained by the residents of an adjacent apartment house complex. The garden had been in existence for five years.*

assumption that the cooperative approach will rarely be initiated or encouraged by a sponsoring organization outside the neighborhood. Any impetus in the direction of cooperative gardening styles would have to come from within the community itself.

The advantages of the individual-parcel approach are that it permits participants a great deal of choice as to gardening styles and varieties of vegetables grown without their having to appeal to a committee or a manager for a decision. It solves the problem of food distribution, since people take only what they can grow personally, and sometimes a competitive spirit may arise, encouraging optimum productivity from each plot. In any case, people





tend to be reasonably responsible toward the upkeep of an area they feel is their own, if only for a season.

The disadvantages of the individual style are primarily those of duplication of effort and materials. Resources may be used less wisely. Food, and even land, may be wasted. Everyone buys his own tools but uses them only a fraction of the time. It is more difficult for the group to acquire and disseminate information about new and superior gardening techniques, or of insect management that reduces pesticide use, for example. Most important, the participants feel less of a sense of community and the garden is harder to use as a stepping stone towards addressing other neighborhood issues of energy and resource use and undertaking specific activities for local improvement.

The disadvantages to cooperative gardens are inherent in a society that stresses the individual in an "every man for himself" sense. Resolving such conflicts as distrust of others—particularly over issues of equitable division of labor and produce—disputes over techniques to be used and similar issues can be time-consuming without working models for cooperative action. The successful gardens we are personally familiar with in which everyone works together are usually run along rather authoritarian lines. Participants often become like students in a class or the followers of a garden guru who holds power through a mixture of personal charisma and the infusion of mystical dogma into horticultural expertise. Still, we would like to believe that the hierarchal absolutism common to both universities and religious cults is not essential to the success of a neighborhood garden that is farmed cooperatively. Certainly, the benefits in efficiency of land and resource use and the sense of community self-reliance and realignment of local power would seem to be worth the effort.

**Components of the System:** Regardless of whether other nonvegetable components such as rabbits, chickens, bees, and the like are introduced into the community garden, some sort of waste-management system will need to be devised to provide compost. In some cases, for example, the San Francisco Community Gardens, compost of plant debris or from manure of municipally maintained horse stables may be brought to the gardens from a central point where it has been produced. Often it is desirable to have compost made on the site. The bin system described earlier can be used very satisfactorily on sites up to a certain size. Five compost bins serviced a collectively run University student garden we developed in which thirty-five students were involved on a rotating basis. The planting area was approximately 150 feet by 200 feet (but a considerable area was given over to footpaths and meeting areas because of the heavy traffic within the garden). But if the garden becomes too large, processing all the waste materials through a bin system may be difficult. Still, this may be a matter of who is managing the system. Several years ago, one of us (Javits), using only three bins for an entire twelve-month period, composted the entire daily food wastes of 150 people living in three housing cooperatives, and we understand that the system is still being maintained at the time of this writing. In this event, a windrow system may be used as described in the next section on municipal or large-scale composting.

Other useful additions to a community garden are lockable tool sheds, protected bulletin boards for communications, shaded benches on which the elderly (and everyone else) may relax, sandboxes or other recreational provisions to occupy very young children, and a solar-heated greenhouse for starting young seedlings early in the season, as described in Chapter 9.

The Department of the Interior, Bureau of Outdoor Recreation, has shown an interest in community gardens, and has been active in accumulating information about those already in existence. Doubtless, many states will become involved in setting up community garden coordinators. The responsibilities of the person holding this post in California (within the state's Office of Appropriate Technology) is to "assist communities throughout the state in obtaining land, funding, equipment and technical assistance necessary to establishing community-tended vegetable gardens."

**Municipal Composting:** There are many reasons why a community might decide to establish a municipal or large-scale composting system. Not everyone has sufficient space, time, or interest in maintaining a home composting operation. Furthermore, some types of plant debris, particularly tree trimmings and heavy brush, are too difficult to compost using a bin system, because of either size or coarseness. The large machinery needed to deal with such materials is only cost- and energy-effective on a municipal scale. Also, a city-operated composting program can recycle a large mix of materials generated by the municipal agencies such as the parks and recreation departments, as well as by large landowners, landscape contractors, and tree pruners. Municipal sewage sludge, assuming that it is not too high in heavy metals, can be mixed with the plant debris. The finished compost can be made available to city gardeners and to individual citizens.

1. Program justifications including (a) a solution, in part, to the city's waste-management problems; (b) an environmentally sound management strategy; (c) economic feasibility, in terms of reduced need for land-filling or incineration, and savings on water and herbicides (as a result of using the finished compost as mulch)
2. A site plan and description of operating procedure
3. A proposed budget, including costs and anticipated income derived from dumping charges and sale of finished compost
4. An environmental impact assessment procedure
5. A method for evaluating the project after a year of operation

*Windrows are aerated and repositioned by an equipment operator at the City of Berkeley Municipal Composting Site*

Figure 15-2. **Windrows of Decomposing Plant Debris**


We like to refer to these municipal composting systems as leaf banks to impress upon people that the materials are precious, a resource to be conserved. The materials are deposited in the bank as plant debris and then withdrawn as compost. We know of a local example of a leaf bank (in the city of Piedmont, California) where in fact only leaves are used. They are deposited there by the municipal tree crews and then after a year's slow composting in the piles where they were dumped, the leaf-mold is availabale free to citizens. However, a greater range of plant debris saved in the leaf bank is more desirable, and this requires some sorting and processing.

**Preparing to Establish a Leaf Bank:** The first step in bringing a composting program to your city is to establish a citizens' advisory committee that can assess the present state of affairs and prepare a proposal to be submitted to the city council or other appropriate decision-making body. This committee should evaluate the existing methods of handling plant debris to determine if an alternative is indeed necessary. If it decides that a leaf bank composting system is desirable, the next step is to determine the characteristics of the plant wastes generated by citizens, municipal agencies, and private landscapers and gardeners.

Next, the cost of establishing and maintaining the system must be estimated. It is important that the projected costs be compared with those of the existing disposal methods for these materials. In many cases, plant debris is taken to a land-fill whose life expectancy can be predicted. The costs attendant on establishing a new disposal site when the current one is filled up may indeed justify the cost of establishing a compost site.

However, promoting municipal composting programs exclusively on the basis of the income they might generate in the selling of the end-product has proven to be a poor tactic. Rather, the positive impact these programs have on helping to alleviate solid waste disposal problems should be stressed. While it is true that revenue can be generated from the sale of the finished compost, the most important thing about a leaf bank system is that it is an alternative to existing methods of managing these wastes. People are already paying to get rid of these wastes without expecting a useful product to be ultimately returned to them. So a composting program designed to break even or be subsidized, in view of the potential benefits, is a highly desirable method of waste reclamation. Certainly, the system should not be expected to generate income in addition to the good it does the community. Since abundant documentation exists on the problems and costs associated with "sanitary" land-fills as well as the benefits to be derived from compost (including savings in water, fertilizer, and cultivation labor costs when compost is used around trees and shrubs in parks and other municipally owned grounds), making a good case for the desirability of a composting project in your community should not be difficult. Still, in cases where the cost of the new system is much greater than the present one—all current costs considered, including purchase of soil amendment and mulch by the city—then you may need to explore potential markets for the finished product (see Box 15-1).

After assessing the need and analyzing the costs, the next step is preparing a proposal. It should include the items listed in the margin.

*Site Layout:* A site layout should include accommodations for a project office, a place to receive and inspect incoming plant debris, an area sufficiently large to store two week's worth of material received, a place for storage of shredding and other equipment, an asphalted or cement pad for placement of the compost windrows, and an area for curing the compost and distributing it to citizens.

*Operating Procedure: The Berkeley Composting System:* An operating procedure must be developed for the various management tasks necessary to complete the composting process. The tasks involved are receiving and storing the material, and shredding, composting, and distributing it. The system has to be monitored for objectionable odors, fly-breeding, and the harboring of rats. In cases where the composting system will be maintained by city personnel, a substantial program of education and training in how to manage such a system may be required. We use the program in Berkeley, in which one of us (Javits) has been involved as a technical consultant, as an example of how the process might be organized.

Berkeley's composting program processes plant debris, leaves and weeds, tree trimmings, and brush generated by city agencies, landscape contractors, professional gardeners, and private citizens. No attempt is made to compost household wastes such as kitchen garbage. Although the program is selective and therefore not comprehensive, this factor does simplify operational and maintenance procedures and minimizes potential fly production and generation of odors. An average of 100 to 150 cubic yards of material is delivered daily to the 80,000-square-foot facility located adjacent to the city's land-fill operation. A 50-cent tariff is charged for each cubic yard delivered. This revenue is used to help offset the program's operational costs.

### Box 15-1. **The Boundary Problem**

A central concept used in changing social institutions is the necessity to draw the boundary around enough of a system to insure that the problem can feasibly be solved within it. Two of us (the Olkowskis) learned this technique initially in the process of developing municipal pest-management programs designed to reduce pesticide use. As long as the vegetation-management people focused only on the bug and the plant the problem often seemed unsolvable without synthetic chemical tools. The point was to enlarge the boundary to include these factors: natural enemies of the pest insects; fertilizing, watering, and other techniques; other species of plants and their management; the union's concern for safer working conditions; citizens' efforts to reduce medical expenses resulting from ailments caused by toxic materials in the environment. When these factors were identified as part of the pest-management system, many new management strategies as well as sociopolitical goals made possible solutions that were not previously obvious.

An exact parallel exists with regard to the establishment of leaf bank compost systems. If only the cost of machinery and labor to process the materials are considered, the cost may be prohibitive. But if the boundary is drawn large enough to include the cost of present waste-management and city-owned vegetation-maintenance programs, the need for jobs in the community, and the value of the end-product to the citizens, then all the dynamics of the situation are changed, costs and benefits may be assessed differently, and the problems inherent in establishing the program are more likely to be seen as solvable. As in all such situations, educating the politicians, general public, and municipal staff, if they are to be involved, is absolutely essential. It is a tenet of our personal belief system that most people will modify their views and behavior and accept and be willing to financially support new systems when they understand that the change is truly in their own interest.





Customers receive a voucher that entitles them to one cubic foot of finished compost in return for each cubic yard of fresh material delivered.

The incoming material is heterogeneous, varying in particle size, moisture level, and carbon-to-nitrogen ratio. The site attendant carefully inspects each incoming load, determines its best use, and directs the customer to a particular place on the pad for dumping. Large branches and tree trunks are removed from the piles of received material, sawed into logs, and sold to the public for firewood. Clean sawdust from local lumber yards and cabinet shops is stockpiled and made available to people who want uncomposted material for their own compost or absorbant litter in their animal pens. Clean wood chips delivered to the site from tree-pruning contractors and the municipal public works department are also stockpiled for use by the public or by some other city agency as mulch. Weeds, grass clippings, brush and leaves, and tree trimmings having a diameter of two inches or less are ground to uniform particle size.

The most critical part of the entire composting process is the shredding of the mixed plant debris. Shredding increases the surface area of the coarse material and therefore hastens the decomposition process, reduces volume, improves water and heat retention of the compost windrows, makes handling of the material by heavy equipment easier, and produces a more attractive product. Although the most vital element in the process, shredding is also the least refined. It was difficult to find grinding equipment designed to effectively shred mixed plant debris to the size and at the speed required and at the cost the city could afford. Machines in the right price range with an adequate grinding rate of thirty to fifty cubic yards per hour have been developed to shred homogeneous material such as hay or paper, but these were found to be unsuitable for mixed plant debris. Berkeley, with the aid of State of California funds, finally purchased a Farmhand Tub Grinder. This is a heavy-duty piece of machinery boasting a massive hammer mill. However, in its original form the grinder could not handle material with mixed particle size, moisture content, and texture. City engineers and technicians have modified the machine's grinding mechanism so that it can satisfactorily process up to forty yards of debris per hour, which is the rate required for operation of the project.

A front-loader tractor equipped with a two-yard bucket and grapple hook is used to load plant debris into the hopper of the tub grinder. The material is ground to a 1.5-inch particulate size and then assembled in a windrow (extended pile) with a basal width of 16 feet, height of 8 feet, and length between 40 and 80 feet. Since compaction and shredding reduces the volume of the material by 300 to 500 percent, a 175-cubic yard windrow accommodates five days worth of receipts (500 to 750 cubic yards). The windrows are oriented parallel to each other and at a distance from one another of forty feet from center to center. See Figure 15-3.

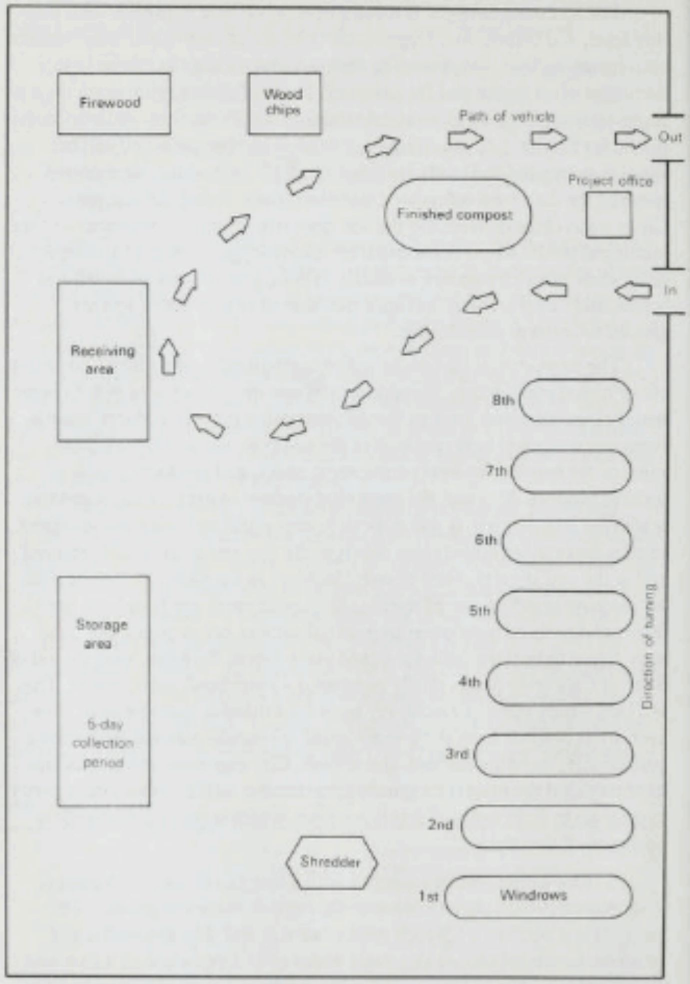
The volume of a windrow can be computed by the formula:

$.625 \times \text{height} \times \text{basal width} \times \text{length}$

Therefore, a windrow having a height of 8 feet, basal width of 16 feet, length of 75 feet has an estimated volume of 4,800 cubic feet, or 175 cubic yards.

*Composting:* Immediately following assembly and placement of a windrow on the asphalt pad, the surface of the material is moistened with a 6-inch layer of water. A windrow with a surface area of 960 square feet requires 3600 gallons of water (the amount is reduced during the rainy season). An

Figure 15-3 **Layout for Berkeley Municipal Composting Program**




*Each successive windrow is smaller due to loss of mass during decomposition.*

additional 1800 gallons of water is applied to the windrow each of the first five times it is advanced on the pad. The moisture content of the compost is regularly tested, and sprinkling rates are adjusted to maintain a moisture level of 50 to 60 percent. Each cubic yard of shredded plant debris requires about 75 gallons of water throughout the composting process, and this must be supplied by the program unless, of course, it rains. Rainbird sprinklers were installed to water the compost.

The windrows are turned and advanced on the pad whenever a fresh windrow is prepared, usually every five days. The pad accommodates eight





Figure 15-4 **Operational Cycle of Berkeley Composting Program**

| PROCEDURE | MANAGERIAL TASKS of site attendant and equipment operator |
|---|---|
| RECEPTION | 1. Inspect incoming loads to determine quality and quantity.<br>2. Decide to accept or reject load.<br>3. Assess fee. |
| DISTRIBUTION | 1. Direct mixed loads to general receiving, clean chips to wood chip storage area and large logs to fuel wood storage. |
| DUMPING | 1. Observe dumping practices of participants.<br>2. Instruct participants to carry from compost site all rubbish and undesirable materials. |
| STORAGE | 1. Consolidate amount of dumped, mixed debris onto storage area daily.<br>2. Regulate storage mass for volume, height, and potential environmental hazards. |
| SHREDDING | 1. Determine frequency of shredding operation.<br>2. Perform operation.<br>3. Adjust screening mesh and flow rate to achieve desired output. |
| COMPOSTING | 1. Assemble shredded material into windrow of predetermined size.<br>2. Moisten windrows.<br>3. Turn and advance windrow.<br>4. Determine stabilization point. |
| Storage & Distribution of FINISHED COMPOST | 1. Move finished compost to finished compost storage area, and assemble into windrow.<br>2. Make available to entitled participants. |

windrows, allowing seven advancements during the forty-day composting period. The front loader advances the windrow by pushing the material from one position to another. The equipment operator carefully mixes the windrow as it is advanced so that materials that were on the cooler outside of the windrow in its former position are incorporated into the hot center of the reconstituted windrow. The heat of decomposition insures that weed seeds, plant diseases, and fly eggs or larvae are destroyed. When the windrow reaches the last position on the pad it has completed the most intensive part of the composting cycle.

The site operators can determine whether the windrow has stabilized (finished decomposing) by checking its temperature (it will have dropped from a fifteen-day high of 150° to 160°F [66° to 78°C] to an end-of-cycle 90°F [32°C]) as well as by observing changes in odors, color, and consistency. At the completion of the cycle the windrow is removed from the pad and the material stored in an adjacent area until it is sold or otherwise utilized by city agencies. Figure 15-4 outlines the entire process.

*Compost Characteristics:* The finished compost is a valuable soil amendment, best used for increasing the organic matter in a poor soil or as a water-conserving mulch around vegetable plants, trees, and shrubs. The compost has a collective nitrogen, phosphorus, and potassium content of 2 to 3 percent, a good balance of trace elements, and a carbon-to-nitrogen ratio of 30:1. It has a bulk density of 600 pounds per cubic yard and will hold at field capacity roughly twice its weight in water. It is a dark brown color, has the texture of composted horse manure, and has the odor of forest leaf mold. One cubic yard of compost will provide a 2-inch layer of mulch over 162-square feet of garden.

**Recycling Centers:** Every community needs to develop a comprehensive plan for managing its solid wastes that takes into consideration the resource value of these materials. A plan to gradually phase out disposal methods that are relics of an earlier "throw-away" ethic is essential. To replace them a whole series of strategies should be developed to raise public consciousness and facilitate the separation of recyclable materials where they are generated: in homes, stores, schools, and businesses. The more accurately the distinctions are made in separating the materials, the more valuable the collection. For example, in Berkeley at this writing the recycling centers can receive $30 per ton for collections of tin cans, but only $15 per ton if the tin ones are mixed together in the same bin with bimetal cans. ("Tin" cans are really steel with tin linings.)

Community recycle centers can play an important role in all aspects of developing such a comprehensive plan, since they function to educate the public as well as channel the material flow. These centers can also provide jobs and youth training and act as a catalyst for neighborhood improvement in low-income areas. Recycling centers can help people understand simple low-capital, low-energy, "appropriate-technology" solutions to community problems as contrasted with the expensive "high tech" processes and machinery often urged at City Hall.

The recycling center that we helped to start in Berkeley in 1970 is still going strong. It is presently managed, along with another site, by a group calling itself the Community Conservation Center (see Figure 15-5). The two sites recycle an average of 2000 tons of reusable waste per year. Their bright blue and white posters suggest the outline of the San Francisco Bay, and are intended to remind citizens that materials that are recycled do not end up in the dumps which fill the Bay.

The legend on the posters gives the locations and hours as well as a list of the materials accepted for recycling:

**Glass:** separated by color, no metal neckrings or caps

**Cans:** aluminum, crushed; tin (actually steel cans with tin linings), flattened; bimetal, smashed

**Paper:** newspaper, tied in six-inch bundles; cardboard, unwaxed and flattened

**Bottles:** California wine bottles —fifths (all shapes), half-gallons, gallons (these are sterilized by a local group called "Encore!" and reused by local wineries)

Personnel are paid to do the work of the center: supervising the use by the public, maintaining the site, storing the materials collected, keeping records, and so on. The organization has slowly managed to inch salaries upwards as the prices they receive for materials gradually rise. However, along



Figure 15-5 **A Community Recycling Center in the City of Berkeley**


*Maintained by the community Conservation Center.*

with the rise in value of some of the secondary materials has come increased pilfering from the sites, and staff have had to guard their stored materials more vigilantly. (Prices paid for old newspapers nearly doubled in a few months during the fall of 1978, for example.) The City of Berkeley contributes some truck drivers from the Department of Public Works as well as truck rentals and maintenance for a total of just slightly less than the center's total budget.

Two of the center's on-going problems are occasional vandalism and the general untidiness of the sites. However, the personnel feel that the extreme accessibility of the centers encourages greater citizen participation than would occur if the center were in a more protected and less obvious site in the industrial area.

It is particularly worth noticing that in addition to taking glass of various colors (this is sorted into separate bins of brown, white, and green at the center itself), wine bottles are cleaned and reused as they are. The basic rationale is that high-quality products should be used as long as possible. We mentioned this idea earlier in connection with the concept of recycling paper, but glass bottles offer a particularly good and obvious opportunity for reuse. At present most glass containers are thrown away after being used once. A tremendous amount of materials, energy, and labor has been in-

Box 15-2. **The Oregon Bottle Bill**

The Oregon Bottle Bill was the first legislative effort in the United States to attempt to encourage the reuse of glass, plastic, and metal containers. The law requires that the refund value be embossed on each container, that certain containers be banned (those with detachable metal pop-tops), and that redemption centers be established to receive reusable containers.

The bottle bill works in Oregon! The evidence that it is valid and effective is overwhelming. Rumors and misinformation circulated by opponents continue, however. The facts, in contrast to the objections raised against the bill, follow:

**1.** Beverages in returnable containers cost less. Post-bottle-bill price increases were due to increases in sugar prices.

**2.** Sales have not fallen, but have increased.

**3.** Overall employment has increased (by 365 jobs), but some specific jobs have been eliminated.

**4.** A net savings of 1.4 trillion Btu per year has been documented. This is enough energy to heat the homes of 50,000 Oregonians for a year. Projected savings on a national level would save 70,000 to 80,000 barrels of oil each day!

**5.** Highway litter has been reduced. The number of containers entering the solid-waste stream has been reduced by 88 percent. Garbage reduction has been estimated at 7 to 10 percent.

**6.** The bill caused no increases in state or local government.

**7.** The bill was enthusiastically received by the public. Ninety percent of the population approve of the law, and 95 percent participated in its implementation. Oregon retailers and distributors have cooperated and supported the law, helping to make the transition smoother. The bill has enhanced community awareness and commitment to environmental concerns, facilitated recycling and resource recovery operations, and attracted public involvement in community air quality standards and the protection of open space.

To quote from the law itself, "The Bottle Bill gives some Americans a chance to demonstrate their real priorities: a good life and clean environment based not on consumerism but on conservation. The public does not demand a throw-away economy; it has merely responded to aggressive advertising and marketing techniques which promote waste of natural resources."

For further information about the bottle bill, write to the Oregon Department of Environmental Quality, Recycling Information Office, 1234 S.W. Morrison, Portland, Oregon, 97205, or call (503) 229-5119.

vested in their fabrication, distribution, and disposal.

Currently, "bottle bills"—which set prices for returnable containers and outlaw disposable ones—are being contemplated by various state legislatures as a way to reduce litter and to save energy. Industries that depend upon disposable containers are fighting these bottle bills at every turn. We believe that these laws will eventually become common and disposable bottles will become a thing of the past. The Oregon Bottle Bill is a model. It is a very successful piece of legislature now having a highly positive effect on energy savings, litter reduction, and jobs within that state (see Box 15-2).

A next step in the process of change would be to develop less destructible containers that would survive many uses without breaking. Such a product could be plastic (if the problem of plasticisers migrating into the contents could be avoided), metal, or glass of sufficient strength to be recleaned and reused without breaking. At present, the initial bottle bill in Oregon shows a recycling pattern of over twenty reuse cycles for a glass beverage container. Containers that theoretically never wear out would surely use up less energy in the society as a whole than replacing glass containers after twenty or more cycles. At this stage however, reusing glass containers is a step in the right direction.

The ultimate objective is to have a social policy requiring that material goods be designed to last as long as possible and made of substances that permit recycling when they can no longer be used in their original form. At least two highly cherished assumptions of our present society are challenged by this goal: the right to make objects that become obsolete or break down quickly so the consumer has to buy another, and the right to have an endless variety in the shapes of manufactured items (such as bottles) rather than a few standard sizes used over and over for everything.



Figure 15-6. **Summary of the Major Material Recycling Paths**

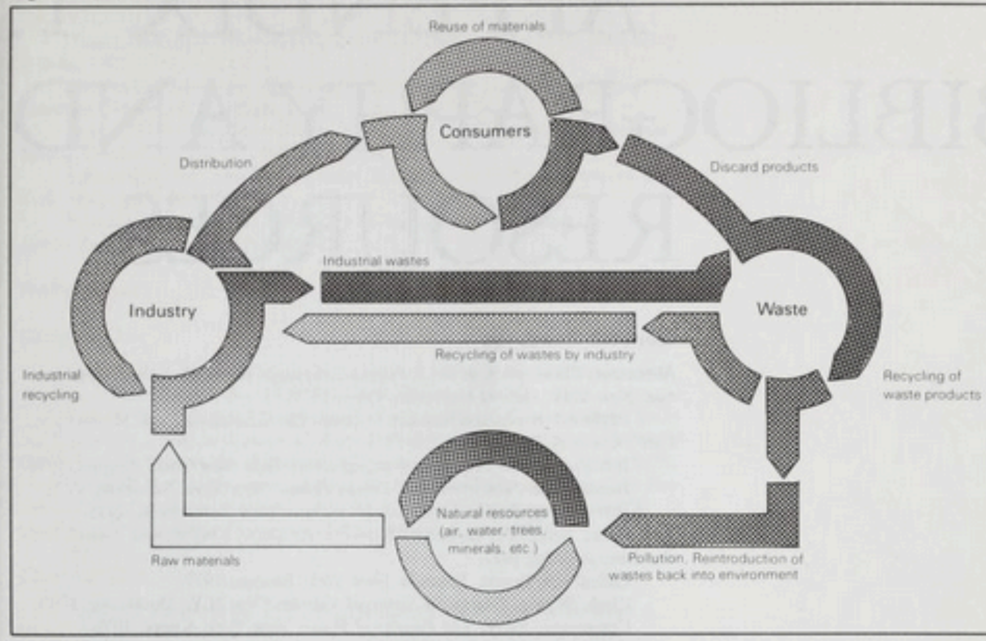



Figure 15-6 provides a model on which to construct the major recycling pathways for our society at some future time. The overall plan indicates that there are priority recycling paths, the use of which should be maximized before other paths are used. One of the most obvious examples would be the industrial recycle pathway (arrow 3). If this pathway were maximized, wastes would be recycled as close to the point of generation as possible. Waste paper from a paper mill recycled within the plant that generates the waste is such an example. This is already done to a fair degree within industry, but often only after vigorous prodding by some antipollution law. The homeowner's role here would be that of an intelligent consumer who purchases from industries that recycle and make durable items, or as a member of a particular industry who tries to encourage and develop recycling programs where none existed before.

The overall objective of organizing our social use of resources around maximum recycling is to reduce wastes and the costs now borne by society, which has to manage those wastes. Ultimately, by developing material-use systems that more closely emulate self-regenerating natural systems the society could begin to develop a steady-state economy—or a solar economy, if you will. The experiment surely seems worthwhile. If we wait longer, we may not have a choice.

Many other neighborhood or municipal projects will spring up in the future. We hope this book will stimulate people to think about the transformation of our destructive way of life.