COMMUNITY MANAGEMENT OF THE COMMONS

CHAPTER PROLOGUE

The village of Törbel, in the Swiss Alps, has managed its communally owned forest and grazing lands successfully for centuries, sustaining the resources and avoiding the tragedy of the commons. Written rules for resource management go back at least to the thirteenth century, and on February 1, 1483, the villagers established an association to regulate Törbel's communally owned lands. The villagers had previously decided that the forests and certain low-productivity lands, such as the high Alpine meadows, should belong to the community rather than private owners, and they had set the boundaries between private and community land. The community gave villagers rights to graze their cattle on the mountain in summer, and to use timber from the forest, and it established rules to protect the resources.

Cattle Grazing on an Alpine Pasture
Some Swiss villages prevent overgrazing by establishing community ownership and control of such pastures.
(Georgia Engelhard/Monkmeyer Press)

The grazing rules, established in 1517 and still enforced, state that "no one is permitted to send more cows to the alps than he can [feed in] winter" (Netting, 1981, p. 61). The cows are sent to the alp all at once, and are immediately counted, because each household is allocated cheese in proportion to the number of cows it owns. A local official is authorized to levy fines on those who violate the rules against overgrazing and other kinds of misuse of the common resource. The official, in turn, is elected at the annual meeting of the association of local cattle owners, who have the power of removal. Cattle owners contribute an annual fee, proportional to the number of cattle they own, that pays a staff to maintain roads and paths on the mountain and rebuild corrals and huts damaged by avalanches.

The forestry rules work as follows: Once a year, the village forester marks the trees to be harvested. The families eligible to harvest logs form work teams and equally divide the work of cutting and stacking logs. The households are then assigned stacks of wood by a lottery. This procedure assures a fair distri-

bution of work and of logs, and since trees can be harvested only once a year, it is easy to spot rule violators.

These systems have operated in Törbel for centuries, and similar systems were developed in many other Swiss villages. The villagers' methods for avoiding the tragedy of the commons have stood the test of time. In many villages, though not all, the rules have adapted well to changes such as population growth and increases in the value of the villagers' labor in the outside economy. (The resource management system of Törbel was described in detail by the anthropologist Robert Netting, 1976, 1981.)

The coast of central Maine is the leading lobster-producing area in the United States. Unlike many fisheries, where valuable species have been fished almost to extinction, the Maine lobster fishery has produced a nearly steady yield for many decades. The State of Maine's government is partly responsible for this success by setting legal limits on the size and sex of lobsters than may be caught, requiring licenses and patrolling lobstering areas. But most of the credit belongs to the lobstermen themselves. There are not enough fishery wardens for adequate enforcement, and it is so easy to get a license that licensing is no barrier to overfishing. The lobstermen sustain their livelihoods and the resource by their own informal means of control, based on assigning lobstermen to particular territories, and in the places where the strictest territoriality is maintained, both the resource and the lobstermen do best. The anthropologist James Acheson (1975, 1987) has studied the fishery in detail, and this account is taken from his work.

Along the Maine coast, lobstering is done in small boats by fishers who drop wooden traps or "pots" into the water and pull them up regularly to collect any legal lobsters inside. The law requires that each trap and buoy be marked with the owner's license number, making it possible to check that lobstermen are licensed. (This law also makes it possible to for a lobsterman to know who is fishing where.) A typical lobsterman owns 400 to 600 pots and uses them in a very small area near a home harbor, moving them farther out in winter, close to the shore in summer, and to intermediate areas in spring and fall when the lobstering is best. Legally, any licensed lobsterman can fish anywhere, but because of the effort of pulling pots, it is more efficient for them to work in contained territories near their homes.

Lobstermen have developed strong, unwritten rules for governing these territories and defending them from outsiders. As Acheson describes it,

> To go lobster fishing, one must be accepted by the men fishing out of a harbor. Once a new fisherman has gained admission to a "harbor gang," he is ordinarily allowed to go fishing only in the traditional territory of that harbor. Interlopers are met with strong sanctions, sometimes merely verbal but more often involving the destruction of lobstering gear. This system . . . contains no "legal" elements (Acheson, 1987, p. 40).

Along some parts of the Maine coast, the lobstermen enforce territories strictly, keeping all outsiders away and reserving certain areas for particular individuals or families, for example, on the basis of their ownership of nearby land on islands. Territories are marked by landmarks on the shore and are defended, sometimes to the yard, by individuals who silently

> sanction the interloper. First, the violator may be warned, usually by having his traps opened or by having two half-hitches tied around the spindle of his buoys. If he persists, some or all of his traps will be "cut off." That is, his traps will be pulled, the buoy, toggles, and warp cut off, and the trap pushed over in deep water where he has little chance of finding it (Acheson, 1987, p. 41).

Far from shore, where the boundaries are harder to define, lobstermen from neighboring harbors may share the same area.

Along other parts of the coast, it has become more difficult to defend well-defined territories. With the advent of motorized boats and depth-finding equipment, lobstermen who could purchase larger boats increased their effective range. But to pay for the boats, they had to fish in all seasons and to invade other lobstering territories, especially far offshore. The men in the invaded territories generally let mixed fishing occur rather than imposing sanctions because they knew how much the interlopers had at stake and feared a full-scale "war," with large financial losses for all.

Both types of territoriality establish forms of property rights in an area where the law does not recognize private property, and the effect has been to prevent overfishing. The stronger the enforcement of territoriality, the greater the benefit. In the tightly "perimeter-defended" areas we described first, there were fewer boats per area of fishing grounds, with several salutary results. Each lobsterman could make a living with less effort, there were more lobsters per area of ocean, and larger lobsters were caught. It is only in the perimeter-defended areas that lobstermen have been successful in imposing conservation measures such as closed seasons and limits on the number of traps a lobsterman can use. Such measures benefit every lobsterman in the area, and put less stress on the lobster population, but they do so only if the rules are observed. Lobstermen in the perimeter-defended areas did the best job of enforcing the territories, so they were best able to prevent the tragedy of the commons and benefit themselves. But even in the territories where control was much looser, the fishery and the lobstermen have survived.

INTRODUCTION

The systems of resource management used in Törbel and on the Maine coast are different from the systems we have discussed in Chapters 4 and 5 because they were created and operated by the resource users themselves—they are self-organized systems. We refer to them as systems of community management. The resource users devise their own management rules, accept the rules voluntarily, and have the power collectively to change them. An important characteristic of community management systems is that when they work well, the self-imposed rules become shared social norms that most people adhere to because they believe they are doing what is right, or at least necessary to keep the system working. When most people internalize the community's norms as their own, minimal policing is needed and individuals do not feel coerced. Communities sometimes impose incentives like those discussed in Chapter 5—they levy fines and even physically interrupt behavior that violates community rules—but successful systems are marked by

how lightly such coercive means of behavior control are used, compared to individual self-control and informal social pressure.

The examples of Törbel and the Maine coast are special in that they involve small groups of people who depend on local, renewable resources for a significant part of their livelihoods. We will see that successful community management is most often observed in settings that have these and other characteristics in common. We should emphasize that small communities do not always maintain their natural resources over the long term. As we will see, smallness is an advantage only in combination with other qualities of the communities, the resources, and the ways the two interact.

The relevance of the success stories from Törbel and Maine to the world's environmental problems is limited by the fact that most of the world's serious environmental problems arise on too large a scale to be managed by villages, local fishers, and other small community groups, no matter how careful they are with their natural resources. But as we will see, some of the management principles that work so well in Törbel and the Maine lobster fisheries can be extended to other settings.

This chapter first examines the conditions that enable some local groups like those in Törbel and Maine to manage their renewable resources successfully, while other groups suffer the tragedy of the commons. We discuss the implications of successful community management for Garrett Hardin's model, which predicts that successes like those of Törbel and the Maine coast cannot be achieved. We then ask how applicable the techniques of community resource management are to the major environmental problems of modern societies. We conclude, as in other chapters, by discussing the conditions that are favorable for using these techniques, and the limits of their applicability.

HOW DOES RESOURCE MANAGEMENT WORK IN SMALL COMMUNITIES?

In Hardin's formulation of the tragedy of the commons, the only alternative to "ruin," brought on by the remorseless working of individual self-interest, is "mutual coercion, mutually agreed upon"—that is, the

establishment of rules, backed by the coercive power of government, that force individuals to do what is good for the group. The success of the Törbel villagers and the Maine lobsterers is inconsistent with Hardin's ideas in that members of these communities seem to have put group needs ahead of narrow self-interest—in Törbel, over many lifetimes—without depleting the resource, and without coercion. Community management does not depend on central governmental regulations or the other sorts of externally imposed incentives we discussed in Chapter 5. Neither does it depend on organized programs of persuasion or information, such as we discussed in Chapter 4. And it does not seem to require a deep religious or moral commitment either (Chapter 3), although in some societies, systems of community management are built upon shared religious beliefs (Rappaport, 1970).

A strict adherent of Hardin might argue that these examples are merely rare exceptions to a general rule, but in fact, they are not isolated instances. It is true that small communities often suffer tragedies of the commons, but there are hundreds of documented cases like these two, in which communities have are maintained their important natural resources over very long periods without the use of coercive governmental institutions, and there are probably innumerable undocumented cases throughout human history. The political scientist Elinor Ostrom has examined many cases of success and failure and has collected her observations in a book, *Governing the Commons* (1990).

Ostrom focused on the sustainability of what she defines as "common-pool resources." A common-pool resource, as we noted in Chapter 2, is one that is large enough geographically to make it difficult, though not impossible, to exclude individuals from benefiting from its use. For example, a water well can be controlled easily by its owner, but the large underground aquifer that provides its water is a common-pool resource. Sustainability is a mark of successful management because renewable resources, such as grasslands, forests, aquifers, fisheries, and many others, replenish themselves at a limited rate. If the average rate of resource use exceeds the average rate of replenishment, the resource cannot be sustained.

Sustainability is an issue because common-pool resources can be depleted by overuse.

Ostrom looked at renewable resources where substantial scarcity existed, where relatively small numbers of individuals (no more than 1500) depended heavily on the resource, and where resource management choices would not produce major harm to outsiders. Thus, she excluded very large-scale resource systems and problems like air and water pollution that cannot be geographically contained. We return later in the chapter to the question of whether the strategies that work on the scale Ostrom studied can also work in these other situations.

Ostrom found that success in developing long-lasting, sustainable community management systems depends on the characteristics of the resource, the group using the resource, the rules they develop, and the actions of government at the regional and national levels (see Table 6-1).

Characteristics of the Resource

When community management works well, the resource is always one with fairly clear boundaries, so that it is possible to define who has rights to use it and to exclude outsiders if necessary. Also, the resources need to remain within their boundaries. For example, commercial marine species that are caught in bays and near shore, like the Maine lobster, are much more likely to be sustainably managed by fishers than those caught in the open ocean, such as whales. Whale stocks tend to be overexploited unless strong agreements are made between national governments, which then impose the rules on their fishing fleets. Fishers by themselves can sometimes (though not always) succeed in controlling the harvest of species like lobsters, but they virtually never succeed with species like whales.

Success also requires that the resource be of a type that makes it apparent to most of the people who use it that they will be harmed, usually by the results of resource depletion, if they do nothing to control their collective behavior. Ostrom offers the example of groundwater supplies in the area around Inglewood, California, a semiarid region near the Pacific Ocean where water wells began showing signs of salinity in

TABLE 6-1 Conditions Conducive to Successful Community Resource Management

1. Resource is controllable locally
   a. Definable boundaries (land is more controllable than water; water is more controllable than air)
   b. Resources stay within their boundaries (plants are more controllable than animals; lake fish more than ocean fish)
   c. Local management rules can be enforced (higher-level governments recognize rights of local control, help enforce local rules)
   d. Changes in the resource can be adequately monitored
2. Local resource dependence
   a. Perceptible threat of resource depletion
   b. Difficulty of finding substitutes for local resources
   c. Difficulty or expense attached to leaving area
3. Presence of community
   a. Stable, usually small population
   b. Thick network of social interactions
   c. Shared norms ("social capital"), especially norms for upholding agreements
   d. Resource users have sufficient "local knowledge" of the resource to devise fair and effective rules
   [(a) facilitates (b), and both (a) and (b) facilitate (c). All three tend to make it easy to share information and resolve conflicts informally.]
4. Appropriate rules and procedures
   a. Participatory selection and modification of rules
   b. Group controls monitoring and enforcement processes and personnel
   c. Rules emphasize exclusion of outsiders, restraint of insiders
   d. Congruence of rules with resource
   e. Rules contain built-in incentives for compliance
   f. Graduated, easy to administer penalties

the early 1940s. All the wells in an area of 170 square miles (435 km^2) drew their water from an underground natural reservoir called West Basin. At first, many people believed that the salinity was due to a temporary condition affecting the wells nearest the ocean, and that the wells would soon return to normal. But when nine city governments in the West Basin commissioned a study, they learned that overuse of the underground water by the rapidly growing human population was drawing salt water from the ocean into the whole basin. Once it became clear that overuse would ruin the water for the entire basin, the local water users quickly got together to establish a set of rules to ration water pumping and to enforce the limits (Ostrom, 1990, pp. 114–123).

Characteristics of the Group

Groups of people that devise and maintain successful systems of community resource management typically have certain characteristics. Successful groups are rather stable, with limited population growth and relatively few members moving in and out, and with most members of these groups placing high value on maintaining the resource. These two characteristics often go together. When members of the group have opportunities to meet their needs in the larger economy, they are less dependent on the local resource. They have decreased incentive to follow local rules for resource management and often leave the community when resources become scarce, rather

than working to create better management systems. Similarly, when outsiders enter a community at rapid rates, local management systems are faced with the problem of getting newcomers to accept rules they did not help create and whose importance they may not readily understand. Population growth, however, has sometimes been a stimulus for a change from an open-access system, where there are no rules governing resource exploitation, to a community management system. Such seems to have been the history of the English commons, where for hundreds of years, population increases were associated with more effective local resource management systems, which decayed when population decreased. The changes depended on community cohesion, which increased as population rose (Levine, 1986).

Stability is important for an additional reason. Stable, geographically tight social groups are characterized by thick networks of social interaction. People interact with many different neighbors for a variety of purposes: with some around issues of child care, with others in business, with others for food production and consumption, and so on, so that through one network or another, everyone in the group is linked to virtually everyone else. Groups with these sorts of thick, ongoing social networks build up shared expectations of the behavior of members—that is, norms of interaction—around such matters as keeping promises, following rules, and reciprocation.

Community management is more likely to be successful in groups where there are widely shared norms before the resource management problem arises. If people in a community already know whom to trust and what to expect from each other, it is easier to arrive at rules that individuals believe will work. If people in a locality know that their neighbors can be trusted to keep their promises, they can be confident that the neighbors will abide by resource management rules they have agreed to. Ostrom describes shared norms as a kind of "social capital," with which a group can build institutions that can maintain resources with minimal expense for enforcement. Groups that already share social norms find it easier to create new norms that group members will follow. The term *community* is sometimes reserved for groups

that have the social characteristics just described: relative stability of population, long-term direct social interactions, thick social networks, and a body of shared norms (Singleton and Taylor, 1992). To the extent that a group has these characteristics, we can describe it as a strong community in a sociological and psychological sense. We use the term *community management* to reflect the fact that resource management is much easier to organize and maintain when community is strong in this sense.

Successful groups are also those in which there are easy, low-cost ways to share information, enforce rules, and resolve conflicts. For example, the anthropologist Fikret Berkes (1986) has reported the experiences of several coastal fishing areas in Turkey that were threatened by overfishing in the 1970s. In Alanya, the local fishing cooperative was able to devise an effective system for managing the harvest. At the beginning of the fishing season, each fisher was assigned a fishing area by lot for the opening day of the season. After that, fishers changed areas daily according to prearranged rules, so that each fisher had an equal chance to fish in the better areas. Any fisher who was assigned a good fishing ground on a particular day would automatically monitor behavior in the area, and would quickly know if someone else was fishing there. In addition, the fisher could easily confront the interloper and if that failed, could get the support of the community at the end of the day when the fishermen met at the local coffee shop. The system worked smoothly for as long as it was studied. Farther to the west, in Bodrum, the fishing cooperative was unable to prevent overfishing. In Bodrum, outsiders, including commercial fishing trawlers and charter boats from a booming tourist industry, were increasingly fishing in the area. Even when the locals could identify the interlopers, it was difficult to address the conflicts directly or to enforce the local rules. The outsiders did not respond to informal social pressure because they were not part of the community, and moreover, the government did not effectively enforce the laws, such as a three-mile limit, that existed.

When individuals in the group know each other well and have frequent occasion to interact, they also find it easy to get information that may be needed to

For a small Turkish community, a coffee shop like this is a good place for informally sharing information, enforcing community norms, and resolving conflicts.
(Paul Conklin/Monkmeyer Press)

modify the rules. For example, fishermen in Alanya would easily know from daily conversation whether total fish catches were declining, making it necessary to reconsider the management rules. Cattle owners in Törbel would quickly learn if the local official in charge of levying fines had become corrupt or unfair. In this way, the close contact of community members helps groups keep their management systems working well.

Finally, successful management tended to occur in small communities. Smallness facilitates interaction, monitoring of violations, and enforcement of norms, all of which are important to community management. But it is worth noting that Ostrom found some community management systems that served large numbers of people. These systems worked by building larger units out of smaller ones, in what she called "nested enterprises." West Basin and the other water

basins Ostrom studied in Southern California provide good examples. In each basin, there was a relatively small number of wells, but some of them, particularly municipal wells, served large numbers of people. Each municipality had already established a system for allocating its own groundwater, so it was possible for the municipalities to act as if they were individuals for the purpose of agreeing on rules for pumping water. The principle of nested enterprises can allow for community management of resources even when the number of dependent people is large—but Ostrom concluded that it is effective only when rules are developed from the bottom up, when rules for small-group management are already in place before the small groups get together into a larger agreement.

Characteristics of Effective Rules

Successful community management is characterized by rules that limit resource exploitation by excluding outsiders and controlling the level of resource use by insiders. Rules that work are, first of all, the product of participatory choice: Most of the people who must abide by them have had a say in making and modifying the rules. Effective rules are also perceived as fair, or equitable—group members are convinced that the rules have more or less the same effect on all those who are asked to abide by them. Participation and fairness increase the likelihood that people will internalize the rules and obey them without coercion.

Effective rules must be congruent with the resources they are designed to manage, and changeable when conditions change. For example, it was fair to assign each Maine lobsterer a fixed territory because the lobsters were distributed more or less evenly, but in Alanya, where the fish ran in certain areas in particular parts of the season, the only way to arrive at a fair allocation was to rotate fishers through all the areas of the fishery. The Alanya fishing cooperative found its system after a process of trial and error, changing the rules until it arrived at some that seemed fair and enforceable. It is important to note that no one is in as good a position as the fishers themselves to develop fair rules, because they have the best understanding of the tides, fish behavior, and other factors

that determine where the good fishing spots are from day to day. Their local knowledge may be essential for devising fair and effective rules.

This is one reason Ostrom emphasizes that the best way to develop rules that are congruent with local conditions and flexible enough to change with those conditions is for the people most knowledgeable about those conditions—the users of the resource—to make the rules. She cites numerous sad cases in which well-meaning outsiders, including public officials who believed, like Hardin, that only government action could restrain individual selfishness and prevent the tragedy of the commons, imposed management rules to the detriment of the resource. For example, the government of Nepal nationalized its forests to protect them from overexploitation. The result was to override management rules established at the village level, so that individuals, who saw their villages as having lost control of the forests, began to act as egoists, cutting trees without any restraint to meet their needs and wants. The national government could not afford to police the forests adequately, so deforestation accelerated. The government eventually repealed its nationalization law, making village control the national policy. The new system, in which government provides a legal status for community management, seems to work much better (Arnold and Campbell, 1986).

Successful rules also tend to build in incentives for compliance, so that following them has benefits that counteract the temptation to overexploit. In strong, tightly linked communities, members who comply with rules establish reputations as reliable community members, and so may find it easier to ask their neighbors for favors or to make exchanges on trust, because they are known to be trustworthy. Successful rules may also have built-in material benefits. In the perimeter-defended lobster areas in Maine, lobstermen could spend the poor-fishing months on land, repairing their equipment, secure in the knowledge that because no one was poaching in their areas, they could catch larger lobsters when they returned to the water and make as good a living as if they had spent those slow months fishing. Territorial systems also build in incentives for careful resource management by rewarding people for investments in the productiv-

ity of "their" resources. Robert Repetto (1986) offers this dramatic example:

> *Oyster grounds in Connecticut that are leased to individuals are ten times as productive as those in Maryland that are fished in common, because on individually leased beds, fishermen will seed with shellfish spat for higher yields, thin and transplant the growing crop, take steps to eliminate predators, and make other improvements. Oystermen on public waters do not, because the returns are not assured. The world harvest of aquaculture products [Repetto claims] could be expanded thirtyfold or more, if constraints on the leasing of coastal areas could be overcome and investment opportunities realized (Repetto, 1986, p. 30).*

Individual territories are not the only way to get these benefits. Small communities can benefit from investments in resource productivity as well. For example, in Törbel, the Alpine grazing lands were kept as communal property, probably because they were too unproductive to support families if used as private property (they were useful for only ten weeks of the year). Even so, the community made investments in the productivity of the alp through collective maintenance projects such as rebuilding walls and trails, and spreading manure to improve fertility. Whether the resource is owned privately or communally is not so important as whether the management rules can keep outsiders from capturing the benefits of the owners' investments in it. In Törbel, the highly productive land was privately owned and the forests and meadows were communal, but in both cases, the owners had built-in incentives for sustaining the resource because they could benefit for many years from their efforts, and would suffer if they did not manage the resource wisely. In both cases, the management rules internalize the externalities of resource management.

Successful community management also requires accurate, accountable, and relatively inexpensive systems for monitoring the state of the resource and individuals' compliance with the rules. Accountability means that the people who enforce the rules should be subject to control by the resource users, so that they can be controlled or removed if they become corrupt or unfair. In the simplest and most effective form of accountability, the monitors are the resource users

themselves. A management system has the lowest cost when the resource users do the monitoring automatically in the course of their everyday activities, as with the fishers in Maine and Alanya, who would automatically notice declines in the catch or the presence of poachers. It can also be effective, however, to delegate the monitoring job, for example to village officials in Törbel or to "watermasters" in the California groundwater basins, who were given the jobs of ensuring that all the wells have accurate water meters and making annual reports on withdrawals of water.

Community management also requires quick, convenient, and inexpensive ways to resolve conflict and deal with violations of the rules. These can include informal procedures, such as the discussions in the Alanya coffee shop, and also formal sanctions. In either case, the system works best if administered by the resource users or an accountable party. Successful systems typically use graduated penalties—small ones for small or initial violations and more serious penalties for persistent violations. When most of the penalties are small and monitoring is built into the system, the cost of enforcement is low, and when most people adhere to the norms most of the time, small penalties are usually sufficient. The low cost of monitoring and enforcement is a major advantage of local management over central management, as the case of the Nepalese forests shows.

The Role of Central Government in Community Management

Ostrom found that the effectiveness of community management also depends on factors outside the community, particularly in government. Sometimes, as with the Nepalese forests, government officials take the attitude that they know best how to manage a local resource, and override community management rules. The typical results include overexploitation of resources, as in Nepal, extraordinary efforts to circumvent the rules, and public protest. In addition, Ostrom reports numerous instances in which central government officials who were responsible for resource management accepted bribes or political favors in return for allowing some individuals to take more than their share of a resource. This rewards the selfish at

the expense of the resource and the people who depend on it. Such corruption arises most easily when central officials who have limited ties to the local community are in charge, and where local resource users do not have enough political power to exercise control over central government officials.

Central government can also help community management, for instance by affording local rules the legal status of contracts enforceable in the courts, and by providing support for monitoring the condition of the resource. The State of California was helpful to the West Basin and other regional water users in both these ways. For local water users, the likelihood of expensive litigation over water rights created a strong impetus to negotiate agreements to restrict pumping, and the courts approved the agreements as legally binding. The state helped further by agreeing to pay part of the cost of monitoring the agreements. The concept of *comanagement,* in which local communities manage resources under rules that they develop with the support of government and where they and the government share power and responsibility, is one of the promising new ideas in environmental resource management (McCay, 1993).

The Psychology of Community Management

In organizational terms, the keys to community management systems such as those in Törbel and Maine are participatory decision making, monitoring, social norms, and community sanctions. But as Hardin convincingly showed, the success of resource management ultimately depends on controlling the behavior of individuals. How does a set of community management rules change individual behavior? To ask the question another way, what makes individuals follow the rules when they can gain something by breaking them? The key is that most people do what is good for the group and the resource because they *internalize* the group's interest, rather than acting out of *compliance* with a set of external incentives. This is a subtle but important social-psychological distinction (Kelman, 1958). Compliance—the method of control most closely associated with regulations—works only when people expect to be punished for a violation, but internalization works all the time. A compliant motor-

ist will stop at a red light only if he or she fears punishment in the form of a fine or a traffic accident. A motorist who internalizes the red-light norm will stop even with no police or traffic in sight. Obviously, a system that runs on internalization can be effective with much less policing than one that relies only on compliance.

Community resource management systems run mainly on internalization, but they always include an incentive structure as well, consisting of built-in incentives where they can be devised, and monitoring and formal and informal sanctions where built-in incentives are insufficient. The incentive structure is very important even when most people internalize group norms so that it is unnecessary to threaten them very often with sanctions. Effective incentives are necessary to control the few who do not internalize the norms and others who usually follow the rules but may sometimes be tempted to stray. The ability to penalize the few violators assures the many that they will not suffer by controlling their own behavior. People need to know that violators will be discovered and dealt with in order to be comfortable doing what is good for the group. When a system is effective and most people internalize the norms, penalties are rarely imposed and the costs of maintaining the system are low. Effective systems usually use graduated sanctions. Few individuals break the rules, and most rule breakers comply with mild sanctions, making more severe ones almost unnecessary to use. But without any incentives against overexploiting the common resource, some individuals could take advantage of other people's self-restraint with impunity, and the system's whole basis in trust would begin to unravel. Enforcement costs would climb, and people would become less willing to exercise self-control, leading to a vicious cycle ending with the tragedy of the commons.

Why do people internalize the group norms? Because they have participated in creating them, because they see their value for themselves and their community, and because the norms become part of the meaning of the community they share with others, with whom they have ongoing and trusting relationships. It is necessary to have a system of sanctions to protect group members from anyone (including themselves)

who might be tempted to violate the rules for personal gain. But the reason most people act on the norms most of the time is that doing so is what it means to be a member of the community—as members, they have a sense of responsibility to follow the rules. Most people see following the rules as the right thing to do, rather than as coerced behavior. In short, the incentive structure that a community creates (including monitoring and enforcement) and the processes it follows (participation and social expectations of rule-following) create the psychological conditions for self-control (internalized norms). It is self-control that ultimately makes community management different from the incentive strategies we discussed in Chapter 5, and it is belonging to and feeling responsible to the community that shape self-control. This is why a strong community is so important to successful resource management at the local level.

We should be careful not to glamorize the psychological and social climate in the strong communities that manage their resources successfully, or to conclude that because these social systems work well for the environment they necessarily work well for the people. Small, cohesive communities, even if they are participatory in making decisions about the natural environment, do not always distribute resources equally or fairly, and the presence of the thick social networks that help make community management work does not necessarily guarantee that community members are happy or that their relationships are harmonious. Strong communities are often good at exercising informal social control, a skill that helps them provide public goods such as natural resource management, crime control, and the like, but these communities' norms sometimes repress individual community members, and there is an inevitable tension between the demands of community and such widely held modern values as freedom of individual expression and procedural justice.

The social downside of community management can be seen in some of the success stories we have cited. In the Maine lobster fishery, the rules of territoriality favored landowners over others, and therefore families that had lived in the area for generations over relative newcomers. There was not full equality of access to the resources. Further, the rules were en-forced by a kind of informal justice that included illegal destruction of private property and that lacked avenues of appeal if the enforcement was unfair. In the Alanya fishery, disputes were settled informally at the coffee shop—an environment that, like the fishery itself, excluded women. These examples suggest that small communities that achieve social control by the use of norms and informal sanctions can be quite repressive in their own ways. This is why for generations, some people, particularly those who felt repressed or out of place in their small social systems, have migrated from rural communities to the cities or to other countries.

Community Management and Hardin's Model

According to Garrett Hardin's formulation of the problem of common-pool resource management, successful community management cannot occur. Hardin's formulation assumes that the overriding human motives are always self-centered. If this were the case, whenever there is a valuable, depletable resource to which individuals cannot be denied access (that is, a common-pool resource), some individuals would selfishly exploit it and others would follow suit out of the need for self-preservation. Tragedy would inevitably follow.

Successful community management shows that under some conditions, it is possible for other motives to win out over selfishness so that a common-pool resource can be managed over long time periods with very limited coercion. Without putting up fences or stationing armed guards, communities can get individuals to control themselves well enough to protect shared resources. Ostrom refers to the systems of rules, norms, social pressures, participatory decision making, and sanctions that are responsible for this achievement as resource management *institutions*. These social inventions help people act in the collective interest when they recognize that doing so will also benefit them as individuals.

Hardin offered one essential insight. He realized that an individual's awareness of a common fate with a larger group—even when combined with willingness to sacrifice for the group—is not enough to solve the resource management problem because the struc-

ture of the situation can create irresistible pressures on individuals to take more of the resources than the pool can sustain. Put in our terms, education, even combined with the right values, is insufficient when the incentives are wrong. It only makes sense for an individual—even one who cares about the group—to exercise self-restraint if there is reasonable assurance that others will do the same.

What Hardin did not recognize was that coercion is not the only way to provide that assurance. Individuals can and sometimes do create noncoercive institutions that give people the assurance they need. It is important to repeat that these institutions do not depend on individuals' willingness to sacrifice themselves. They depend on individuals' seeing how self-interest and group interest can reinforce each other and creating community norms and sanctions that they believe will restrain some people's impulses to take advantage of each other. To the extent people have faith in a community and its management institutions, they are willing to comply with the community's rules, help to enforce them, and help modify them as needed to maintain the resource and the group's collective well-being.

Hardin's blind spot about the potential value of noncoercive social institutions is important because it is shared by many other individuals, and even whole intellectual disciplines. Hardin's idea of self-interest implies that community management institutions cannot work, so he teaches that government coercion is the only way. He is not alone in this way of thinking. Both Skinnerian psychology and neoclassical economics view individuals as acting in isolation and do not often consider how social institutions and relationships can shape individual behavior. (Recently, some neoclassical economists have begun to address the question of institutions.) We believe that it may make a great difference in terms of humanity's ability to solve environmental and other problems whether people think of the problems only in individualistic terms or also consider solving them by creating social institutions and making use of social relationships. The following true story suggests how individualistic ways of thinking can get in the way of resource management and why we sometimes call Hardin's scenario the "Tragedy of the Economists."

During the 1970s, a number of researchers began studying behavior in the commons by creating small-group laboratory simulations. One of us (Paul Stern) developed a four-person game that presented people in a schematic form with the choices they would make if they were deciding whether to join a carpool. Following public concerns of the time with the "energy crisis," the simulation focused on the depletion of oil supplies. Each player got a "salary"—a small amount of real money—before every round of the game and then spent money to get to work. Every round, the players could discuss and then choose one of two alternatives that amounted to driving alone or joining a carpool. Driving alone had a known cost, representing the cost of fuel and maintenance for a car. Those who chose to join the pool then decided on one member (the driver) who would pay a higher cost, representing not only the cost of fuel and maintenance but also the extra time and inconvenience of driving the group. The others (passengers) paid a low cost that did not include fuel. The game was repeated, allowing the carpoolers to take turns driving if they chose. At the start of the game, the cost of driving alone was less than the average cost of being in a carpool, creating an incentive to drive alone, much the way one exists in reality: for most workers in the United States, after all the financial and convenience issues have been considered, driving to work alone is preferable to carpooling. The game simulated resource depletion (an energy shortage) by having the cost of fuel rise at a rate determined by the total amount of driving that had been done during the game. The result was that incentives for carpooling increased over time as the resources were depleted. The more solo drivers there were early in the game, the faster the resource was depleted and the faster the costs of driving increased later on. Thus, the strategy that was best for the group in the long run (and for the environment) was to carpool from the beginning, in order to delay resource depletion.

A number of student groups played the game at Elmira College, in Elmira, New York (Stern, 1976). Generally, when the players were given detailed information about how the costs would be affected by their behavior, they fairly quickly agreed to carpool consistently and earned a few dollars each before the

resources ran out. (When they lacked detailed information, they used the resources much more rapidly, and earned much less.) The findings were consistent with Ostrom's conclusion that people are more likely to manage resources well when they can see that all will suffer unless they collectively control resource use.

Once, professors at a faculty seminar were invited to play the game. The four volunteers were a philosophy professor, an English professor, a chemist, and an economist. They were given complete information about how the game worked, and then began a long discussion about strategy. The philosopher suggested (quite correctly) that it would be best in the long run for everyone to join together in a carpool from the beginning, but the economist pointed out that at the start of the game, everyone would be better off if each drove alone. He reasoned, therefore, that everyone should drive alone until the cost of driving got to the point where it would pay better if everyone joined the carpool, and then everyone should join the carpool. The argument convinced all his colleagues. The result was that the group used resources very fast at the start of the game, exhausted the resources much more quickly than they might have, and did not do nearly so well as the student groups.

We take this as an object lesson in the limits of the kind of shortsighted analysis that adds up what is good for individuals in the short run rather than choosing what is good for communities in the long run. The economist convinced his colleagues to engage in a sort of egoistic thinking that Garrett Hardin believes to be universal among human beings, and that is in fact practiced and advocated by many economists. The argument was powerful enough to convince the others, even though one of them had initially suggested a better solution. The tragedy of environmental management is a certainty if everyone takes the individualistic view this economist advocated. But fortunately, people, aided by the institutions they create, do not always think and act this way. (We do not mean to accuse all economists of being shortsighted egoists. However, we are not the only ones to report evidence that training in economics is associated with an increase in egoistic behavior [see Marwell and Ames, 1981; Frank, Gilovich, and Regan, 1993]).

Other Benefits of Community Management

Community-based institutions for resource management may have value beyond their effect on the natural environment. Ostrom points out that groups that have an abundance of "social capital" in the form of norms of reciprocity and shared expectations of behavior start out at an advantage in building resource management institutions. By the same logic, building and operating successful resource management institutions provides social capital that can be valuable for solving other social problems that require cooperation. That is to say, strong communities succeed at resource management, and success in resource management strengthens communities. Groups that have built up familiarity, shared expectations, good communication, and trust working on an environmental problem may find it easier to address other community problems that involve providing public goods and controlling selfishness, such as neighborhood safety, drug abuse, and school truancy. We return to this possibility later.

APPLYING COMMUNITY MANAGEMENT PRINCIPLES BEYOND SMALL GROUPS

Most of the examples of community resource management we have discussed so far come from rural communities that depend economically on locally available natural resources. Life in such communities is far different from the life of most citizens of urbanized, developed countries, whose economic survival does not depend nearly so much on natural resource supplies in their immediate vicinity. This section considers whether the principles of community management we have described are applicable under the conditions of modern developed economies. We find that they are applicable in two kinds of situations: in which modern communities still depend on local resources, and in which some of the principles can be applied even in the absence of significant resource dependence.

Local Resource Dependence in Modern Societies

Few people in modern, developed societies depend for much of their livelihood on fishing, hunting, cut-

ting trees, or grazing cattle. In fact, because of global markets for food, fuel, and raw materials, people get what they need from suppliers all over the world. People eat fruits and vegetables that are out of season locally, and even some that must be imported throughout the year. Most people who buy in the global economy do not even know where the raw materials come from that make up their automobiles, home appliances, or other household goods. Global markets ensure that people with cash incomes can almost always escape the pain of local resource shortages by simply buying products from elsewhere.

There are, however, a few important exceptions to this rule—situations in which people, even in modern societies, are still largely dependent on local, common-pool resources. In such situations, Ostrom's principles for community resource management should be widely applicable. We briefly examine two of these situations—water supply and waste disposal—and find that community management principles can be effectively applied.

Water Supply. Most modern communities depend on nearby rivers and reservoirs or local aquifers for their water supplies. Transporting water over long distances is uneconomic for most purposes, though there are exceptions such as the canals that move water hundreds of miles to Southern California and an emerging international market for bottled drinking water. Most communities depend on the availability and quality of local water, and community institutions are an obvious management strategy. Even in Southern California, where much water comes from long distances, Ostrom found water supply institutions based on community management principles.

The California water management institutions that Ostrom studied are "nested" institutions. The members of the water associations are city water departments and other major water pumpers, rather than individuals, and the smaller units to which individuals belong operate by the norms of businesses or public utilities—service in exchange for payment—rather than those of community management. Consequently, even where community institutions manage the water supply, individual Californians do not normally internalize norms for careful use or experience a sense of

responsibility to the community to husband water resources.

The relationships of individuals to water change, however, during the periodic droughts that hit California. During those periods, local governments have called on citizens to cut water use, and people have responded. During the serious drought of 1976–77, a number of water districts in Southern California sent educational brochures to their residential water users explaining the need to conserve (which was widely covered in the local news as well) and advising on ways to save water. Even though the brochures were usually enclosed with the water bill—a procedure that has been generally ineffective when applied to energy conservation, as we saw in Chapter 4—the typical consumer response was to reduce water use by 10 percent for the duration of the drought (data are from Berk et al., 1981, Appendix 3).

More remarkable was the response to the water rationing programs instituted in many Northern California communities. For example, in the East Bay Municipal Utility District, which supplies water to the cities of Oakland and Berkeley and sixteen neighboring communities, communities restricted water use for landscaping, prohibited decorative fountains, and allocated water to each household based on a formula that estimated water needs. The goal was to reduce water use by 35 percent, and in fact reductions averaging about 40 percent were achieved (Berk et al., 1981). What was most impressive, however, was the level of community acceptance of the restrictions. For example, the city of San Leandro in the East Bay area was included in a 1979 study of drought response. The conservation programs in San Leandro were even more successful than planned. Instead of the 35 percent planned savings, residential water use declined 60 percent. When residents were asked to rate the conservation program on fairness and effectiveness, using the A–E grading system common on school report cards, fully 73 percent gave the program an A for fairness, and 81 percent gave it an A or a B for effectiveness (Bruvold, 1979).

The studies show that information was effective and that rationing was even more effective. Combinations of programs saved more than single programs (Berk et al., 1981). Moreover, people seemed to will-

ingly accept restrictions on their water use during the drought emergency, and in the areas where the restrictions were the most stringent, the most frequent complaints about the program were not that the restrictions were too severe but that they were not enforced strictly enough and that more education was needed to increase their effectiveness (Bruvold, 1979). In short, Californians strongly supported their communities' water conservation programs.

It appears that the drought created conditions that were conducive to shared norms in favor of restricting water use. The research is not conclusive about the psychological processes that were involved, but between the research results and anecdotal accounts, the following picture emerges. The water shortage was clearly visible to Californians: Grass turned yellow, lawns needed more water, and pictures of the low levels in water-supply reservoirs appeared prominently in the newspapers and on television. The reservoirs, in particular, may have been especially graphic evidence of a very unpleasant common fate that awaited unless the rains came or consumption decreased. Water districts were a sufficiently local entity to take collective action, and typically, they were accountable to citizens as public agencies. Where water restrictions were in force, violations were easily identified because the largest water uses in homes—watering lawns and filling pools—were highly visible to the neighbors. Anecdotal accounts suggest that Californians got angry and used all sorts of informal social sanctions to control the behavior of neighbors whose green lawns showed them as violators of the drought norms. In short, the drought situation had many of the characteristics, and brought out many of the psychological mechanisms, that Ostrom identified in small communities of resource-dependent people in rural communities.

Waste Disposal. The waste products of modern industrial society are almost always disposed locally, into landfills, waterways, and the air. Air and water often carry wastes outside the local area, thus weakening pressures for community management, but not always. Communities often face public health threats due to the actions of local motorists, whose automobile exhaust produces smog, or local manufacturers, whose liquid chemical wastes seep into water supplies. These conditions hold the potential for management by community institutions because they present communities with a common fate and clear evidence that continuing the status quo will become unacceptable to most citizens.

The clearest examples of common fate in waste disposal, however, concern solid waste. Solid wastes in most U.S. communities are deposited in central locations, usually landfills, either directly or after part of the waste has been changed into other forms (e.g., by incineration). In many communities, shortages of landfill space, concern about toxic materials, increasing disposal costs, and public opposition to siting new waste facilities have made old waste disposal practices untenable and have forced local governments to consider new policies to reduce the volume of waste. Many have responded with community-based recycling programs.

The block leader approach described in Chapter 4 is a good example of how principles of community management work for recycling. Hopper and Neilson's (1991) experiment in Denver suggests that much of the effectiveness of adding block leaders was based on increasing the strength of norms—both social norms (the behaviors people expect of each other) and internalized personal norms (the things people feel a personal obligation to do without considering what others may expect). We have already seen that norms are a key to the success of community management. Let us now examine how the block leader approach affects norms.

One thing block leaders do is turn recycling from a private, individual activity to a social one, in which social norms can influence behavior. People become aware that recycling is a neighborhood effort, and they expect that what they do in that effort will be monitored by their neighbors. Since most Americans are predisposed in favor of recycling and believe it is a good thing for their communities (Dunlap and Scarce, 1991), they can expect that their neighbors will not only notice, but judge. Thus, the presence of block leaders can give people the expectation that they face the social disapproval of their neighbors if they do not contribute to the recycling effort. Block leaders provide a monitoring system and, as Ostrom noted, moni-

toring and norms reinforce each other. In the case of recycling, the prospect of monitoring puts teeth into preexisting social norms.

To understand how block leaders affect personal norms, we need to understand the relationship between personal norms and prosocial behavior. The social psychologist Shalom Schwartz (1977), whose research on values we discussed in Chapter 3, has developed the concept of *norm activation* to describe a process by which, under certain conditions, individuals experience a sense of personal obligation to act in a prosocial way, and a sense of guilt if they do not. Personal norms for prosocial behavior are activated under two conditions: First, people must believe that an existing condition poses a threat of harm to others (Schwartz calls this Awareness of Consequences, or AC); second, they must believe that their personal action or inaction has the power to prevent that harm (Schwartz calls this condition Ascription of Responsibility to self, or AR). When a person holds both beliefs, he or she experiences a sense of obligation to act to prevent the harm. Thus, if someone believes that failure to recycle is harmful to the community, and believes that his or her own action can make a difference, that person will feel obligated to recycle, independently of social pressure. Note that the absence of *either* AC or AR will keep the person from feeling a personal obligation—it is still possible to get such a person to recycle, but not on the basis of internalized norms. In Hopper and Neilson's experiment, having block leaders led to stronger personal norms, and to more recycling behavior. We do not know whether the block leaders helped spread the awareness of the negative consequences of waste disposal, and thus increased AC. But it is quite likely that they increased people's sense that their own behavior would matter (AR), because having the whole block in a sense committed to recycling made personal behavior part of a larger effort in which people were responsible to each other and collectively could make a difference.

We should add that Schwartz's norm-activation model has been shown to explain a number of environmentally relevant behaviors. For example, people are more likely to reduce energy use (Black, Stern, and Elworth, 1985) and refrain from burning trash in their yards (Van Liere and Dunlap, 1979) if they believe these activities threaten the well-being of people in general and if they also believe their personal actions or those of people like them can make a noticeable difference. They are also more likely to support government policies for environmental protection if they believe that environmental conditions are harmful to people and that the policies are directed to changing the behavior of the responsible parties (Stern, Dietz, and Black, 1986). There is evidence that for some people, harmful consequences to ecological systems and nonhuman species has the same norm-activating consequences as harm to people (Stern, Dietz, and Kalof, 1993; Stern, Dietz, Kalof, and Guagnano, 1995).

A city block is different in some important ways from the communities that Ostrom studied. Like those communities, residents may interact frequently, and they may monitor each other's behavior, but their relationship to their resource (in this case, the landfill) is not as close as the Maine lobsterers' relationship to theirs. Although each individual would find it very inconvenient to use a different landfill, the neighborhood does not control the landfill, because it is shared with the rest of the city. Consequently, one block's reduction in solid waste may have little effect on the resource as a whole. People's awareness of that fact may eventually reduce their enthusiasm about block-level recycling programs. Of course, a nested approach using block leaders around the city might solve that problem. We report in Chapter 7 on a successful citywide recycling program that uses such an approach.

The facts that block-level programs can work at all in a large city, and that citywide conservation programs can also be effective, are significant. They suggest that the techniques of community management can be useful even when some of the optimal conditions for community management are absent.

Community Management without Resource Dependence

The success of the block leader approach to recycling relies on some of the key social-psychological mechanisms that make community management work. It

uses face-to-face communication among people who already have social contacts and some degree of trust, it establishes and reinforces shared social norms, it activates personal norms, it makes people aware they may be monitored, and it makes monitoring simple. The following examples show how some of the same mechanisms have been used effectively even when the basic condition of community resource dependence is absent.

Although few U.S. communities depend on local resources for their energy supplies, a number of them have operated successful community-based conservation programs. As we have seen in Chapters 4 and 5, carefully designed information and wisely chosen incentives are elements of successful programs. As we show here, the most successful programs also use principles of community management.

In Chapter 5, we mentioned the FACE program in Fitchburg, Massachusetts, that in only six weeks succeeded in getting low-cost weatherization materials installed in one-sixth of the homes in that city. We emphasized the way the program removed barriers to action by providing information, low-cost or free materials, and, if necessary, installation, all in one step. But the notable success of the program also depended on its creative use of some of the principles of community management.

FACE was conceived from the start as "a local collective" (quotations are from Fitchburg Action to Conserve Energy, 1980). The city planning coordinator's office, which organized the program, immediately created an Advisory Council that represented a cross-section of the community and appointed coordinators from each neighborhood of the city to provide "direct access and feedback on a neighborhood level." It opened centers in each neighborhood to increase participation and provide convenient locations for people to get training in how to weatherize their homes. FACE relied heavily on volunteer labor from college students and other interested individuals.

The program made special efforts to provide weatherization training in settings that were comfortable and familiar to the citizens. The two most successful techniques were training sessions arranged by appointment at workplaces and so-called Tupperware

sessions that were held for any group of neighbors that could gather ten or more people in a place of their choosing. The informality of these sessions and their reliance on existing social groups made it easy for participants to ask questions and to encourage and learn from each other. Encouragement was especially important to many women who initially believed weatherization was too technical or difficult to accomplish on their own. The program used the popular rhetoric of "self-help" and a "hands-on approach" to training to make conservation an active and rewarding experience. "People were constantly reminded at training sessions that this was *our* program and that *we* had to spread the word to relatives and neighbors if it was going to work. The sense of ownership and identity with FACE became very strong as the program progressed" (emphasis in original). The final report claimed that "a sense of shared commitment resulted" and that "there is now an increased atmosphere of community and cooperation in Fitchburg."

In short, the FACE program successfully applied and adapted community management principles, among them reliance on face-to-face communication, shared commitment to a common activity, interdependence within the group, and the creation and reinforcement of shared norms (spreading the word, helping oneself and others). The community approach allowed the successes of individuals and the group to reinforce each other: "Individuals proud of the work they had done apparently made a point of showing their neighbors," thus spreading the word and adding a kind of credibility that even a well-liked local government can only hope for. The use of face-to-face groups made it easier to elicit the level of individual commitment necessary for this program's success.

The FACE program did not have all the above elements at the start. Rather, they evolved over the program's six-week duration because the program used a participatory approach—another key principle of community management. The final report mentions a number of outreach techniques that were tried but failed, and several neighborhood centers that were closed because they added little to the program's effectiveness. The explicit effort to get continuing feedback from all the neighborhoods allowed FACE to

find particular methods that worked well for Fitchburg and to discard ideas that looked good in the abstract but that did not work. The process is similar to the one used by the Alanya fishermen, who spent years tinkering with their system for allocating fishing areas until they found one that worked.

The experience with residential energy conservation programs in the 1970s and 1980s repeatedly confirms the value of using existing community institutions (a form of what Ostrom calls social capital) to help in advertising, marketing, and modifying the programs where necessary. Community institutions are especially critical for reaching groups of people who tend not to respond to mass-media campaigns: low-income and low-education groups, renters, speakers of foreign languages, and so forth. Such people tend to be especially skeptical or unresponsive to programs brought to them by large, established institutions, but they are much more responsive if the church, civic, or community groups to which they belong act as intermediaries.

Experience shows that the community approach can add greatly to the efficiency of programs, in the sense of getting the most benefit for a limited cost. An example is the experience of the Residential Conservation Service program in the state of Minnesota, already mentioned in Chapter 4, which aimed to promote energy efficiency by conducting energy audits in homes. The participating utility companies used three different methods to perform their energy audits. Some companies had their own employees perform the audits, while others hired private companies or community groups as subcontractors. Utility companies that hired private companies spent half as much per audit as those using their own staff, while maintaining the same quality of audits and reaching more homes (6 percent versus 4 percent of those eligible). But the utility companies that used community groups got the best results. Their audits were of the highest quality of all, reached 15 percent of the eligible homes, and cost one-third of what companies paid to their own employees (Polich, 1984). The community groups apparently benefited from their credibility with consumers, which made marketing easier and gained them easier access to homes. It may be that

when accepted community groups are the bearers of the program, people tend to act on the norms of community membership: It is a valued thing to participate in programs for the good of the community.

The best way to use the strengths of a community to design an effective environmental program cannot be known from theory, and they can only be predicted in rough approximation from an examination of the community. An indispensable key is to establish a participatory process that can, by trial and error if necessary, find ways to involve the right groups, address any emerging problems, and keep the environmental program on track. The experiences in Fitchburg and other communities show that community-based programs can have positive effects on community morale, as well as achieving their environmental goals: There is a connection between community resource management and the strength of community feeling.

COMMUNITY MANAGEMENT AS A WAY OF LIFE

For some people, community management institutions are desirable not only because they can sustain natural resources, but also because they support a much-desired way of life. Community management works best in relatively small, relatively stable social groups characterized by common geographic location; frequent personal contact; economic and social interdependence among group members; shared norms; and informal means of monitoring, enforcing norms, and resolving conflicts. This is roughly the social organization of a nomadic tribe, an agricultural or fishing village, or a small rural town. It is a form of social organization that has been the norm throughout most of human history, as we note in Chapter 8, and one with strong cultural resonances even for many modern urban and suburban dwellers. The positive images associated with small communities include friendly and helpful neighbors, trusting relationships, freedom from crime, a leisurely pace of life, and closeness to nature. There are also negative images, of course—backwardness, boredom, loss of privacy, restrictions of free expression, and intolerance or even

repression of differences—but nevertheless, the ideal of village life holds strong attractions for many modern human beings, particularly in the United States. We do not mean to advocate life in small, cohesive communities as a better way of living—that, after all, is a value judgment on which people differ. But for people who are living happily in such communities or who desire to do so, community resource management has important social benefits as well as environmental ones. Such people often prefer community management even when other management methods are beneficial in economic terms.

This section explores the link between community resource management and community social organization from two angles. It examines the efforts of communities to maintain their own systems of resource management—and their ways of life—in struggles against development policies imposed from outside that they see as threatening both. It then examines the idea that people can organize the way they interact with the natural environment so as to make resources more manageable at the community level.

Community Management versus Development Policy

Recent decades provide numerous stories of economic development efforts that have negative environmental consequences. There are many reasons for these effects; one is that the development process often disrupts local community management institutions.

An illustrative story comes from the foothills of the Indian Himalayas, where for centuries people have relied on the forests for cooking fuel, fodder, and food. The forests also helped control the floods that sweep through the region every monsoon season by holding rainwater in the soil and releasing it slowly. For centuries, most of the forest land has been the communal property of the local villages and hamlets, with the poor and hungry having rights, recognized by their communities, to gather firewood, mushrooms, fruit, and fodder from the many tree species growing there. These rights were a matter of life and death for

landless people and for everyone when droughts reduced the productivity of the fields. Gathering in the forest was mostly the work of the village women.

Beginning in the late nineteenth century, the forests entered the cash economy, first through commercial felling of native trees and, since the 1950s, through the replanting of forest lands to a single, fast-growing commercial species, usually eucalyptus, that produces lumber for market but no fruit, little fodder, and relatively few twigs for cooking. This sort of forest development was the policy of the British colonialists and then of the Indian government, both of which wanted the cash. The resulting loss of tree cover in the higher elevations meant that by the 1960s, floods in the Ganges valley were becoming increasingly dangerous. Moreover, because the commercial plantations were private property, communities lost control of the resources, and villagers (except for a few landowners) lost their right to turn to the forests for sustenance in hard times.

In this historical context, a social movement began growing in the late 1960s and early 1970s to save the multispecies, common-property forests because of their value for flood control, subsistence, and the local way of life. The story has been told in detail by Vandana Shiva (1989), an Indian physicist who, out of concern for the Indian environment, became an expert on the ecological and human benefits of India's ancient subsistence systems and the human and environmental costs of many modern development plans.

The movement, known as Chipko and organized originally by women who had worked in Mohandas Gandhi's nonviolent resistance to British colonial rule, used nonviolent methods to resist development plans that involved cutting trees from the remaining common lands. Recognizing the multiple threats inherent in replacing forests that provided diverse resources for all with tree plantations that provided cash incomes for a few, the leaders were able to organize an increasing number of grassroots groups for action when government agencies decided to give forest lands over to commercial forestry. Women from local communities organized to protect trees from foresters, sometimes literally hugging trees in the presence of men with axes, and staying in place until the sched-

uled tree harvest was postponed or canceled. The word spread from isolated successes until people were mobilizing across the region to protect threatened forests.

The Chipko movement drew on deeply held beliefs and values, as well as on very real concerns for survival. The following statements made by movement women to axmen suggest the depth of feeling:

> *The forest is our mother. When there is a crisis of food, we come here to collect grass and dry fruits to feed our children. We dig out herbs and collect mushrooms from this forest. You cannot touch these trees.*
>
> *Stop cutting trees. There are no trees even for birds to perch on. Birds flock to our crops and eat them. What will we eat? The firewood is disappearing: how will we cook? (Shiva, 1989, pp. 74–75)*

These statements show both the spiritual and material value of the indigenous forests to the people, as well as their awareness of the ecological connections between forests and croplands. The burden of deforestation fell especially heavily on women, who had the responsibility to gather firewood for cooking, and whose workload increased as the forests receded.

Shiva shows how community institutions and community well-being suffered under a government policy that treated common lands as "wastelands" and that sought to convert them as quickly as possible to marketable uses. She shows how the Chipko movement was an attempt to reassert community values and local control by people who realized that the community's management institutions were the only proven way to meet basic needs.

The Chipko story makes two things clear. First, whatever benefits may come from commercial development of natural resources, market-oriented development can be incompatible with community management. This is not because it replaces common property with systems of private property—in Törbel, private and communal property have coexisted for over 500 years under a set of rules chosen by the community itself—but because commercial considerations put decisions about resource use under the control of forces outside the local community. Indian forest policy relied on cash cropping (in this case,

lumber) to repay development loans to outside lenders, who did not have to bear the costs that development imposed on local people and resources. Commercial systems place little importance on the noncashable benefits that natural resources provide and that local people value highly—in the Himalayas, food for the poor and hungry, fodder, flood control, and low-quality cooking fuel. Nor does market-based management place any value on the social capital present in community institutions that manage local resources and provide other desired public goods. The local benefits of the indigenous system of forest management became, under the cash-crop economy, externalities in transactions with outside purchasers who, because they were outsiders, did not have to take them into account.

Second, community management can sometimes yield social, environmental, and even economic benefits far in excess of what development experts and central government officials recognize. Shiva shows in her book that indigenous systems often provide greater economic value, when all the forest's products (not only the lumber) are taken into account, than the modern development systems that replace them. The same argument has been made in studies of sustainable development around the world. It appears that communities that have depended on local resources for generations sometimes learn to use them more efficiently than any modern development plan.

The Chipko movement had numerous successes in defending community management systems against the inroads of national and global markets, but the struggle remains a difficult one. India is increasingly part of a global economy in which cash is needed for fuel, transportation, medicines, and manufactured products. People who live in subsistence economies lack the cash to benefit from modern advances of all kinds, and their governments often lack the cash to provide for them, so a strong desire for money is understandable in terms of meeting local needs. In the Himalayas, needs for cash often created conflict between the women of the Chipko movement and their own husbands, who, in order to get money to support their families, worked at jobs in the forest products industry. The story of Chipko suggests that there may

be a fundamental incompatibility between community resource management and the global market economy that provides so many of the benefits of modern life. It hints that there may also be an incompatibility between the global economy and the global environment. That unhappy possibility brings us to another approach to community management.

Making Resources More Manageable

A number of social thinkers have advocated reorganizing societies and economies into smaller units that they believe would be better able to manage environmental problems. The *bioregionalist* movement, for example, advocates drawing political boundaries to match ecological ones, such as watersheds (Sale, 1991). Under this system, a problem like water pollution could be handled by one regional government. Under today's political arrangements, water pollution tends to be a source of perennial conflict between upstream governments that can stop pollution but have little incentive to do so because the pollution flows downstream, and downstream governments that have the incentive but no power to act upstream, where the pollution originates. Bioregionalists argue that more "natural" political boundaries would reduce social conflict and also give people identities tied to their environments rather than to nations or other political entities that can come into conflict over claims on the same territory. A problem with the bioregionalist approach is that even after all the effort that would be required to alter political boundaries and institutions, there would still be many environmental problems—air pollution, for example—that cross any boundaries that might be drawn.

Some argue that the key to environmental management is to bring social institutions down to "human scale" (Sale, 1991; Schumacher, 1973). They claim that smaller units are socially easier to manage and that they can depend on technologies that are easier for relatively untrained people to understand, produce, and maintain. This argument is often made in the context of development policy, using the concept of "appropriate technology." Proponents say that large hydroelectric projects, for example, transfer political power to the banks, governments, and engineers responsible for the project and away from the people who are supposed to benefit, whereas smaller-scale projects can be financed and controlled locally, so are more likely to bring local benefits. The argument about human scale is consistent with the evidence that community management techniques are easier to implement and use when the community is small.

The physicist Amory Lovins (1977) made an important argument along these lines about energy policy in the 1970s, when the United States was facing expected shortages of petroleum supplies and was looking to coal and nuclear power technologies as the chief alternatives. Lovins argued that either of these technologies would take the country down a "hard energy path" that required centralized control and regulation and large-scale financing. He contended that the result would be bad for the environment, and would erode democratic principles of public control. Only experts would understand the technologies, but they would not have incentives to protect the environment or the local residents; the people who might be most affected would not have the knowledge or power to decide. Lovins saw the hard path as leading to technocratic control by technological experts. His favored alternative was "soft energy paths," relying on energy efficiency and renewable energy technologies based on wind, water, and solar power that were relatively small-scale and local in character. Lovins argued that soft paths are environmentally preferable and also that they would better preserve American political values of democratic control and individual autonomy.

"Soft-path" technologies tend to be inexpensive, small-scale, and designed for local energy production. An example would be a small city that, instead of getting energy for public and private uses from large electric and gas utilities, produced gas from its landfill and electricity from windmills supplemented by hydroelectric power from a nearby reservoir. It is in the nature of soft paths that each community would be free to find its own combination of supplies to meet its needs. In terms of social organization, however, soft-path solutions tend to have some things in common. They rely on the initiative of local households, businesses, and governments and they are managed by

those same actors. Some technologies may be adopted privately (for example, a solar water heater for a house) and some may be communal (for example, a hydroelectric power station); similarly, the management rules are likely to be a mixture of private-property rules and community-based ones.

The choice of a soft path makes community management a more viable option. A community that depends for its electricity on its own windmills and dam possesses two necessary conditions for community management: a resource that is controllable locally, and mutual dependence on that resource. If the same community used 1 percent or so of the output of a large coal or nuclear-fired power plant, which in turn purchased its fuel in a global market, it would not have control of its energy supplies, and would probably find it much more difficult to use community management methods to achieve a desired community goal, such as a collective reduction in energy use.

The soft-energy-path idea is an example of a broader strategy, which is to put control over resources, wherever possible, into the hands of human institutions, particularly communities, that can manage them sustainably, and to choose technologies that are manageable at the community level. This strategy turns on its head the usual procedure in modern societies, in which technologies are developed for economic profit or governmental purposes with only secondary regard to their implications for the environment and without considering in advance how any unfortunate environmental consequences will be controlled. Proponents argue that the usual way of choosing technologies has been destructive both to environmental and human values, and that technological choices should take these values more directly into account. They point out that choices about technologies and about the governance of natural resources inherently have a value dimension, and they argue that different values should take priority. They also point out that having resource supplies and management in the control of a group of people that simultaneously benefits from resource use and suffers from any associated environmental damage helps to internalize the externalities of resource decisions.

Renewable energy technologies present many opportunities to use this strategy of promoting community management, but not the only ones. Water management, as the bioregionalists suggest, can be organized by institutions at the level of watersheds that address environmental problems that arise at the same level, such as water availability and pollution. The management system might be similar to those that Ostrom studied in California that manage water supply at the level of aquifers. And forest management, as the Nepalese experience suggests, can be done at the village level as well as the national, with village-level management having some clear advantages.

The strategy of solving environmental problems by dividing the resources into humanly manageable units is often advocated for its presumed social benefits as well as its environmental ones. A key potential benefit is the strengthening of community. Suppose, for example, that members of a community must interact to manage a reservoir that provides the community's water and electricity. It would be necessary to create a setting—an organization, or a set of town meetings—that would bring community members together to address common needs and goals. This process would increase communication, creating new interactions between individuals who might not have interacted before and thickening the community's social network and thereby making for a stronger community. People would get to know each other better and have the opportunity to build shared expectations and norms, which tends to increase the community's ability to solve other shared, nonenvironmental problems. In addition, situations that create interdependence and a need to solve "superordinate" problems affecting everyone more or less equally are well known to help reduce conflict between individuals or groups (Sherif et al., 1961). As we have already noted, however, strong communities are sometimes repressive of some of their members and inimical to individualist values such as free expression.

WHEN IS COMMUNITY MANAGEMENT LIKELY TO WORK?

Table 6-1 summarizes the conditions under which community resource management is most likely to succeed. These conditions are described earlier in the chapter. The table is ordered roughly from conditions

in the natural environment, such as the physical and geographical character of the resources, to social conditions, such as the nature of the community and the rules it devises. The order is only rough, however, because social and environmental conditions can interact. Social conditions, such as national policies, can make a resource that is controllable in principle into one not controllable in practice. Social conditions can also make the environment more controllable, such as when new technology made it possible to perceive and monitor the Antarctic ozone hole and to determine how to control it, or when systems of informal property rights enable the Maine lobsterers to establish and enforce boundaries for "their" resources. Generally, items appearing earlier in the table require larger social forces to change them than those appearing later in the table. This means that if some of the conditions of community management are missing, the chances for success are usually greater if the missing items are toward the bottom of the table.

Large-scale social forces have for generations been weakening two of the major conditions in the table: local resource dependence and the presence of community. The globalization of markets and improvements in transportation have decreased the importance of locally available resources in most people's lives. Fewer people depend on subsistence agriculture or fishing, local energy sources, or locally produced household technology. And when local resources fail, as occurs in periods of drought and famine, people can now be saved by resources shipped from across the world. These trends have brought great benefits to humanity (although large numbers have yet to benefit), but they make environmental conditions less manageable at the local level by decreasing mutual dependence on the local environment. The same social and economic forces have weakened community in many localities, as people seek their fortunes by moving to areas where economic growth provides opportunities. More people migrate, weakening the long-term social interactions and thick social networks that appear to be needed for community management, and also eroding local knowledge of the properties of the resource base. Economic specialization further thins social networks, as relationships around work, child care, consumption, and so forth become more separate from each other and increasingly based on monetary exchange rather than social obligation. Again, there are undeniable benefits from organizing human life around modern markets, but because this form of social organization weakens community, it makes community resource management more difficult.

Equally threatening to the possibility of community management is the fact that human activity has increasingly altered the environment at the global level, creating new problems such as global climate change, stratospheric ozone depletion, and ocean pollution that are uncontrollable locally because their boundaries are intrinsically global. It is hard to see how community management alone could ever solve such problems, no matter how strong local communities were.

In sum, large-scale social and economic changes have increasingly limited the possibilities for community management. As we have seen, however, there remain significant areas of opportunity, including water supply and solid waste disposal, where resources often meet the conditions of local controllability and resource dependence. There are also many other situations in which the techniques developed by community institutions can be used to supplement informational and incentive-based strategies of behavior change, even when most of the conditions for full-scale community management are lacking.

There is one scenario that might make community management a more viable strategy over time, but it requires some serious shifting of social trends. This is the scenario exemplified by the soft-path approach in energy, in which resource dependence is systematically shifted from global to local supplies, resource-using technologies are increasingly designed and organized to be controllable at the local level, and the decision power is given increasingly to community-level groups. As we have seen, this scenario is imaginable for the management of energy, water, and some other kinds of resources. It would, however, entail a change in social organization that goes somewhat against the grain of recent social trends. It is beyond the scope of this book to try to evaluate all the costs and benefits of this approach. We simply point out

that it is a possibility, and that it has the potential advantage of enabling people to use a proven system of resource management that has become decreasingly common over the last century.

CONCLUSION: WHAT CAN COMMUNITY MANAGEMENT ACCOMPLISH?

The community management approach to environmental problems has significant advantages, but like the other major approaches, it is not sufficient by itself. Here we summarize its major advantages and limitations, and draw some conclusions about its appropriate role in preventing tragedies of the commons.

Advantages of Community Management

Community management builds on long-standing social traditions. It is a system of resource management that has served our species well, in an evolutionary sense, for millennia. Whereas formal educational programs and financial incentives are creations of modern societies, which have not yet learned to perfect them, community management systems have been with humanity for thousands of years. We know these systems can work and that they are compatible with human social organization.

Community management internalizes externalities. The problems of externalities—in which some people benefit from the use of resources while creating pollution for others or robbing them of their own resources—cannot occur when the resource and all the consequences of using it are kept within the same group of people. This was the case for a wide range of resources managed communally in the communities Ostrom studied. It is important to note, however, that commmunity management does not always eliminate the externalities. For example, a community upstream in a river valley may manage its water supplies quite well for itself while it lets its polluted water flow downstream. For community management to internalize the externalities, the resource must be a relatively closed system.

Community management can be effective over very long time periods. No other strategy for resource management can claim the centuries-long success that is evidenced in communities like Törbel. The reason is probably that the social system that manages the resources is one that maintains itself. Community management systems contain incentive and educational components, but they are not very noticeable because, rather than being imposed by outside entities such as governments, they are integral to the community. When the controls come from within, the system can last as long as the community, and can evolve to meet community needs.

Community management can encourage people to move beyond selfishness. As we pointed out at the start of the chapter, successful community management is inconsistent with Garrett Hardin's ideas in that people put group needs ahead of narrow self-interest. Yet community management works with the same kinds of people who act as egoists in other social contexts. It is the social character of community management—the participatory process, the creation of a sense of community, and the internalization of group norms—that shapes people to think and act for interests beyond themselves. From many value perspectives, though not all, that is an advantage that puts community management ahead of other strategies that rely on egoism. We return in Chapter 8 to the question of the potentialities for egoism and altruism in human nature.

Community management has low enforcement costs. As we have pointed out, internalized norm-following is much less expensive, in terms of policing, than other strategies of behavior change. Community members in effect police themselves and each other. Such a strategy should therefore be highly attractive in a time when governments experience limited resources.

Community management is the forgotten strategy. Paradoxically, one of the greatest advantages of the community approach to resource management is that it has been so widely ignored. The dominant view in policy analysis is one that looks down on environmen-

tal problems, as from on high, and seeks to impose solutions on individuals, groups, or organizations that are presumed to be unable to solve the problems themselves. Garrett Hardin and all other analysts in the Hobbesian tradition presume that some sort of Leviathan is needed to keep people from ruining their environments, and all neglect the lessons from situations in which this assumption was untrue. What this means is that a large number of interventions to solve environmental problems have neglected the principles of community management, and that there may be significant room for improvement by remaking the interventions to be more congruent with those principles.

Limitations of Community Management

Community management works best with a limited range of resource types, such as the coastal fisheries, well-bounded aquifers, grasslands, and forests that Ostrom studied, where resources and pollution can be contained within a small geographic area. Unfortunately, the world's most pressing environmental problems are not like this. Some of them, such as climate change and ozone depletion, are inherently global, so that every community's contribution to the problem is mixed with every other community's. Others are resistant to solution because they present incentives for communities to export their environmental problems to other communities. For instance, many communities can shift their water pollution downstream or their air pollution downwind, take water that is needed downstream, or cut trees in the mountains that provide flood protection in the valleys. In all these cases, the key resources are inherently hard to control locally because community management fails to internalize the externalities. Communities may manage their self-contained resources quite well, yet become involved in a tragedy-of-the-commons dynamic when they share resources with other communities. It seems necessary in these situations for some decision power to lie at a higher level than the community. Although it may be possible to address these problems with nested arrangements among communities or systems of

comanagement between communities and larger governmental units, thus retaining some of the advantages of community management, these strategies are still relatively untested. When a resource affects people outside a community, the community management strategy is insufficient by itself.

Social trends are destroying the conditions for community management. No matter how attractive community management may seem on an abstract basis, it is becoming increasingly difficult because the necessary conditions for it are eroding. People are increasingly dependent on resources that are traded in global markets and are therefore uncontrollable locally, and modernization and migration are making small, stable communities less and less common in the world. As these trends continue, there are fewer locally manageable resources, and fewer groups with the social capital and knowledge to make community management work. What may be desirable is becoming less and less possible, and it may be that in the present era, making community management into a useful strategy for the world's great environmental problems would require nothing short of a social revolution.

Promising Applications of Community Management

The limitations listed above are very serious, indeed. On one hand, the major world environmental problems are not amenable to community management alone; on the other, fewer and fewer communities have the necessary skills for managing the problems that can be handled at the community level. Despite these limitations, we find that community management, or at least principles of it, have great promise for dealing with certain environmental problems and as part of a mixed strategy for dealing with most environmental problems.

Management of locally controllable resources. Land use, water supply, and coastal fisheries, which have been the predominant areas of success for the community management strategy, continue to present

important environmental problems, especially in rural areas. Community management remains a highly effective strategy for solving these problems, and governments can do more to provide the conditions conducive to successful community management. In addition, even in modern, urbanized societies, some important resource systems, including water supply and solid waste, are locally controllable and seem particularly suited to community-based approaches. We believe much more can be done to apply the community management strategy to those sorts of problems.

Combining elements of community management with incentives and education. The evidence discussed in Chapters 4 and 5 clearly shows that energy conservation and recycling programs in the United States and other modern, industrialized countries are much more successful when they incorporate elements of the community approach. Incentives and education can be supplemented and made much more effective by relying on word-of-mouth communication and using the resources available to existing community groups, such as their access to audiences and their credibility. Programs that use community institutions and informal social networks are much more effective at spreading their information or advertising their incentives than programs that rely only on mass media or contacts between strangers, and because they are in closer touch with the community, they are better able to identify and make needed improvements. Even though strong communities may be a thing of the past in modernized societies, the kinds of social bonds that existed in those communities still have great influence over individual behavior. In addition, the participatory decision approach that is characteristic of community management turns out also to be effective when decisions must be made on a regional or even a national basis. We believe that for the full range of environmental problems, success will be more likely if the solution strategy used takes advantage of principles such as participation, involvement, creation of norms, and built-in monitoring that proved their value within small communities and are also valuable in larger and more complex social units. Moreover, solving even a few problems with community-based institutions can relieve pressure on the overworked national and international institutions of environmental protection. In Chapter 7, we discuss ways that principles from the community management approach can be combined effectively with the other major solution strategies for environmental problems.