INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

sustainable solutions for ending hunger and poverty

2020 FOCUS 11

Collective Action and Property Rights for Sustainable Development

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2020 VISION SM

FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

CAPRi

CGIAR System-wide Program on COLLECTIVE ACTION AND PROPERTY RIGHTS

Introduction

Millions of rural poor people in developing countries depend on natural resources—farmland and rangeland, fishing waters, forests—for their livelihoods. But whether they can use these resources sustainably to climb out of poverty often depends on the institutions that govern resource use—property rights and collective action. A multiplicity of property rights and collective action arrangements exist around the globe, and researchers have learned numerous lessons about what kinds of arrangements work best under what conditions. Making property rights and collective action work for the poor is not as simple as issuing new land titles or mindlessly applying standards that have worked elsewhere. Instead, it requires a detailed understanding of local resource conditions and social relationships, among other factors.

This collection of briefs draws on a wide body of research conducted through the System-wide Program on Collective Action and Property Rights (CAPRi) of the Consultative Group on International Agricultural Research (CGIAR). It describes the complex issues surrounding property rights and collective action that policymakers and development professionals must understand and address if they are to successfully promote sustainable and pro-poor management of natural resources. We are grateful to editors Ruth Meinzen-Dick and Monica Di Gregorio, as well as all of the contributors, for their insights on this crucial topic.

Joachim von Braun
Director General

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Head, 2020 Vision Initiative

The International Food Policy Research Institute (IFPRI) is one of several international research centers supported by the Consultative Group on International Agricultural Research (CGIAR). **"A 2020 Vision for Food, Agriculture, and the Environment"** is an initiative of IFPRI® to develop a shared vision and consensus for action on how to meet future world food needs while reducing poverty and protecting the environment. This set of Focus briefs presents technical research results that encompass a wide range of subjects drawn from research on policy-relevant aspects of agriculture, poverty, nutrition, and the environment. It contains materials that IFPRI believes are of key interest to those involved in addressing emerging food and development problems. The 2020 Vision Initiative gratefully acknowledges support from the following donors: Canadian International Development Agency; Danish International Development Agency (DANIDA); and Swedish International Development Cooperation Agency (SIDA).

The System-Wide Program on Collective Action and Property Rights (CAPRi), one of several intercenter initiatives of the CGIAR, fosters research and promotes collaboration on institutional aspects of natural resource management between the CGIAR centers and National Agricultural Research Institutes. CAPRi intends to contribute to policies and practices that alleviate rural poverty by analyzing and disseminating knowledge on the ways that collective action and property rights institutions influence the efficiency, equity, and sustainability of natural resource use.

Collective Action and Property Rights for Sustainable Development

Overview

Ruth Meinzen-Dick and Monica Di Gregorio

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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Institutions of collective action and systems of property rights shape how people use natural resources, and these patterns of use in turn affect the outcomes of people's agricultural production systems. Together, mechanisms of collective action and property rights define the incentives people face for undertaking sustainable and productive management strategies, and they affect the level and distribution of benefits from natural resources. The linkages between property rights, collective action, and natural resource management have important implications for technology adoption, economic growth, food security, poverty reduction, and environmental sustainability. Yet despite their importance in people's lives, property rights and collective action are often undervalued, and when they are recognized, often misunderstood.

WHAT ARE PROPERTY RIGHTS AND COLLECTIVE ACTION?

Collective action is often considered narrowly in terms of formal organizations, and property rights only in terms of formal title issued by the government. In fact, they are much more than that.

Collective action can be defined as voluntary action taken by a group to achieve common interests. Members can act directly on their own or through an organization. In the context of natural resource management, even deciding on and observing rules for use or non-use of a resource can be considered collective action, and it can be instituted through common property regimes or through coordinated activities across individual farms.

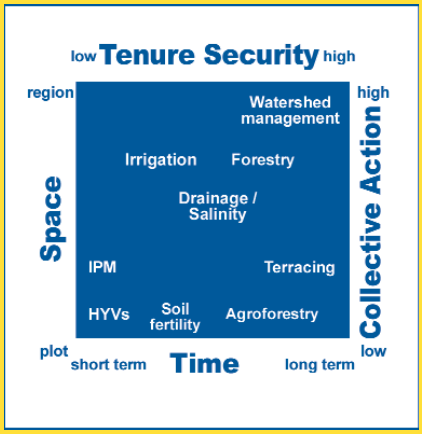
Property rights can be defined as "the capacity to call upon the collective to stand behind one's claim to a benefit stream" (Bromley 1991). Rights do not necessarily imply full ownership and the sole authority to use and dispose of a resource; different individuals, families, groups, or even the state often hold overlapping use and decisionmaking rights. To be secure, rights should be of sufficient duration to allow one to reap the rewards of investment and should be backed by an effective, socially sanctioned enforcement institution. This institution is not always the government; communities or other institutions may provide the backing.

LINKS TO SUSTAINABILITY OF NATURAL RESOURCE MANAGEMENT AND AGRICULTURAL SYSTEMS

The following figure illustrates how property rights and collective action affect the application of agricultural technologies and natural resource management practices. Conventional on-farm technologies like improved, high-yielding crop varieties (HYVs) have a short, usually seasonal, time horizon and a small spatial scale, often a single plot. They can be adopted by a single farmer—even by a tenant. Other technologies may require longer time horizons between their adoption and their payoff. In those situations, farmers need secure tenure (property rights) to have the incentive and authority to adopt. For example, tenants are often not allowed to plant trees or lack incentives to do terracing. Moving from on-farm technologies to those that operate at larger spatial scales implies a greater need for collective action to make the technology work. Integrated pest management (IPM), for example, must be coordinated across farms

Most natural resource management practices have both long time and large spatial scales. Both property rights and collective action are therefore crucial for the management of forests, rangelands, fisheries, watersheds, or irrigation systems

Relative Importance of Property Rights and Collective Action in the Adoption of Natural Resource Management and Agricultural Practices



that serve more than a single farm. In some cases, the scale of the resource to be managed may go beyond what can be done by voluntary collective action by a community. Federations of user groups may sometimes be able to manage larger resources, but often the state or even international bodies become critically important partners. In these cases, co-management between the community and government, rather than government management alone, often leads to better outcomes.

Property rights and collective action also affect natural resource management and agricultural production systems in interaction with other factors such as information, wealth, risk, labor, and marketing. Collective action and networks among community members can facilitate access to information and even allow farmers to participate in technology development. Ownership of assets can serve as collateral for obtaining credit. Microfinance programs have shown that action through groups can also provide access to credit, with social bonds providing collateral. Rights over common property resources frequently

function as a buffer against risk, especially environmental events and loss of other livelihoods. Similarly, collective action enables risk sharing and inspires mechanisms for collective self-help. Collective action and reciprocity arrangements offer ways to overcome labor shortages, especially for practices that require intense labor effort in concentrated periods.

Property rights and collective action are also interdependent. This is particularly clear in the case of common property regimes, where holding rights in common reinforces collective action among members, and collective action is needed to manage the resource. Maintaining property rights can require collective action, especially in the case of landscape-level resources and where outsiders challenge local claims

LINKS TO POVERTY REDUCTION

Property rights and collective action affect people's livelihoods. The most vulnerable and marginalized rural groups often lack access to resources (that is, they have no or insecure property rights) and find participation in collective action too costly because of lack of time and resources. Enhancing rights to even relatively small homestead plots can increase food security by allowing women to grow gardens, and rights to common property often provide insurance for the poor. Tenure security provides key assets for poverty reduction, allowing the poor to help themselves by growing food, investing in more productive activities, or using property as collateral for credit. Collective action can increase food security through mutual insurance.

Both property rights and collective action are empowerment tools. Poor people often have difficulty making their voices heard. Interventions to strengthen their property rights or to help them participate in collective activities improve their bargaining positions. Security of rights and the capacity to manage local common resources allow people to make decisions while taking the future into consideration. This longer-term approach generally translates into more environmentally sustainable management practices and a healthier resource base for future generations.

IMPLICATIONS FOR POLICY AND PRACTICE

Many countries are now adopting policies to devolve the management of forests, fisheries, irrigation, watersheds, or rangelands to local communities or to develop some form of co-management between the state and communities. In addition, community-driven development initiatives are helping local organizations to set priorities for local public service spending and to provide services such as schools and health centers. For these programs to succeed, effective collective action within communities is essential.

As the briefs on forestry, irrigation, fisheries, and rangelands in this series show, successful collective action does not always emerge, especially where traditional management institutions (like tribes on rangelands) have been weakened by migration or excessive state intervention. Government agencies need to change how they work with communities, becoming more conscious in their efforts to strengthen local management institutions and allowing more local decisionmaking without imposing external rules.

Devolution programs that transfer management responsibility for natural resources from government agencies to farmers often fail to transfer corresponding rights. Yet rights over the resource are needed to provide groups with the incentives to conserve and even invest in the resources. Without recognized decisionmaking rights, the groups lack the authority to manage the resource or to stop members or outsiders from breaking the rules. Recognized property rights not only reinforce collective action that is needed for collective management, but also provide security for individuals and households. Several briefs in this collection suggest ways of strengthening property rights for the poor.

Many other government and nongovernmental organizations involved in community development are addressing collective action issues, whether through revolving credit or livestock schemes, agricultural extension groups, or domestic water supply. There is a wealth of practical experience on ways to organize or strengthen collective action. Researchers have documented factors that affect collective action, but their findings are often based on a few successful case studies. Much more needs to be learned about what approaches do and do not foster collective action that continues beyond the project intervention, as well as about how externally induced organizations interact with indigenous institutions for collective action. Promising approaches suggested by briefs in this collection include using facilitators, community organizers, or farmer-to-farmer learning; providing groups with credit to make investments and create property rights; and increasing access to technical information about resources. As collective action grows, local groups are forming federations up to the national level to address their problems at appropriate levels and to gain a voice in policy decisions, including critical issues of rights to resources. ■

For further reading see D. Bromley, *Environment and Economy: Property Rights and Public Policy* (Cambridge, MA: Basil Blackwell, 1991); R. Meinzen-Dick, A. Knox, F. Place, and B. Swallow, eds., *Innovation in Natural Resource Management: The Role of Property Rights and Collective Action in Developing Countries* (Baltimore: John Hopkins University Press, 2002); R. Meinzen-Dick, A. Knox, and M. Di Gregorio, eds., *Collective Action, Property Rights, and Devolution of Natural Resource Management: Exchange of Knowledge and Implications for Policy* (Feldafing, Germany: German Foundation for International Development [DSE]/Food and Agriculture Development Centre [ZEL], 2001), http://www.capri.cgiar.org/workshop_devolution.asp; and A. Knox, R. Meinzen-Dick, and P. Hazell, "Property Rights, Collective Action, and Technologies for Natural Resource Management," CAPRi Working Paper 1 (Washington, DC: IFPRI, 1998), http://www.capri.cgiar.org/pdf/capriwp01.pdf. Also visit the CAPRi website at http://www.capri.cgiar.org.

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Collective Action and Property Rights for Sustainable Development

Understanding Collective Action

Elinor Ostrom

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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UNDERSTANDING COLLECTIVE ACTION AND COLLECTIVE ACTION PROBLEMS

Collective action occurs when more than one individual is required to contribute to an effort in order to achieve an outcome. People living in rural areas and using natural resources engage in collective action on a daily basis when they

- plant or harvest food together;
- use a common facility for marketing their products;
- maintain a local irrigation system or patrol a local forest to see that users are following rules; and
- meet to decide on rules related to all of the above.

Frequently, however, it becomes difficult to exclude nonparticipants from benefiting from the collective action of others. This situation creates a collective action problem for the participants. When individuals seek out short-term benefits for themselves alone, they are better off when others contribute to the collective action and they do not. In this case, they benefit without paying the costs. Of course, if all individuals pursue short-term, self-centered benefits, no collective benefits are achieved.

CAN PARTICIPANTS OVERCOME THE COLLECTIVE ACTION PROBLEMS THEY FACE?

Some theoretical treatises assume that individuals are unable to overcome the temptation to pursue short-term, "selfish" benefits. According to this view, effective collective action can be achieved only if external policymakers impose government or private ownership. It is true that appropriately designed property rights systems can help individuals overcome collective action problems, but such systems need not always be externally imposed or involve government or private ownership. Indeed, efforts by national governments to impose uniform rules on large stretches of land involving diverse ecological and sociological systems have frequently led to worsening natural resource conditions rather than improvements. Outsiders' efforts to impose property rights often fail to take into account indigenous property rights and the organizations that individuals themselves have established over time.

Many local indigenous institutions have evolved as the people affected have tried to find better ways of organizing joint activities. Indigenous methods for engaging in collective action have sometimes survived for centuries, through floods, fires, pests, overpopulation, and warfare. These institutions may not be recorded in any formal records and are frequently unknown except to local participants.

Any effort to influence policies for managing water, rangelands, forests, fisheries, and other natural resources must take into account factors that increase the likelihood that individuals will engage in their own collective action to manage local resources. By understanding these factors and developing policies to enhance them, national and international agencies can increase the level of collective action generated at the local level. The efforts of national and international agencies can then be devoted to large-scale collective action problems that do require their attention and effort.

Policymakers sometimes want to learn the precise formula that will solve a particular problem. Extensive research has shown, however, that no blueprints exist that can reliably be used to solve collective action problems, either within or across sectors. Instead of uniform blueprints, research has highlighted broad design principles that have been used by successful groups. Furthermore, researchers have identified the attributes of groups and resources that facilitate successful solutions to these problems.

WHAT PARTICIPANT ATTRIBUTES ARE CONDUCIVE TO OVERCOMING COLLECTIVE ACTION PROBLEMS?

The first characteristic of successful efforts is agreement by the involved individuals that the problem at hand is an important one. At first this characteristic sounds trivial, but it is not. Government agencies frequently complain that local populations do not perceive collective action problems as either relevant to their concerns or within their abilities to address. In regard to the conservation of wildlife, for example, residents living around a reserve frequently find themselves paying high costs and receiving few benefits for the presence of the wildlife reserve. If people's crops are eaten, their animals are threatened, and even the lives of their children are at risk, they will need to see substantial and tangible benefits from the establishment of a park before they will see any reason to engage in collective action to preserve wildlife.

A second factor is the degree of autonomy a group has to take collective action on its own or within a nested institutional setting, and this factor can depend on the macro political-institutional environment in which individuals find themselves. For many local groups, past attempts to take collective action proved dangerous. In a highly authoritarian regime, independent action is perceived as threatening to the center. Individuals who have lived in such regimes for long periods of time are always nervous about independent action, even when assured that the regime has changed. In addition, the capacity to create a private association without long and bureaucratic processes or expensive filing of documents greatly enhances the capabilities of local people to solve problems.

Other factors relate to the way users of a resource view both the future and each other. If users have a high discount rate in regard to a particular resource—that is, they view exit

as a reasonable short-term option—there is little motivation to put in extensive time and effort to create a sustainable, long-term governance system. Those who have overcome collective action problems usually have a relatively low discount rate in relation to the particular problem at hand. Secure property rights for the group can help reinforce a long-term perspective. Participants must also have some level of trust in the reliability of others and be willing to use broad strategies of reciprocity. If participants fear that others are going to take advantage of them, no one will wish to initiate costly actions only to find that others are not reciprocating. Prior organizational experience and the presence of supportive local leaders also reduce the transaction costs that must be paid before finding possible solutions.

WHAT RESOURCE SYSTEM ATTRIBUTES ARE CONDUCIVE TO OVERCOMING COLLECTIVE ACTION PROBLEMS?

Overcoming collective action problems is always a challenge. Four factors enhance the likelihood that local users will move toward devising institutions for sustainable development:

1. The flow of resource units, such as fish, water, or forest products, is relatively predictable.
2. Resources are scarce but not entirely destroyed.
3. Reliable and valid indicators of the condition of the resource system are available locally at reasonable costs.
4. The resource system is moderately sized.

The presence of all four conditions enhances the probability that local users can come to a common understanding of the nature of the system they are using and of how their own collective action can create rules about who uses how many of the resource units and where, when, and how these uses are allowed. It is important to note that not every group facing favorable conditions is successful in organizing itself and sustaining that organization over time. Nor are groups with less positive conditions fated to fail forevermore.

Collective action problems are found within the councils of the highest levels of government as well as those related to local resource management. It is important for policymakers to understand both the importance of local initiatives and the difference that external authorities can make by enabling groups to take initiative and experiment with diverse local institutions and by affecting some of the conditions through the policy environment.

WHAT CAN BE DONE?

Imposing top-down, detailed prescriptions for "solving" collective action problems by policymakers located far from particular collective action problems has rarely been a successful strategy. National agencies can nonetheless accomplish a great deal by

- providing accurate information about natural resource systems, such as groundwater replenishment rates, geological structure, and long-term precipitation records;
- recording key information about the behavior of wildlife and fisheries not available to local users;
- providing arenas for low-cost conflict resolution;
- designing mechanisms for discourse and debate by local users in their effort to learn from one another and discover new strategies;
- disseminating information about successful organizations and the design principles that characterize them; and
- creating institutional mechanisms that local participants can use to organize themselves, such as through special districts, private associations, and local/regional governments.

It is also important that policymakers not presume that they are the only relevant actors in efforts to solve collective action problems. They have partners if they are willing to recognize them. ■

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Collective Action and Property Rights for Sustainable Development

Understanding Property Rights

Ruth Meinzen-Dick, Rajendra Pradhan, and Monica Di Gregorio

2020 VISION
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Collecting firewood from a forest or water from a stream, grazing a herd, felling trees, preventing entry to a protected area, and making decisions about who should or should not have rights to collect firewood or water are all expressions of the exercise of property rights to natural resources.

Property rights govern who can do what with resources. They specify the claims and related obligations of different actors—individuals or groups—to the benefits of a resource. The assigned set of rights and obligations shape the authority and incentives structure of the rights holder.

MANY TYPES OF RIGHTS

People often think about property rights in a narrow sense as ownership—the right to completely and exclusively control a resource. But property rights are better understood as overlapping "bundles" of rights. There are many combinations of such rights, but they can often be grouped as

- *use* rights, such as the right to access the resource (for example, to walk across a field), withdraw from a resource (pick some wild plants), or exploit a resource for economic benefit; and
- *control* or *decisionmaking* rights, such as the rights to management (plant a crop), exclusion (prevent others from accessing the field), and alienation (rent out, sell, or give away the rights).

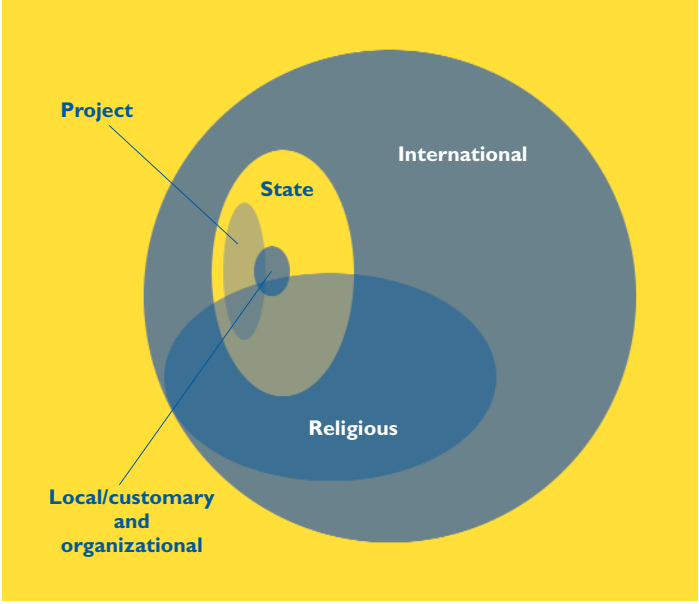
These rights may also be conditioned by the amount, timing, and other aspects of resource use and management. Several individuals or groups may have different kinds of rights over the same resource. For example, all members of a community may be allowed to bathe in a river or collect drinking water, but only certain farmers may be allowed to draw water for irrigating fields and to decide how to distribute that water in the dry season, while the state may claim ultimate "ownership" of the water, including the right to reassign it to others. Even on land declared as state forest land, individuals from a community may have the right to collect medicinal plants or fallen branches for firewood (use), local groups may have the right to plant trees (management) and guard them (exclusion), but the state may retain the right to approve any felling of trees and to collect revenue from users.

LEGAL PLURALISM: MANY SOURCES OF RIGHTS

To recognize property rights in practice, we need to look beyond state-issued titles to the resource. As illustrated in the figure, there are multiple sources of property rights, including:

- international treaties and law;
- state (or statutory) law;
- religious law and accepted religious practices;
- customary law, which may be formal written custom or living interpretations of custom;
- project (or donor) law, including project or program regulations; and
- organizational law, such as rules made by user groups.

Coexisting Multiple Sources of Property Rights



To understand this complexity, it is useful to start from people's experiences with access to and control over resources. From this vantage point it is clear that people draw upon a range of strategies for claiming and obtaining resources, depending on their knowledge and assessment of which best suit their situation.

The coexistence of these laws does not mean that all laws are equal or equally powerful. Each is only as strong as the institution that stands behind it. Often state law is more powerful and used by government officials, for example, to declare and enforce forests as state property. Statutory law is also used by powerful outsiders, such as logging companies with concessions in customary lands, to claim resources in ways that are not locally recognized as legitimate. On the other hand, actions of local communities, such as petitions, demonstrations, and roadblocks, are ways of claiming locally recognized rights as well as seeking recognition of their rights by the state.

In some cases state law, although important, is not as relevant as the village, ethnic community, or user group in deter-

mining property rights on the ground. For example, state laws on inheritance are often ignored in favor of religious laws or local custom. Research has shown that state titling programs do not always provide stronger security than customary rights and may even be a source of insecurity for women and households with less information or fewer connections to obtain government land registration.

While legal pluralism can create uncertainty because rival claimants can use a large legal repertoire to claim a resource, multiple legal frameworks also provide flexibility for people to maneuver in their use of natural resources.

PROPERTY RIGHTS AS FLEXIBLE AND DYNAMIC SYSTEMS

Often the more variable the resource, the more flexible are the property rights that develop over it. Water rights are particularly fluid, changing by season and year, depending on the availability of the resource and demands for water. Similarly, many customary rangeland management systems negotiate access rights depending on factors like weather and the social relations between the groups. This flexibility provides a measure of security in times of drought or other disasters, by creating reciprocal expectations of resource sharing between groups.

Another source of change in property rights comes from the interaction between types of law. The different legal frameworks do not exist in isolation, but influence each other. Changes in state law can influence local custom, but changes in customary practices can also lead to changes in state law. For state law to be effective on the ground, it must be implemented effectively. Legal literacy programs may be needed to inform the public—and even government officials—about changes in the laws.

How exactly these different legal orders influence each other depends on power relationships between the "bearers" of different laws. Power relationships also determine the distribution of rights and whether people can effectively claim their rights. Actual rights to natural resources are therefore a product of locality, history, changes in resource condition and use, ecology, and social relationships and are subject to negotiation. Thus, in practice, property rights are not cast in stone or in title deeds, but negotiated.

PROPERTY RIGHTS, RESPONSIBILITIES, AND DEVOLUTION PROGRAMS

Effective resource management entails balancing benefit entitlements and responsibilities of property rights. After failing to effectively manage natural resource systems centrally, many governments are now undertaking decentralization and devolution programs to transfer responsibility for resource management to local governments and user groups. Unfortunately, many such programs emphasize the transfer of responsibilities without transferring the corresponding rights. As a result, user groups may lack the incentive, and even the authority, to manage the resource.

When devolution programs do transfer rights over resources to a user group or local government, that institution becomes the gatekeeper determining individuals' rights over the resource. Effective voice in those organizations becomes essential to exercising any decisionmaking rights over the resource. This situation can be especially problematic for women when formal rules limit membership to the "head of household" or when social norms make it unacceptable for women to speak up in public. Because strengthening control rights of some means restricting the use rights of others, those who are not members of the group in question may have less access to the resource.

Thus, while effective transfers of rights and responsibilities from centralized government agencies to local organizations can lead to more sustainable resource management, authorities must give due attention to the equity outcomes, especially noting who loses access to resources.

IMPLICATIONS

Although property rights have a powerful influence on human welfare and natural resource management, this key institution is complex. Property rights do change over time, but legislative reform alone is unlikely to change the manifestation of property rights on the ground. Rather, change occurs through the social and power relations and negotiations between different groups, which may appeal to a variety of legal bases for claiming property rights. Instead of looking for simple "solutions" to property rights issues, it is more useful to try to understand the complexity. This approach involves looking at the claims and the bases of the claims made by individuals, groups, or government entities to different bundles of rights over the resource and at the different types of law that pertain to the use or management of the resource. Security of tenure is important, but so is flexibility to respond to changing conditions that affect resource use and property rights. ■

For further reading see R. Meinzen-Dick and R. Pradhan, "Legal Pluralism and Dynamic Property Rights," CAPRi Working Paper 22 (Washington, DC: IFPRI, 2002), http://www.capri.cgiar.org/pdf/capriwp22.pdf; J. Spiertz and M. G. Wiber, eds., *The Role of Law in Natural Resource Management* (The Hague, the Netherlands: VUGA, 1996); B. R. Bruns and R. S. Meinzen-Dick, eds., *Negotiating Water Rights* (New Delhi and London: Vistaar Publications and Intermediate Technology Development Group Publishing, 2000).

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Collective Action and Property Rights for Sustainable Development

Local-Level Public Goods and Collective Action

Nancy McCarthy

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 4 of 16 • February 2004

In communities throughout the world people work together to provide goods and services that their governments do not provide. They build and maintain local parks, feeder roads, religious buildings, and community halls; they operate volunteer fire control groups and establish rules for local natural resource management. Sometimes local groups share responsibilities for maintaining public services, such as schools and health clinics, with their local or central governments.

Not all communities, however, provide the optimal level of local public goods. Evidence shows that not only are some public goods provided more often than others, but also that some communities mobilize themselves more easily to provide them. Given the vital importance of public goods in providing basic services necessary for alleviating poverty and in managing the local natural resource base for sustainable development, this brief offers an approach to understanding the problems communities face in providing different kinds of public goods.

WHY ARE SOME PUBLIC GOODS "EASIER" TO PROVIDE THAN OTHERS?

Even within the same community, people cooperate to provide certain public goods but not others. It is possible to explore this variability by asking, How do one individual's benefits change depending on how many other people actually contribute to a specific activity? Using game theory to examine an individual's incentives to contribute to a public good helps to highlight the exact nature of the interdependency among community members in terms of the decision to contribute or not.

This brief considers five potential incentive structures that are likely to be important empirically, although the actual number of possibilities is much greater. In the first case, every individual is better off contributing to the public good even if no others contribute. In this case, the role of the group might be only to share information and coordinate activities. Such an incentive structure might occur when there are large increasing returns to contributions in the provision of a public good. Certain pest control measures might have this structure; if each individual controls pests on his or her own farm, overall pest prevalence may drop to zero, so everyone realizes large benefits. Unfortunately, such a fortuitous incentive structure does not occur often.

In the second case, the individual may be better off contributing to the public good if no one else does, but when others contribute the individual would prefer to "free ride," or contribute nothing. This case is often referred to as a "chicken game." As in the first case, the primary role of the group is to coordinate actions among members. Coordination is particularly important if the good must be repeatedly provided and members can take turns in providing the good. Herd mobility is such an example: each herder would prefer to stay at home and avoid the costs of mobility but would rather move if others remain at home. Coordinating herd movements can lead to a socially optimal pattern of herd mobility.

In a third incentive structure, the individual might prefer to contribute to the public good if all others do but would not if no one else does—an example of an "assurance game." In this case, the role of the group is to assure each member that others will not free ride. Given the incentive structure, this case is likely to be more costly to manage than simply coordinating movements as required under a "chicken game" structure. Investments in community infrastructure sometimes have this structure, particularly when investments are discrete decisions, such as construction of a building or bridge.

In the fourth example the individual may prefer not to contribute if no one else does and also prefer to free ride if everyone else contributes—even though all members would be better off if each one contributed his or her own share. In this case, the incentive structure resembles a "prisoner's dilemma." This situation is likely to occur when returns to contributions increase but at a decreasing rate: for example, certain soil erosion control measures. Such an incentive structure may also result when returns are highly variable, as they are, for example, for investments in agroforestry techniques in regions with high climatic variability. Managing this type of incentive structure is likely to be the most costly.

Finally, it may be the case that it would be best, under existing conditions, not to provide the public good at all. In other words, social returns to a certain public good may simply be too low for it to be in the interest of the community members to provide that good.

Several key factors determining externalities and incentive structures include technological characteristics (such as the returns to scale or if the good is discrete), costs of inputs, the extent to which private goods can substitute for public goods, and the uncertainty or variability in returns from the public good. The provision of certain public goods may also affect the returns to other public goods. For instance, returns to investments in soil erosion control measures undertaken on common pastures may depend on collective action in managing use rates of those pastures. Returns to improving roads and bridges may be higher where successful pest control leads to higher marketable crop surpluses.

Finally, actions in one community may affect returns to activities elsewhere, such that groups operating across communities may be far more successful than more localized ones. Pests, fires, and water easily cross community lines and therefore require many communities to cooperate. Of course, externalities that affect large segments of the population are precisely those that give rise to government involvement. Real and effective partnerships between government agencies and

community groups can manage these externalities more successfully.

WHY ARE SOME COMMUNITIES MORE SUCCESSFUL THAN OTHERS IN PROVIDING PUBLIC GOODS?

Although the incentive structure determines in part how difficult it will be to undertake any particular collective activity, there are also characteristics of the group that determine the cost of doing so.

Any factors that enhance a group's ability to identify common goals, work together, and negotiate in good faith will enhance cooperative capacity and thus reduce the costs of undertaking collective action. Trust among members was one of the first factors to be identified. A history of successful collective action also improves chances of continuing success in an expanded set of activities, creating a virtuous circle. Social, economic, and cultural heterogeneity have long been thought to reduce cooperative capacity because such diversity makes it difficult to find mutually beneficial arrangements. Sociocultural diversity may also improve cooperative capacity, however, by widening the possible set of cooperative arrangements and avoiding institutional inertia. Recognition and support from external agencies, such as government, enhances the authority of the group to engage in collective action. More participatory forums for setting the collective action agenda and implementing activities, transparency and accountability mechanisms, and credible and fair conflict resolution mechanisms all contribute to successes in collective action.

Other factors may affect both cooperative capacity and individual incentives. For instance, increases in group size may increase individual incentives to free ride. On the other hand, having more members can initially defray the costs per member. As membership continues to increase, cooperation becomes more costly owing to higher negotiation, monitoring, and enforcement costs. Unequal distribution of wealth and opportunities to work outside of the community also affect cooperative capacity and incentives.

IMPLICATIONS FOR POLICYMAKERS

Where externalities are relatively localized, community members may be better able to provide public goods because they are more knowledgeable about local conditions than are outsiders. As policymakers determine how best to aid communities in their quest to provide public goods, it is important that they carefully consider both individual incentives to provide particular public goods and the factors affecting communities' capacity to cooperate. For instance, improving a community's capacity to cooperate will have spillover benefits for all public goods provision and so might form part of a national strategy to improve collective action. In highly heterogeneous communities, however, a focus on conflict management and resolution mechanisms may be the most useful intervention. Elsewhere, it may be more relevant to disseminate information on organizational tools.

Where policymakers are making decisions on devolving responsibility for specific public goods to the community, they must undertake a realistic assessment of individual incentives to engage in collective action. This means assessing the underlying technological characteristics, gauging the uncertainty, or the variability, of the benefits to be realized, and determining the extent to which other public (or even private) goods and services affect the potential returns from the particular activity. The costs of making, monitoring, and enforcing agreements vary according to the underlying incentive structure and are highest in the "prisoner's dilemma." The appropriate organizational structure, procedural rules for making and enforcing agreements, and determination of fines or rewards will also differ depending on the incentive structure, and projects and policies must take this into account.

Finally, there are certain situations where institutions above the local level need to operate. Under these conditions, local groups and local and national government agencies need to coordinate and cooperate through "co-management," or nested arrangements. The burden should not fall on communities alone.

The importance of determining the relative costs and benefits of promoting community-based collective action before wide-scale policies and programs are implemented cannot be overemphasized, particularly in the context of government-led devolution and decentralization policies. Without a clear understanding of costs and benefits, project managers and government agencies may well impose upon the community the responsibility for providing a public good or service for which social costs well outweigh the benefits. Worse still, failure in collective action now will have a negative impact on the capacity of the community to engage in successful collective action in the future. ■

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Collective Action and Property Rights for Sustainable Development

Property Rights, Collective Action, and Agroforestry

Frank Place, Keijiro Otsuka, and Sara Scherr

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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Agroforestry is about integrated agricultural systems in which trees play a prominent role. Agroforestry can provide a variety of functions or benefits for farmers and communities. The most easily identifiable are the tree products consumed by humans: fuelwood, timber, poles, fruits, medicines, and resins. A second group of benefits consists of the services provided by trees to other agricultural activities of the farmer: fodder, green manure, shade, soil conservation, and stakes. A third group includes the communitywide or even global benefits from agroforestry systems: biodiversity, watershed protection, carbon sequestration, and microclimate regulation. In this brief, we explore the role that social institutions—specifically property rights and collective action—may play in the development of agroforestry.

Different agroforestry systems require different periods of time to develop and manage. Depending upon what benefits are sought, farmers will adopt varying degrees of joint action or coordination within the landscape. Over longer time periods, property rights increase in importance; over larger areas, collective action becomes more important. The figure shows how different types of agroforestry outputs or activities will demand different levels of property rights or collective action.

Relative Importance of Property Rights and Collective Action in Agroforestry

PROPERTY RIGHTS AND AGROFORESTRY

To justify investing in trees, a household or group must have reasonable assurance of receiving the benefits from their investments. Investors must have confidence that tenure will be secure in the future. In much of the world, the rights to plant, harvest, and benefit from trees are linked to underlying land rights. In places where individuals or households have acquired land on a permanent basis, through purchase or inheritance for example, they almost always have rights to plant and harvest trees.

Complications arise when government regulations protect a particular tree, when a tree is naturally growing and perhaps predates a household's occupation of the land, or when there are overlapping rights (for example, between two families). In these cases rights to the trees may be contested. In the mailo tenure system in Uganda, both owners and long-term tenants claim strong rights to land. Customary or formal legal rules may grant certain tree rights to non-landowners. The poor may be granted collection rights to fallen tree fruits or dead branches for fuelwood, or pastoralists may be given access to tree fodder in the dry season.

There are also situations where rights and incentives to plant trees are weak. This is the case with land acquired on a temporary basis, for example, through sharecropping arrangements. Land rights may not be conducive to tree planting when the state is the de jure owner of all land. In some cases rights to land are conditional on certain behavior. In matrilocal societies such as in southern Malawi, husbands' rights to land are conditional on their continued marriage to the wife, and in patrilocal societies women do much of the agricultural work but lose their rights if the marriage ends. In parts of Africa, women may lack individual rights to plant trees that produce direct consumer products, although they may be allowed to plant trees for other purposes. Local custom or law often defines specific types of rights, such as the rights of neighbors to harvest products from farm boundary plantings or to plant trees that will block the sunlight to a neighbor's house.

The importance of tree tenure must also be considered at a landscape level. Where farmers have unfettered access to trees in woodlands or forests, their incentives to plant trees on their own land are reduced, even if their rights to plant are unquestioned. By the same token, if farmers lose access rights to communal land, such as when land is designated a restricted conservation area, incentives to plant trees in household plots might increase. In strong communal land tenure systems, communities may be encouraged to establish agroforestry systems that provide communal benefits, such as riverine vegetation or common dry season tree fodder reserves.

In customary tenure systems, individual rights to land are granted to those who invest in the land. In the past the major

investment required to open up new land consisted of clearing trees, and so deforestation became associated with increased individual tenure security. Today, with virgin land all but disappearing, new types of investments are more commonly made to secure tenure on customary lands. Tree planting happens to be one of the easiest and most durable investments people can make to prevent the emergence of claims to the land from other family members, villagers, or authorities. In situations where tree planting can enhance tenure security, it is not necessarily the initial level of tenure security that determines the extent of tree planting, but the expected tenure security at the time the benefits accrue. As a result, one may well observe significant tree planting in areas where tenure security is perceived to be relatively low. This tendency also applies to the state. Establishing plantations on customary land can be a way for the state to reassert its rights over customary legal systems. This larger goal of expanding control explains why local communities in various parts of Southeast Asia have burned or encroached on state-run eucalyptus plantations.

COLLECTIVE ACTION AND AGROFORESTRY

Most agroforestry systems can be established on individual plots and managed without explicit collective action. But collective action can increase the effectiveness of agroforestry, either by reducing risks or costs or by enabling positive externalities to occur. Examples include collecting and mixing tree seeds to prevent genetic deterioration, managing group nurseries to take advantage of scarce water sources, establishing grazing rules to prevent browsing of seedlings, and collectively guarding valuable tree stands to reduce protection costs.

For agroforestry systems intended to produce community-wide agricultural or environmental benefits, other types of collective action are essential for establishment and management. Examples include the coordinated planting of trees to reduce soil erosion in a watershed or to establish a communitywide windbreak (such as was done to protect dairy calves and coffee trees in Costa Rica) and the joint fencing of lands to restore natural woody vegetation for biodiversity and water management (as has been done by large farms in Australia). These examples of collective action for agroforestry are seen throughout the world.

Although nongovernmental organizations (NGOs) or external projects often attempt to create new local organizations to carry out such activities, mobilizing existing local groups can be more effective over the long term. Even if the work is new to these existing groups, they can be successful because social capital (trust and mutual obligations) and organizational systems are already established.

RELEVANT LESSONS FOR AGROFORESTRY

As shown in the figure, the importance of property rights or collective action arrangements for management incentives will depend on the particular agroforestry-related task, product, or service being evaluated. Consider the difference between timber and nontimber forest products. In the case of a timber plantation (lower right portion of the figure), incentives to invest and manage determine the level of benefits received. Since it is relatively simple to detect harvesting activities and the size of timber area is often limited, it is easy to protect the trees. In such a case, a clear private property rights system leads to an efficient management outcome. In the case of woodlands (upper left portion of the figure), the protection of nontimber products is costly but tree management is not very important because of relatively low returns to improved management for these lower-value products. In this case, collective protection under a common property regime system often works best. Finally, effective property rights or collective action arrangements need not be formalized. In many examples throughout the world, indigenous systems provide appropriate incentives for the development of agroforestry systems.

Social institutions for property rights and collective action clearly shape agroforestry investments. Agroforestry development initiatives must consider these institutions as they work with local people to identify suitable tree species, agroforestry systems, planting sites, and management systems. In the short term, there may be limited scope to modify these institutions but considerable room to work creatively within them. Over the medium to long term, the development of property rights and organizations for collective action will be critical to improved land management, including agroforestry.

In the future, property rights and collective action will play increasingly pivotal roles in defining rights and responsibilities over the externalities of tree management practices. As stakeholders recognize the need for effective management of, for example, the erosion resulting from tree felling or rights to carbon sequestration from tree planting, they will increasingly value and depend on the institutions that protect their property rights. ■

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Collective Action and Property Rights for Sustainable Development

Irrigation, Collective Action, and Property Rights

Douglas L. Vermillion

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 6 of 16 • February 2004

Approximately 40 percent of the world's food and 60 percent of its grain is produced under irrigation. Between 1900 and 1950 the total area under irrigation worldwide nearly doubled, rising from about 48 million to 94 million hectares, and by 2000 it had more than doubled again, reaching 240 million hectares. This dramatic expansion in irrigated area has produced an enormous and expensive infrastructure. Governments already straining under fiscal deficits often find themselves unable to meet the costs of adequately operating, maintaining, rehabilitating, and upgrading these systems without enlisting user participation.

SHIFT IN ROLES BETWEEN GOVERNMENTS AND WATER USERS

Governments are now shifting their role from direct management of irrigation systems to regulation of the water sector, provision of support services to water user associations, and capacity building among water user associations and irrigation service providers. During the past two decades more than 40 developing countries in Africa, Asia, Latin America, and the Middle East have adopted programs to transfer the management of irrigation systems from government agencies to water user associations. Sometimes irrigation management transfer programs have focused on organizing water user associations and assigning responsibilities to them but have not transferred appropriate property rights and authority nor provided strategic planning to change the roles and modalities of government. There have not been adequate incentives and accountability mechanisms for all parties concerned.

STATE- AND FARMER-SPONSORED INVESTMENT

Water users are not normally active contributors to state-sponsored irrigation projects. These users usually have no sense of ownership of or responsibility for irrigation systems that are built, repaired, and staffed by governments. Since water user associations are not generally formed before construction, farmers do not participate in decisionmaking and their water rights within the irrigation system are not clearly defined. For these reasons, and because the water service is so often poorly defined and provided, farmers are unwilling to pay irrigation service fees. When governments are unable to mobilize adequate resources to finance irrigation, the condition of infrastructure and the quality of water services decline further.

By contrast, traditional irrigation systems have been developed and managed by local farmer groups in many parts of the world. In many cases such systems have been operated, maintained, and improved by local people for decades and even centuries. Research shows that a fundamental reason for their long-term viability is that they are founded on locally derived principles of water and land rights, rules, and obligations. Water rights are often embedded in the infrastructure itself. For example, many systems use proportioning weirs—structures that divide shares of water to fields on the basis of proportional rights to water allocated by the local community. Those shares, or water rights, are often based on farmers' previous investments in collectively developing or maintaining the system. Obligations of water users are linked to property rights through community-based rules that are in turn backed by the social force of the community.

Such traditions sometimes break down in the face of state-sponsored development. In South Sumatra, Indonesia, for example, the government, with no participation from the local community, installed a water division box on a site where farmers had previously used a traditional water-proportioning weir. After construction of the new division box, the farmers promptly reinstalled their proportioning weir just below it. This case illustrates the importance of designing property rights, local institutions, and infrastructure in an integrated way.

The limitations of state-sponsored irrigation are now widely recognized. For irrigation systems to be productive and sustainable, water users must play a larger role in their governance, financing, and management. To motivate water users to act collectively in support of the system, decisionmakers must adopt democratic processes with appropriate incentives and accountability arrangements.

PROPERTY RIGHTS FOR WATER USERS

The most important incentives for gaining the support of water user associations are clear and recognized rights over water, land, and infrastructure. The most important of these rights include the following:

- the right to use, both on individual farms and for the irrigation system as a whole, a certain amount or share of water of an acceptable quality;
- the right to cultivate land and choose what crops to plant, with collective protection against conversion of irrigated land to other uses;
- the right to use, repair, and improve irrigation infrastructure;
- the right to determine what irrigation services will be provided and by whom;
- the right to adopt rules, irrigation service plans, and budgets;
- the right to establish, collect, and use an irrigation service fee (without having to transmit the funds to the government);
- the right to assign penalties, settle disputes, and obtain legal support;

- the right to give consent to or refuse external assistance; and
- the right to maintain representation in a higher-level public council at the river basin or district level.

Agriculture and economic policies can have a profound effect on farmer incentives to invest in irrigation. In many countries, inexpensive imports, low crop prices, and high input prices result in low or nil profit margins for irrigated agriculture. This constrains the ability of water user associations to pay more for irrigation services. In some countries it may be necessary to increase the price of food crops to reflect real production costs or otherwise earmark consumption taxes to finance part of the cost of irrigation.

SUSTAINABLE MANAGEMENT OF IRRIGATION SYSTEMS

Since irrigation systems are integrated hydraulic networks, their management should also be integrated. For medium and large-scale irrigation systems, the principle of federating local water user associations up to higher levels of the system has been adopted in several states of India and in China, Indonesia, and Mexico.

For sustainable management of groundwater irrigation, the aquifer is the unit that should be managed in an integrated way. Some pilot areas, especially in South Asia, are beginning to adopt this principle. Local associations of groundwater users regulate small aquifers or incorporate groundwater management into conjunctive management of canal irrigation systems with irrigation departments. Establishing effective property rights over groundwater can be difficult because it is often hard to measure the stock of the resource, its boundaries, and the movement of the aquifer, or the amount of water extracted.

CONCLUSION

Increasingly, governments are realizing that motivating water users to take over responsibility for financing and managing irrigation systems requires transferring the authority to govern irrigation systems to water users as well. Governments should reorient how they relate to water user associations so that a new partnership is created to (1) empower water user associations with property rights and governing authority, (2) ensure that governments provide support services and regulate the sector at the macro level, and (3) establish cost sharing for irrigation investment. Irrigation management transfer becomes part of a more comprehensive, participatory, and strategic reform process for the irrigation sector.

International experience suggests that successful irrigation sector reform programs establish both a policy working group and a national secretariat that help to guide and coordinate the planning and implementation of the reform process. The process should include:

- strategic, participatory planning,
- research and stakeholder consultations,
- mobilization of political support,
- design and adoption of an appropriate policy, legal, institutional, and regulatory framework,
- strategy to coordinate lending and technical assistance,
- public awareness campaigns, and
- monitoring, evaluations, and course corrections.

It is ironic that the huge investments in constructing irrigation systems have not been followed with commensurate investments in sustainable management of these systems. In order to meet the growing demand for food in the future under conditions of increasing competition for water, it is vital that farmers become more active participants in governing and managing irrigation systems. ■

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Collective Action and Property Rights for Sustainable Development

Collective Action and Property Rights in Fisheries Management

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2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 7 of 16 • February 2004

Until the late 1960s, villagers on the island of San Salvador in the Philippines enjoyed open and unrestricted access to an abundance of coastal resources. In the early 1970s an influx of migrants, combined with the integration of the village economy into the international market for aquarium fish and a shift to destructive fishing operations, ruined the local fishing grounds, and conflicts erupted. Government claims of full control over the use and protection of marine and coastal resources did not stop the depletion or degradation of the resource.

The developing world presents many similar examples where central government management of fisheries resources is unable to either reduce overfishing or counteract destructive fishing methods. The state often lacks the capacity to enforce property rights and regulations on resource use.

Fisheries are complex and interdependent ecological and social systems that require integrated management approaches. The actions of one person or group of users affect the availability of the resource for others. Managing such common pool resources requires conscious efforts by a broad range of stakeholders to organize and craft rules enabling equitable and sustainable use of the resources for everyone's benefit. Collective action is often a prerequisite for the development of community-based institutions and the devolution of authority that is required from central to local authorities.

COLLECTIVE ACTION IN FISHERIES

There is extensive evidence that communities can improve the conditions of the shared resources on which they depend. Over the past decade, the community of San Salvador has organized and established, with the help of government intervention, a marine sanctuary and reserve. An arrangement for community-based management of coastal resources fostered collective action by forming and strengthening local organizations. These organizations became responsible for marine resource management and income-generating projects, and they reduced overfishing and other destructive practices. A local ordinance banned fishing within the sanctuary and allowed only nondestructive fishing methods in the marine reserve. The local municipal council passed an ordinance providing legal protection for the sanctuary. From 1988 to 1996, the average fish catch increased, and living coral cover and the number of coral species doubled.

But not all efforts to establish collective action in fisheries are successful. Research in Bangladesh suggests that the boundaries of the bodies of water, the scale of the resource, and the type of fishery all play a significant role in determining whether efforts to foster collective action succeed. Existing property rights also influenced the types of new institutions for collective action that could be established. One community in Bangladesh was unable to regulate access to the closed fishing grounds where leaseholders had historically controlled access to and stocking of carp, even after community-based fisheries management was introduced and individual leasing was discontinued. Only through successful collective action was it possible to protect group rights over individual ones.

PROPERTY RIGHTS ARRANGEMENTS

Private, state, or community control each has its own limitations in fisheries management. Private ownership often has prohibitively expensive enforcement costs and unequal distributional outcomes. Direct state control has high information costs and often lacks monitoring mechanisms, trained personnel, or financial resources. In some cases community control excludes the poorest people from access to a common property resource, increasing inequality. Combining state, private, and community control over fisheries in imaginative ways can offer more efficient, equitable, and sustainable management. This combination is often referred to as co-management.

Co-management in fisheries involves the active participation and cooperation of government, nongovernmental organizations (NGOs), organized fishers' groups, and other stakeholders in management decisions. It can help build cross-institutional collective action. It represents a more democratic governance system than state management because users are more involved in determining the rights over the fishery and in sharing decision-making authority. It improves management efficacy by drawing on local knowledge and securing higher compliance with rules.

AN EXAMPLE OF SUCCESSFUL CO-MANAGEMENT

Fisheries management involves multiple natural and human settings. San Miguel Bay in the Philippines is a multispecies, multigear bay surrounded by 3 cities and 74 coastal villages whose major livelihood is fishing. Since the 1980s conventional fisheries management problems—overfishing, distributional inequity, and limited economic opportunities—and negative impacts from various coastal and land-based sectors have been evident.

Here in the 1990s the WorldFish Center conducted an issue-based, multisectoral, and multidisciplinary analysis (including ecological, economic, social, political, and administrative perspectives) that led to the production of a coastal environmental profile, a technical report detailing the status of fisheries, and an integrated fisheries management plan. The management plan included financing and monitoring schemes, participatory implementation plans involving diverse organizations and institutional levels, and the establishment of the San Miguel Bay Fisheries Management Council, composed of provincial and municipal government representatives, NGOs, academic institutions, and various local organizations.

San Miguel's experience highlights (1) the critical role of an appropriate human perception of the situation; (2) the importance of collective action and stakeholder participation at key stages of research, planning, and implementation; (3) the useful-

ness of structured decision methods for research, planning, and associated debates; and (4) the efficacy of research combined with planning efforts to ensure its utilization and relevance on the one hand and to provide a scientific basis for management planning on the other.

EMPOWERING COMMUNITIES

Unfortunately, governments rarely undertake co-management as a means of empowering fishing communities and increasing democracy. Instead, governments often consider co-management an instrument to achieve their objectives more efficiently by involving fishing communities in the implementation process. Part of the problem is that the organizational structures of government departments have not adapted to the new co-management concept. Most fisheries departments are still staffed with natural scientists and are almost exclusively focused on resource conservation rather than on fishing communities' livelihoods.

Collective action can help to empower poor communities, as the example of San Salvador Island shows. But effective co-management requires government to devolve real and substantial rights and responsibilities to representatives of fishing industry organizations or groups of harvesters to achieve sustainable resource management. Moreover, devolution of rights is generally not successful without collective action.

For collective action to succeed, governments and fishers should meet to discuss problems and their possible solutions and to develop arrangements for management. Fishers should be asked to express their concerns and ideas and be given an opportunity to develop their own organizations, networks, and coalitions. The government's role is to provide legitimacy and accountability for local organizations and help develop collective action institutions such as community-based and co-management organizations. Successful long-standing arrangements for marine fishery co-management, such as in Japan and Norway, all have a legal foundation.

Where authorities do not devolve some of their powers, governments can abuse co-management arrangements to extend control where it was previously absent. Government agencies need to supplement department staffing with new professional skills and develop capacity to deal with co-management processes in several communities simultaneously. Such changes may require reorienting mindsets both in government organizations and in communities.

THE CHALLENGES AHEAD

Despite progress in achieving collective action and co-management for fisheries, a number of challenges remain:

• *Developing co-management institutions on a larger scale*

Many of the problems and issues facing fisheries can be solved only on provincial, national, or even international levels. Fishery resources are generally too large to be entirely within the control of a few communities. In these cases it is imperative to provide for representation of fishery groups at different levels.

• *Reconciling local and global agendas*

Often international agreements on fisheries and local environmental management contradict each other. The government needs to meet its double obligation of attending to international agreements while sharing decisionmaking power for fisheries management with communities.

• *Identifying a management knowledge base acceptable to stakeholders*

To maintain scientific validity and achieve wide acceptance, co-management systems need to reconcile both formal scientific knowledge and fishers' knowledge. One approach may be to identify science-based indicators of the status of the resource system that also reflect fishers' observations.

• *Developing approaches to manage conflicts*

Management arrangements may require access rights to be limited to some resource users and to exclude others, often resulting in conflicts. Participatory approaches for managing such conflicts are crucial for successful co-management.

• *Reforming existing institutions to empower local communities to participate in determining management objectives*

This step may require substantial changes in governmental fisheries management agencies and in stakeholders' perceptions of their respective roles.

These issues must be addressed in practical experiments with collective action and co-management. The results need to be documented and the experiences communicated to others who may be in the process of establishing or developing collective action capacity among fishers. ■

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Collective Action and Property Rights for Sustainable Development

Collaborative Management of Forests

Eva Wollenberg, Bruce Campbell, Sheona Shackleton, David Edmunds, and Patricia Shanley

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 8 of 16 • February 2004

Governments around the world increasingly seek to manage their forests with the collaboration of the people living nearby. Ministries of forestry or their equivalents usually do this by offering local people access to selected forest products or forest land, income from forest resources, or opportunities for communicating with government forestry officials. In return, the agency obliges local people to cooperate in managing the forests around them by protecting existing forest or by planting trees. Governments claim that the programs devolve control over forests to local people and provide more secure livelihoods, as well as help maintain and regenerate forests. By sharing rights among local groups and the state, the programs also help to reconcile the resource claims of local people with those of the national government. Everybody supposedly wins.

Millions of the rural poor now participate in collaborative forest management schemes under a variety of tenurial and organizational arrangements. We examine those arrangements and ask whether local people have indeed gained more access to benefits from and control over forests. Our findings suggest that most co-management projects actually maintain and even extend central government control. Where communities had already managed forests in Orissa and Uttarakhand in India, the government required that they share their incomes with the state forest department. Governments in many countries typically predetermine which species can be planted in reforestation or agroforestry schemes and what types of organizations can be given rights to manage forests. Whereas local people have gained greater legal access to forests and some might have increased their incomes, many have also lost out. For example, game areas and plantations have been frequently established on land used by poorer members of communities for grazing or cultivation. Local people have also not shown a consistent interest in forest management.

THE COLLABORATIVE MANAGEMENT MODEL

Collaborative management or "co-management" forest programs have had a huge impact. In India, more than 63,000 groups have enrolled in joint forest management programs to regenerate 14 million hectares. In Nepal, 9,000 forest user groups are trying to regenerate 700,000 hectares of forest. In Brazil, farmers help to manage 2.2 million hectares as extractive reserves. Half the districts in Zimbabwe participate in CAMPFIRE schemes, in which local communities can share revenues gained from tourist use of wildlife areas. These programs have generally helped to protect forests and improve access rights of the rural poor to forest resources but have often fallen short of their potential to significantly improve the livelihoods of the poor.

Collective action has been a key feature of organizational arrangements for co-management. These arrangements have included (1) corporate, legal organizations of rights holders such as rubber tappers' organizations in Brazil, ejidos in Mexico, or trusts in Botswana; (2) village committees facilitated by government departments such as Forest Protection Committees in India; (3) local government organizations such as Rural District Councils in Zimbabwe; and (4) multi-stakeholder district structures aligned to line departments such as the Wildlife Management Authorities in Zambia. Collective action assists in co-management by reducing the number of people that forest agencies must deal with and by bringing together different groups to play complementary roles in forest management. Even when governments contract directly with households or individuals, community organizations usually help with the programs, as in the case of Integrated Social Forestry in the Philippines.

STATE CONTROL

The organizational arrangements for co-management strongly influence how much government agencies can control forest management and outcomes for local people. Forestry agencies exert more control over decisions about species selection, harvesting practices, sales, consumption, and the distribution of benefits where they have devolved management to local governments or larger-scale organizations. In such cases, the agency's interests in timber production, revenue generation, and environmental conservation have often overridden villagers' interests in livelihoods.

Forestry agencies exercise control over individuals and village groups as well by making local organizations accountable to the agencies rather than to local stakeholders. The agencies use standardized contractual agreements and regulations that limit local people's self-determination. Local people who organize collectively are better able to mobilize resources and negotiate for desired benefits. They are able to exert more influence when they have the direct support of nongovernmental organizations (NGOs), donors, federations, and other external actors. Collective action, both within communities and together with outside groups, thus helps local people become more influential stakeholders in co-management arrangements. Where local groups have managed their own forests without state intervention, however, they have not necessarily been better off. Without government support, they often have had difficulty implementing or enforcing their decisions.

ADDRESSING POVERTY

Collaborative management has improved formal access to forests for rural people. Harvesting forest resources helps them meet subsistence needs and offers a safety net in times of shortage. Yet local people's rights to valuable commercial products such as timber or game remain restricted. Where

forests yield financial benefits, governments often fail to deliver local people's promised share of incomes or deliver them primarily to local elites. For the poor to benefit substantially from forest access, they need more secure property rights over valuable resources. Only rarely have poor communities received substantial financial benefits, such as in Botswana where 45 families shared about US$125,000 annually from the Chobe Trust.

Focusing too narrowly on organizing collective action around managing a single resource such as a forest may divert potentially productive efforts. Converting forests to agriculture or other uses or initiating land reform may bring local people greater economic benefits in many areas. Forest co-management programs are not sufficient to address poverty.

ORGANIZING COLLECTIVE ACTION: CHALLENGES FOR THE FUTURE

Co-management has revealed the difficulty of dividing roles, rights, and responsibilities, especially where the groups involved have highly divergent interests. Forest agencies have had varying experiences in organizing collective action. Romantic ideals about harmonious communities and the local knowledge and capacities of "traditional peoples" have been counterbalanced by internal conflict and lack of leadership in many communities and the difficulty of organizing collective action where local social capital is weak. Increasing competition and fragmentation of forests have led to more de facto privatization of land, making it difficult for communities to organize together around a common resource. Many co-management efforts rely on outside agents to facilitate collective action, but sustaining that action has proved difficult. Other stakeholders, such as local governments or NGOs, often create their own sets of incentives or pressures for local people that work against co-management initiatives.

Forest co-management has created a useful institutional entry point. It now seems time to build more actively on the lessons learned. State officials and local people have had different expectations about the process and goals of co-management. Forest departments have controlled the terms of co-management and been reluctant to share their benefits. People in forest areas now must achieve the rights and power to bring about a fair division of control, responsibility, and benefits between themselves and the government.

Checks and balances need to be in place to ensure that local elites or other groups do not monopolize benefits and decisionmaking. The process should acknowledge the multiple interests among different groups and give special attention to the livelihood needs of the poor. Initiatives need to build better on existing management practices and enhance local livelihood options.

The current bureaucratic approaches to co-management do not address the complexity of these different needs. Frameworks for natural resource management that are developed locally by stakeholders and then linked to national objectives are more flexible and responsive to local interests. In the past it has been difficult for large centralized forest agencies to accommodate local interests, and local groups have had little voice in agency decisionmaking. This is changing as governments decentralize and as the role of NGOs increases. Choosing the right facilitators and settings for these negotiations is critical for ensuring that the interests of the poor are met. Experience suggests that local responsiveness will be higher when institutional arrangements facilitate good communication and learning among stakeholders. The learning process should include both local interest groups and national policymakers to reflect different interests. Where forestry incomes are limited and less attractive than incomes from other sustainable land uses and other activities, the rural poor should be encouraged to pursue economic options other than forestry to better meet their needs.

Triggered by past experiences and by the increasing complexity of demands from different interest groups, the co-management paradigm is shifting. Management increasingly involves not just a local group and the government, but a range of stakeholders, and acknowledges overlapping systems of management and diverse interests. The actors involved have recognized that more emphasis is needed on the institutional and political aspects of management design. Thus forest management efforts are focusing on negotiation and on frameworks that emphasize local people's right to self-determination and allow for effective representation of rural poor people in negotiations. The rural poor and their federations and advocates are bringing a new sophistication to negotiations and demanding that their voices be heard. ■

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Collective Action and Property Rights for Sustainable Development

Institutional Options for Managing Rangelands

Tidiane Ngaido and Nancy McCarthy

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 9 of 16 • February 2004

Garret Hardin's "tragedy of the commons" theory uses the example of rangelands to argue that when many people have access rights to the same resource, there is a potential for each individual to overuse and underinvest in the resource. This theory has prompted a debate over the effectiveness of common property resource management, especially for rangelands.

In reality, rangelands have been subject not just to the open access situation described by Hardin, but to a wide range of tenure arrangements, with different structures for regulating access to, use of, and management of rangelands. These include many customary and tribal institutional arrangements that have functioned for long periods. Each of these property rights regimes and institutional options is associated with different costs for achieving various goals, such as poverty reduction, equitable access to resources, and sustainable use and management of those resources. This brief considers the benefits and costs of alternative tenure and institutional arrangements and the impact of existing legal and policy frameworks on the sustainability and equity of pastoral production systems under three categories of landownership: (1) state ownership; (2) individual ownership; and (3) common property.

STATE OWNERSHIP

Proponents of state involvement maintain that only an external authority can enforce the best use of, and investment in, common pool natural resources. They argue that the state has greater financial resources with which to make large-scale investments and can bear the risk associated with such investments better than community members can. Defining the "best" use rates and investments, however, requires a good deal of information on local conditions. In most cases government agencies responsible for state rangelands have only limited knowledge of agroecological conditions, and even less understanding of local rules of use and management. These information problems increase the costs of enforcing management decisions by government agents. Furthermore, in the arid and semi-arid regions, flexibility and mobility are valuable strategies for managing spatial and temporal variation in climate. Centralized government decisionmaking and enforcement structures are likely to severely reduce this flexibility. Finally, collective action is likely to be lower under state tenure because pastoralists may fear that claims on returns to investments they make now on state land will not be recognized in the future.

Nonetheless, a number of different institutional arrangements have been introduced to manage some of these costs, including the granting of common use rights to communities or cooperatives, grazing licenses, and leaseholds.

COMMON USE RIGHTS FOR PASTORAL COMMUNITIES

Some governments provide tacit recognition of pastoral communities' use rights and their potential for informally operating grazing networks. This tacit recognition, however, gives pastoralists only a limited role in management and investment decisions and an even smaller role in deciding on the evolution of property rights. Often users do not have the right to reallocate common land to alternative activities like cropping or reserves, a situation that limits the capacity of pastoralists to respond to local conditions. By appropriating pastoral resources and limiting the role of local-level pastoral institutions, state ownership has often fostered land use conflicts and the breakdown of collective action within and across pastoral groups. In particular, where the state claimed ownership but expended limited resources to manage rangelands or relied on bureaucrats to implement management schemes without knowledge of local resources and institutions, many land use conflicts have arisen and resources have become degraded.

COMMON USE RIGHTS FOR PASTORAL ORGANIZATIONS

Numerous projects have attempted to reorganize pastoralists into cooperatives with the aim of improving rangeland resources and promoting collective action, but the cooperatives have rarely been effective managers of rangelands. In theory, the state and the local organizations could work together to create and enforce use rules and investment activities, but in practice the costs of negotiating such rules have often been prohibitive. In most West Asian countries pastoral cooperatives have mainly been involved in distributing subsidized feeds. In Jordan, however, the new herder-driven cooperatives, which have management rights granted by the state on their traditional pastures, are getting better range productivity results than state-managed reserves, without requiring expensive fencing and guarding. This type of cooperative fosters collective action between members because members are certain to reap the benefits of their investments and control access to improved pastures. There remain, however, concerns about potential conflicts between cooperative members and nonmembers. In the Sahel, most of the pastures exclusively used by members of pastoral organizations reverted to common pastures open to all community members at the end of the projects.

GRAZING LICENSES

As part of a strategy designed primarily to reverse rangeland degradation, government-managed grazing reserves grant grazing licenses. In the best-case scenario, the government has a well-defined and well-funded investment strategy. Grazing reserves

are then opened for grazing during specific periods of the year, and any herder can buy a license, whether or not he or she is a member of the tribe or community that held traditional claim to the reserve area. Pastoral communities contribute little to the management of these reserves, and the main collective action of community members has often been to hinder state licensing policies. In Jordan and Syria, this situation has often led to conflicts between local and nonlocal herd owners. The approach has also been widely criticized because of the high costs of fencing and guarding reserves and the lack of community participation in improving and managing these reserves.

INDIVIDUAL LEASEHOLDS

The practice of granting long-term individual leaseholds on range resources remains limited. In Botswana, leaseholds have in some cases led to increased livestock production and improved rangeland conditions, but the policy has been strongly criticized on equity grounds. In many cases, people with previous claims to resources have been dispossessed or denied further access without compensation. This situation has led to additional pressures on the now smaller common pool resource base, increasing range degradation and leading to conflicts between large and small herd owners. Widespread individual leaseholds increase the vulnerability of pastoral communities during droughts by limiting their capacity to move and negotiate access to neighboring pastures. There is very little collective action under this system.

In summary, state ownership often does not promote community stewardship and thus limits collective action and incentives for members to manage their resources effectively and make long-term investments. Competing claims between pastoral communities and states has created situations of confusion and open access, leading many pastoralists to challenge both state and traditional range management rules and activities and in some cases to illegally appropriate common rangelands.

INDIVIDUAL OWNERSHIP

In pastoral areas of central Tunisia, individual private property rights fostered the transformation of pastoral and nomadic systems into agropastoralist systems. Privatization led to the wide-scale adoption of fodder crop production, including cacti and shrubs. The efficiency of this option, however, depends on the performance of land, purchased input, credit and output markets, and legal and institutional provisions to reduce land fragmentation. Obviously, there is potential for misappropriation of land by the politically powerful, and equity issues are thus of utmost concern. Also, such a system is likely to reduce herd size, mobility, and collective action within and between pastoral groups, and consequently pastoralist households may become more vulnerable to drought.

COMMON PROPERTY

Common property rights for communities make tenure more secure, but the communities must bear all costs of making, monitoring, and enforcing rules regarding rangeland management. Managing access to and use of resources can be difficult, particularly when benefits and costs are not equally distributed among community members. Common property rights are generally granted to a fixed and well-defined group for rangelands with well-defined boundaries, thereby limiting flexibility and herd mobility.

Nonetheless, under community ownership, local institutions may keep their traditional roles of managing the resources, deciding how to allocate resources between pastures and croplands, and deciding on the nature of the rights to be allocated to members and nonmembers. These opportunities may empower local institutions and provide them with the capacity to mobilize collection action and sustain the livelihoods of their communities.

Because landowning communities may have difficulties mobilizing financial resources and technical expertise, they may enter contractual arrangements for improving their resources. Under such contracts, as in central Tunisia and Morocco, state institutions, generally forest services, are entrusted with the responsibility for improving and managing the resource. After the improvement of the resource, rights holders purchase grazing or cutting licenses, and the revenues generated from the licenses are used to pay off improvement costs. Theoretically, these ranges will revert to communities once improvement costs are recuperated; in practice, however, such transfers have often not taken place.

CONCLUSIONS

Achieving efficient, equitable, and sustainable rangeland management depends on the costs and benefits of alternative systems. These costs and benefits, in turn, depend on agroecological, sociocultural, and economic characteristics. The conservation and management of rangelands require not only tenure security, but also an understanding of local livestock production and risk management strategies and factors that promote collective action, which can then be integrated into national policy formulation strategies and project designs. ■

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Collective Action and Property Rights for Sustainable Development

Property Rights, Collective Action, and Plant Genetic Resources

Pablo Eyzaguirre, Nancy McCarthy, Monica Di Gregorio, and Evan Dennis

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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Genetic resources are the genetic material in plants and animals that determine useful traits that people can conserve, characterize, evaluate, and use to meet their needs. These resources are not simply the genes encoded in DNA, but particular expressions of the genes that farmers, scientists, and plant breeders have recognized and selected. Research has estimated that the value of increases in crop yields derived from new genes and genetic modification since 1945 has amounted to about US$115 billion a year worldwide.

Conservation of genetic resources contributes to plant genetic diversity, which includes both the combination of species that constitutes an ecosystem (genetic diversity across species), as well as the number of different varieties within a species. Development agencies, researchers, and policymakers are growing increasingly concerned about the consequences of the current erosion of genetic diversity. The 1997 FAO (Food and Agriculture Organization of the United Nations) synthesis of around 150 country reports states that nearly all countries report that crop genetic erosion is taking place and that it is a serious problem. Loss of biodiversity in cultivated and wild species can increase plants' vulnerability to insect pests and diseases, worsen nutrition through declines in the variety of foods available, reduce the capacity of plant resources to adapt to changing conditions, and lead to loss of local knowledge about diversity. These effects can in turn reduce food security, threaten the sustainability of agricultural production systems, and jeopardize the livelihoods of rural communities today and for generations to come.

Many factors affect the conservation of biodiversity, including demographic changes, technological developments, national agricultural policies, and economic, social, and cultural factors. Institutional aspects related to property rights and collective action play a key role in local plant genetic conservation outcomes.

PROPERTY RIGHTS TO LAND-BASED RESOURCES

Land and water are crucial "partner resources" needed for the conservation of genetic resources. In particular land tenure and water rights are likely to affect in situ conservation (that is, conservation in natural surroundings, where plants have developed their distinctive properties) for a variety of reasons:

- The type and strength of property rights arrangements affect farmers' time horizon and investment choices and, as a consequence, crop diversity.
- Stronger land use and management rights for farmers can increase their ability to grow a variety of crops. Where farmers' investments are crop specific, however, security of property rights might lead to less-diversified cropping patterns.
- Property rights, together with available genetic resources, affect people's capacity to manage variability and risk. Many traditional communities present "patchwork landscapes" with various ecological niches that favor the use of unique varieties and plant types adapted to those niches. High genetic diversity reduces risk, and access to a diverse pool of plant genetic resources improves the long-term resilience of the agricultural production system in the face of adverse shocks like drought.

Formal property rights ("laws on the books") often coexist with and differ from locally exercised property rights. The existence of different overlapping arrangements and regulatory frameworks (legal pluralism) must be taken into account in order to assess their effects on biodiversity conservation. For example, in Ethiopia sacred groves managed by the Christian Coptic churches not only provide landless people with access to nontimber forest products, but also assure protection to areas with some of the highest amounts of biodiversity in the country.

Different property rights regimes have different advantages and disadvantages for biodiversity conservation. For example, local forest and pasture resources held as common property enable farmers to avail themselves of a much wider range of resources than they could if all land were cultivated. In Kenya the plant *Amaranthus graecizans L.* is collected from the wild in communal areas along roadsides and rivers, but it is not cultivated in gardens. Common property rights provide landless poor with access and foster local conservation of this unique genetic resource. Often when access to communal areas is restricted, not only are livelihoods affected, but also species lose their value as the traditions associated with them disappear.

State imposition of new property rights regimes that fail to account for traditional rights can also affect the maintenance of local knowledge of specific varieties. For example, in 1975 a forest ecosystem in Uzbekistan was converted to a protected nature reserve. As a consequence the surrounding communities lost access rights to this land, which contains a wild plant species that had been used locally to cure heart ailments. Having lost access to this wild species, the local people over time lost the knowledge of the heart-improving properties of this plant, and with that, a low-cost health remedy.

THE ROLE OF COLLECTIVE ACTION

Whereas state provision can often sustain ex situ conservation (collection and storage of genetic resources to ensure availability in the future), in situ conservation requires coordination by farmers and other actors. Both formal and informal networks can work to increase access to diversity and availability of genetic variation, or they can work in conflicting ways, thus reducing diversity. In marginalized and remote areas where farmers' own seed systems continue to play a major

role in meeting farmers' heterogeneous needs for seed supply, collective action is especially important.

Germplasm information is composed of both scientific and local knowledge. Because the state is often ineffective at acquiring, documenting, and retaining local knowledge, collective action can provide the means to facilitate the maintenance of local knowledge. Farmers' organizations for seed management, local seed exchange networks, and seed fairs increase the information available about plant genetic resources, contribute to local capacity to conserve local crop varieties, and increase the possibilities for improving local varieties.

Finally, a group of farmers should be able to maintain more diversity with a higher chance of accessing new populations and a lower probability of loss of populations than any individual. Strengthening local capacity to undertake collective action may thus allow farmers and communities to maintain greater genetic resource diversity.

FARMERS' AND INDIGENOUS RIGHTS TO GENETIC RESOURCES

Local conservation efforts are also affected by international policies guiding the development of intellectual property rights for genetic resources. Intellectual property rights, like all other property rights, provide the rights to the stream of benefits (including income) from the resource in question. Article 8(j) of the Convention on Biological Diversity affirms the rights of local indigenous communities to access and benefit from local genetic resources. The recently signed International Treaty on Plant Genetic Resources for Food and Agriculture also affects local rights.

Tracing the contribution of conservation practices to germplasm development is difficult, a situation that complicates the assignment of intellectual property rights and affects the equity of outcomes:

- Who is eligible to claim rights over a specific type of seed?
- When can innovation in genetic resources be considered the product of an individual or a firm, and when is it a product of a collective effort by many individuals?
- If many individuals are involved, is it possible and effective to define and assign collective rights to plant genetic resources?

Although society has paid significant attention to the private actions and ownership (mainly by firms) that underpin genetic resource innovation using biotechnology, it has paid less attention to property rights of agrarian communities and cultures for whom genetic resources are essential livelihood assets.

In the case of biotechnology, genetic resource innovations are treated as individual property. On the other hand, farming communities use genetic resources to meet a variety of livelihood, environmental, and cultural needs, and innovations in genetic resources over time are often the product of long-term collective efforts, such that no single individual can claim to be owner or originator of the innovation process and the resulting genetic resources.

The rules assigning property rights over genetic resources to individuals or groups of users will affect people's livelihoods. One risk of failing to recognize local indigenous rights is that external actors might appropriate exclusive rights over genetic resources they did not, in fact, "innovate."

Given the neglect of property rights of agrarian communities and cultures, collective action can help empower farmers to demand that government bodies guarantee rights to local genetic diversity to farmers. The other side of the coin is that collective action can also be used to limit use of germplasm by others, thereby worsening access and benefits to society as a whole.

RISKS AND PROBLEMS OF EXCLUSIVE PROPERTY RIGHTS TO GENETIC RESOURCES

Even if local indigenous groups have legally recognized rights to genetic resources, privatization itself (or the assignment of exclusive rights) can lead to reduced availability of germplasm. In particular, assigning exclusive property rights to germplasm might reduce access to plant genetic material for everyone, and particularly for poorer farmers, given that often less-informed, less-educated, and marginalized rural populations are at a disadvantage in claiming ownership

Policymakers should be aware of the links between property rights, collective action, and local conservation of local plant genetic diversity. It is important to take into account local regulatory frameworks as well as the existence and overlap of multiple legal systems, try to build on these, and avoid policies that might in fact reduce access to genetic diversity for local populations, in order to avoid eroding genetic diversity and increasing the vulnerability of the poor. ■

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Collective Action and Property Rights for Sustainable Development

Collective Action in Pest Management

Helle Munk Ravnborg

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 11 of 16 • February 2004

Every year, crop and animal pests deprive farmers of significant parts of their production. Some estimates suggest that 10–40 percent of the world's gross agricultural production is destroyed by agricultural pests. These pests include a huge variety of different organisms—not only insects, mites, worms, rodents, and birds, but also, in a broader sense, all harmful organisms such as fungi, bacteria, viruses and virus-like organisms, and weeds. The variety of pests and their interactions with other ecosystem conditions make pest problems very diverse and often complex, so solutions to single pest problems must vary substantially. Some pests can be controlled by individual farmers; others are amenable to public programs like aerial spraying. Many pest management approaches, however, call for neighbors to work together.

In the 1970s and 1980s the rapid spread of the cassava mealy bug in Sub-Saharan Africa cut into cassava production and nearly created a major famine in many areas. Researchers from the Consultative Group on International Agricultural Research (CGIAR) succeeded in identifying and mass breeding a natural predator of the cassava mealy bug—a parasitic wasp from Paraguay—that was released by airplane over the entire cassava-growing belt. By the early 1990s the wasps had spread to a point where a state of ecological balance between the cassava mealy bug and its predator had been created throughout Sub-Saharan Africa. Neither extension, additional investment, or any other action by the farmers was needed. Once released from the airplane, the wasps reproduced and dispersed themselves. But in most cases, technical solutions to pest problems do not have wings of their own and are not implemented that easily. The remainder of this brief focuses on cases where technical solutions alone are not sufficient and the collaboration of farmers is crucial for successful pest management.

FARMER COLLABORATION FOR PEST MANAGEMENT

Leaf-cutting ants are a serious problem for farmers in many parts of Latin America. These ants are capable of destroying an entire cassava plot or one or more fruit trees overnight. There are simple technical options for controlling the ants, such as the regular pumping of insecticide into the anthill. Ants, however, do not respect farm boundaries. Farmers who control anthills on their own fields might still face damage to their crops caused by ants coming from neighboring fields where no control measures are taken.

Actions by individual farmers acting alone in cases like these can also raise new problems. The extensive use of pesticides on some farms may drive pests to fields of others or cause the pests to develop localized resistance to pesticides. Likewise, if farmers use pesticides that kill not only the pests but also their enemies, neighboring farmers who introduce or encourage the presence of predators may find that their predator populations never reach a viable size.

Often, the best results occur when the majority of farmers in an area adopt integrated pest management practices, such as combining occasional use of pesticides with crop rotation or intercropping of different crops or varieties. Convincing neighboring farmers to adopt such practices in a coordinated fashion is thus key to success. This need is especially great when the integrated approach involves allowing some crop losses to achieve greater overall profits, as well as to reduce environmental pollution and health hazards from heavy pesticide use.

In such cases, successful pest management has both a spatial and a temporal dimension. First, it depends upon being implemented in a coordinated fashion over a wide geographic area. Thus pest management is more effective if required institutions are in place to stimulate and facilitate coordinated or collective management efforts. Second, although in some cases a pest is controlled once and for all over a short time, in other cases pest management is a continuous effort that requires sustained collective action. This commitment in turn requires a certain degree of stability in the group undertaking the coordinated pest management. Under certain conditions secure property rights might contribute to ensure such stability, but they are no guarantee. Many other factors contribute to farmers' decisions about whether to continue farming in an area, such as the existence of alternative livelihood options in and outside the area, a sense of belonging to an area, and local cultural and social settings.

GAINING FARMERS' SUPPORT FOR COLLABORATION

Perhaps the biggest obstacle to coordinated pest management is the view of farmers as sovereign decisionmakers. In many places, farmers are reluctant to interfere with the farming practices of others because this action might be perceived as a reproach and thus endanger future relationships and perhaps block future favors. A key challenge therefore is to create institutions through which to encourage neighboring farmers to participate in coordinated pest management so that the individual farmer does not need to approach his or her neighbors.

It is essential that farmers jointly recognize the transboundary nature of pest management problems, because this recognition helps to legitimize the otherwise socially unacceptable interference with the farming practices of others. In the case of ant control in Colombia, a joint community map of the location of anthills and their potential radius of crop damage,

superimposed on a map of farm boundaries, provided an important illustration of the transboundary nature of the ant control problem. With the help of the map and the backing of external facilitators, farmers could calculate the average number of anthills affecting each plot and the number of anthills actually located on plots belonging to other farmers.

In many cases, external support is needed to help systematize the biophysical (such as ecological and entomological) observations and arguments upon which the need for coordinated pest management is based. Institutions such as farmer field schools or an agricultural extension service might be feasible options for providing this external support.

Another important element that helps persuade farmers to participate in coordinated pest management is the availability of low-cost, economically feasible technical options for control. Which options are considered low cost and economically feasible obviously depends upon the context—that is, the potential damage caused by the pest as well as the resources available to the individual farmer. Generally speaking, the more widespread and severe the damage caused by pest problems and the less demanding and costly the technical control option, the easier it will be to persuade farmers to participate in coordinated pest management.

Hence, in areas with no previous experience of coordinated pest management, it is wise to begin by embarking on pest management problems that

- are widespread (that is, they should affect the majority of farmers so that a large proportion of farmers will not decline to participate in the coordinated pest management effort);
- are amenable to low-cost management options so that the poorest farmers are not prevented from participating in the coordinated pest management effort; and
- can be dealt with effectively at a relatively limited spatial scale so that farmers do not become frustrated at having to coordinate their pest management efforts with distant and perhaps unknown farmers.

CONCLUSIONS

Because of the transboundary nature of many pest problems, technical solutions—whether based on the use of pesticides or on biological principles—are rarely sufficient. To be effective, such technical solutions need to be implemented in a coordinated fashion among farmers within a given area. Coordination, however, often represents a major challenge. Even within a limited geographical area it is likely that farmers are highly heterogeneous and that multifaceted and often unequal relationships exist among them.

Why is it advisable, in areas with no previous experience of coordinated pest management, to start by embarking on pest management problems that are widespread, have low-cost solutions, and are of limited spatial scale? First, meeting these requirements will increase the likelihood that a sufficient proportion of farmers within an area will be interested and able to participate in the coordinated pest management options. Second, under these conditions it is easier for farmers to mutually monitor compliance with agreed management practices. Wide and consistent compliance will, in turn, facilitate the gradual development of trust among neighboring farmers, which is so important when, as in integrated pest management, short-term individual gains must be balanced against longer-term collective interests.

The implications are that extension approaches such as farmer field schools should (1) promote an understanding of the spatial dimensions of pest ecology and (2) provide communication techniques that will enable groups of farmers to approach neighboring farmers to invite them to take part in coordinated pest management. ■

For further reading see R. Meinzen-Dick, A. Knox, F. Place, and B. Swallow, eds., *Innovation in Natural Resource Management: The Role of Property Rights and Collective Action in Developing Countries* (Baltimore: Johns Hopkins University Press, 2002), especially pp. 257–271, "Collective Action in Ant Control," by H. M. Ravnborg, A. M. de la Cruz, M. P. Guerrero, and O. Westermann; J. Pretty, *Regenerating Agriculture: Policies and Practice for Sustainability and Self-Reliance* (London: Earthscan, 1995).

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Collective Action and Property Rights for Sustainable Development

Property Rights and Collective Action in Watersheds

Brent Swallow, Nancy Johnson, Anna Knox, and Ruth Meinzen-Dick

2020 Vision for Food, Agriculture, and the Environment

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What's Special About Watersheds?

Watersheds define a terrain united by the flow of water, nutrients, pollutants, and sediment. Watersheds also link foresters, farmers, fishers, and urban dwellers in intricate social relationships. Both factors—the biophysical attributes and the policy and institutional environments—shape peoples' livelihoods and interactions within the watershed.

Watersheds are simultaneously managed at various social and spatial scales, from community-level catchments to transnational river systems and lake basins. The flow of water, soil, nutrients, and other materials across a landscape extends the consequences of decisions about resource use well beyond the individual land user or manager. These flows produce both positive and negative downstream outcomes (or externalities). Upstream pollution by agricultural chemicals can expose downstream users to economic and health costs. More positively, upstream soil erosion can transport fertile soil that can enrich downstream rice paddies or other fields. Because watersheds have such broad impacts at so many levels, they raise special issues for the management of resources through property rights and collective action.

Property Rights and Watersheds

Despite their complexity and diversity, all watersheds share two keystone resources: water and land. Property rights to these two resources are often interrelated, as when rights to agricultural land are accompanied by presumptive rights to its surface and groundwater. Often, however, water rights are more dynamic, flexible, and contested than land rights.

Whereas the supply of land is relatively fixed and certain, water supplies vary depending on rainfall, hydrologic conditions, and amounts extracted by other users. Economic and urban development increases demand for water for urban and industrial use as well as for agriculture. Water users with conditional, secondary, and insecure rights to water are most vulnerable to dispossession. Markets may increase the value of water and economic incentives for its efficient use, but the more water becomes a commodity, the greater the potential for dispossession of poor and vulnerable groups.

Property rights to land resources generally vary across the different types of land that make up watersheds. Insecure property rights to cropland can reduce incentives to invest in land improvements and conservation structures such as terraces or trees that could reduce soil erosion and sediment flows. Usually more important for watershed management outcomes are property rights to filters—small areas of land that help to check, divert, absorb, or stop an undesirable flow of soil, sediment, or pollutants within a watershed. Some types of filters, such as rice paddies and contour strips, are man-made and privately owned and managed, whereas others are naturally occurring and property can range from private to communal to public.

Rights to land, water, or other benefits need not be exclusive to be secure; they can be held in common or overlap with different resource users. Property rights to common or public lands such as wetlands, riverbanks, forests, footpaths, and grazing areas are sometimes insecure and contested. In these situations, community management, public regulation, or co-management by communities and local government agencies may be appropriate to enhance access and operation.

Insecurity or conflict over property rights may encourage extractive use of resources. Experiences from the Sumber Jaya catchment area of Indonesia illustrate the problems arising from ill-defined property rights. The management of upper watershed areas is still dominated by the state. The Forest Department manages 70 percent of the land where local people, classified as illegal squatters, live. Conflict over property rights generates uncertainty about reaping gains on investments in conserving resources and instead provides incentives for farmers to clear primary forest land and adopt farming practices that generate short-term rather than long-term returns.

Collective Action and Watershed Management

Effective watershed management requires various stakeholders to coordinate their use of and investments in these resources. Robust collective management depends on the level of existing community organization and social capital. Strong norms and social relations enable people to work together to achieve their goals. The size and social structure of communities sharing the watershed influence their ability to stimulate and sustain collective action. Smaller groups living closer together are often more unified than larger, dispersed ones in supporting effective collective action.

Achieving coordination often requires reconciling socially defined boundaries like villages with physically defined boundaries like catchments. Although there are technical reasons to use catchments as natural units when applying a watershed approach to natural resource management, organizing collective action along strict hydrological boundaries is difficult. Hydrological features of watersheds or subwatersheds rarely correspond to the village, the district, or other social or administrative unit. The best solution to this problem may be to work within social boundaries, applying a watershed approach. The "focal area approach" used in Kenya gives preference to social, rather than hydrological, boundaries, making it easier to stimulate collective action for managing the resources.

Furthermore, the scale at which the physical environment is optimally managed may not correspond to any one decision-making body in a community. In that case, collective action within existing institutions or through the creation of new institutions becomes critical for managing watershed resources. Decisionmaking does not have to be embedded in only one body at one level, but different management responsibilities can be devolved to different bodies. These options vary according to the size of the watershed, the populations occupying the watershed, and how the scale and interaction of resource flows affect people.

STAKEHOLDER PARTICIPATION IN WATERSHED MANAGEMENT

The extensive nature of resources and the interdependency of users within a watershed underscore the need for broad stakeholder participation in developing and implementing watershed management technologies and practices. When stakeholders do not have an opportunity to participate, the complexity of local realities and the promise of local solutions may be overlooked. Recent evidence suggests that participatory watershed development projects are more successful than externally managed, top-down, "one-size-fits-all" projects.

Achieving effective participation can be challenging because stakeholders often differ greatly in their social, economic, and political power and access. There is always the risk that more powerful stakeholders will negotiate solutions more beneficial to themselves. Downstream cropland owners may reap the benefits of improved water and reduced sediment flows, while less-favored groups, such as women and pastoralist households, find themselves restricted from grazing and collecting firewood in riverine areas. Including women and other less-favored groups in stakeholder consultations could lead researchers or policymakers to consider alternative land use and conservation strategies that would minimize negative impacts on them. Excluding them could undermine the effectiveness of policies if adversely affected groups fail to comply. Socially optimal resource management calls for collective action in negotiation, decisionmaking, management, and conflict resolution among all watershed stakeholders.

Effective democratic forums help provide poor and marginalized members of the community with a greater voice in these processes. Where such forums are weak, less enfranchised groups may need help in asserting their interests. New types of organizations that build on but do not duplicate existing ones and that incorporate more of the stakeholders with interests in watershed management have a key role to play in bridging gaps between local community organizations. External organizations can facilitate, support, and reduce the costs associated with these multi-stakeholder negotiation processes.

Stakeholders who participate in watershed management may also reap the rewards of enhanced human and social capital. By working closely with researchers, farmers can strengthen their technical knowledge about agriculture and natural resource management as well as their analytical capacities for evaluating different technologies. Working as a group, they can also improve their organizational capacity. As they gain the confidence to interact with researchers and extension agents, participating farmers become empowered to address their own problems by seeking out appropriate information or advice. Given the dynamic and long-term nature of watershed management, empowering local communities to take a leading role is essential.

Watershed systems are highly complex: resources frequently have many uses and users; resources and the institutions that manage them span multiple scales; and flows and movements of water, sediment, nutrients, and other substances such as pesticide and fertilizer chemicals cause the actions of a few to have far-reaching effects on many. Interdependencies and conflicts—latent or overt—are inherent in watershed management. If manipulated secretly, these interdependencies can cause suspicion, distrust, and possibly violence and retard economic progress. When addressed in an open, transparent, and dynamic manner, these interdependencies can be the foundation of political cooperation, economic development, and social cohesion. ■

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Collective Action and Property Rights for Sustainable Development

Property Rights, Collective Action, and Agribusiness

Nancy Johnson and Julio A. Berdegué

2020 Vision for Food, Agriculture, and the Environment

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Governments and research and development organizations are increasingly interested in understanding and promoting rural agroenterprises as a way to combat rural poverty. Attention to rural agroenterprises and processes of agroindustrialization in general are related to two fundamental global economic tendencies. First, increasing income levels and demographic changes such as increased female labor force participation have fueled demand for high-value and processed products. At the policy level, structural adjustment and liberalization policies have reduced barriers to trade globally and allowed markets to reach even the most isolated rural areas. Taken together, these trends are fueling a process of agroindustrialization that is transforming agriculture in the developing world. The changes are most visible in Asia and Latin America, but Africa is beginning to show similar effects.

Agroindustrialization brings major opportunities but also many challenges, especially to poor farmers and small agroenterprise entrepreneurs. Market forces cannot be denied, but governments and other organizations must be proactive to ensure that benefits are socially and economically positive and equitably distributed.

The agroindustrialization process has three main characteristics. First, there is the growth in off-farm agriculture-related activities, such as the supply of farm inputs or the processing, distribution, and sale of farm products. The suppliers, farmers, and distributors form supply or product chains. The second characteristic of agroindustrialization is an increased level of integration among actors in the supply chain, ranging from loose coordination to contracting and even subsidiary relationships. Finally, changes in products, technologies, and market structures accompany these shifts in number and integration of actors.

Implications of Market Orientation for Small-Scale Agricultural Producers

Market orientation means adjusting production processes and products to respond to *specific* consumer demands and market signals and trends. Although many small farmers in developing countries will continue to grow subsistence crops, increased production for the market is the trend in many countries. What small farmers grow and how they grow it are increasingly determined by what urban consumers want. Agroindustries are important economic actors that link producers with consumers.

Agroindustrialization processes are often accompanied and stimulated by liberalization of economic policy. This reality means that agroindustries—and the producers supplying them—must be competitive internationally to survive. To be competitive, agroindustries typically work only with those farmers who produce the best-quality products at the lowest possible cost. Often, the competitiveness of the agroindustry is strengthened through strict grades and standards, imposed on their farmer-suppliers through contracts. In negotiating and enforcing those contracts, power relationships between agroindustries and farmers—especially small and poor farmers—tend to be highly asymmetric, favoring industry.

Agroindustrialization processes are often accompanied by privatization of land and other natural resources. The rationale is to facilitate the development of markets that permit transfers of assets toward the highest-productivity uses. Typically this situation has meant a net transfer of productive assets from small farmers and poor rural communities to commercial growers and large-scale corporations, both domestic and multinational. Where customary rights and communal ownership were important, the shift to private property may disadvantage those whose access rights are not recognized under the new regime. To the extent that these people are more marginalized in a society, there is the risk of widening existing inequalities. Similar patterns can be observed with shifts away from traditional labor exchanges toward wage labor.

Where the costs of accessing markets are high due to poor infrastructure, inadequate technology, or information barriers, collective action can help small producers be more competitive. A study of Associative Peasant Businesses in Chile found that cooperation benefited producers in markets where transaction costs were high and where product differentiation was important. In traditional markets for undifferentiated crops, no benefits to association were found. Associations were also found to be good vehicles for introducing new managerial and farming practices that enhanced farm profitability. Only about a fifth of these small farmer associations achieved their objective of helping their members participate in new markets, despite extensive government support. The reasons for their many failures included, among others, their inability (1) to develop and enforce adequate systems of rules to direct relations among the members and between each of them and the organization; (2) to establish effective networks with public and market agents; and (3) to become competitive in the market in which they operate. Collective action is not a substitute for competitive behavior, but rather a vehicle for it.

Implications of Integration for Small Farms and Firms

More striking than the changes in agricultural products and practices is the integration that has occurred in agroindustry over the past decade. The rise of mega-processors and retailers has resulted in very little produce being traded on the open market. A striking example is the rise of supermarkets in Latin America, which in a decade moved from 10–20 percent to 50–60 percent of the retail food sector. Collective action can

sometimes allow producers to rebalance market power relationships and gain bargaining power in negotiations with big buyers.

A driving force behind this integration is the need to coordinate the timing and quality of purchases and deliveries all along the supply chain. Perishability was behind early integration, but other factors relating to economies of scale in the management of information about consumers and their preferences, for example, reinforced the trend.

In agricultural production, the increasing use of contracts by processors reflects this integration. Contracting can be positive for many farmers, but the smallest ones are often bypassed because the transaction costs associated with managing the contract outweigh any productivity advantage the small farmer might offer. Since contracting is characterized by economies of scale, collective action among farmers, such as producer associations, can make them competitive in an integrated supply chain. Collective action among farmers is, however, difficult to organize, coordinate, and manage. A similar situation faces small agroenterprises. Even where farms and firms do not operate under contract, cooperating can help them negotiate better prices for inputs and outputs, manage crises, or improve local infrastructure.

Well-organized farmers have competitive advantages, but collective action at the local level is not likely to be enough to allow small rural enterprises to fully exploit new market opportunities. Whether they are acting individually or collectively, farms and firms need to stay informed about technological and managerial innovations as well as emerging market opportunities in broader networks. A growing array of service providers—formal and informal, public and private—now exists to offer technical assistance, from quality control to marketing to financial planning. Firms that identify and take advantage of these services are more competitive. A study in Colombia found that a 10 percent increase in the number of relationships that an agroenterprise maintained with other actors was associated with increases in income per worker of up to 18 percent. This means that for farms and firms that participate in technically demanding, information-intensive supply chains, managing their relationships can be as important as managing their production processes.

External contacts are important, but internal relationships are also key to firm performance and survival. Increased attention to promoting small enterprises is often accompanied by a push to form and legalize businesses. Decisions about how businesses should organize themselves are often made on the basis of legal costs and potential access to government subsidies for certain types of businesses. Different organizational structures, however, have fundamental differences that firms need to consider. Cooperative forms of organization are based on economic and social objectives and require high levels of commitment and collective action to function. In practice these levels of commitment are often hard to maintain, even if the groups are subsidized. Partnerships have lower legal and administrative costs, but they assume high levels of trust among the partners, a condition reflected in the shared, unlimited liability for the firm's obligations. Corporations have the highest administrative costs, but they may be the best structure for firms where investors do not share high levels of trust and are likely to change frequently. Evidence from Colombia shows that no one organizational structure is best for either economic performance or social impact. The appropriate structure depends on the individual characteristics and objectives of the members.

CONCLUSIONS

Agroindustrialization is transforming agriculture and rural communities in developing countries. As a result, farmers and entrepreneurs need to change the way they do business. Part of the solution is precisely that: to think about and organize themselves as a business and to be more attentive to market signals and opportunities. Because they are in markets that are not perfect, investment in collective action and networking can bring high returns.

The reality of agroindustrialization also means that the public and private sector research and development organizations that support agriculture and rural development must reevaluate how best to support agroenterprise development through policy, technology, and institutional innovations. High-value products and opportunities for adding value should complement the focus on productivity improvement in undifferentiated commodities. Capacity building in business skills, accompanied by more and higher-quality business development services, can improve the competitiveness of small rural businesses. A better understanding of how to develop and support networks and innovative forms of organization beyond traditional agricultural cooperatives is also needed. On a more fundamental level, organizational and institutional innovations often arise in response to high transaction costs associated with market failures. Ameliorating these market failures, especially in the area of information and communication, will contribute to a more efficient and equitable agribusiness sector. ■

For further reading see T. Reardon and J. A. Berdegué, "The Rapid Rise of Supermarkets in Latin America: Challenges and Opportunities for Development," *Development Policy Review*, September 2002, 20 (4): 371–388; J. A. Berdegué and G. Escobar, "Agricultural Knowledge and Information Systems and Poverty Reduction" AKIS Discussion Paper (Washington, D.C.: World Bank, 2001), http://lnweb18.worldbank.org/ESSD/essdext.nsf/26DocByUnid/95644AEDD7FE7F3785256B9E00144BAD/$FILE/Akis_and_poverty.pdf; a summary of this paper was published by the Overseas Development Institute as J. A. Berdegué and G. Escobar, "Rural Diversity, Agricultural Innovation Policies, and Poverty Reduction," AgREN Network Paper 122 (London: Overseas Development Institute, 2002).

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Collective Action and Property Rights for Sustainable Development

Farmer Research and Extension

Anna Knox and Nina Lilja

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 14 of 16 • February 2004

Local innovation is the key to sustainable improvement in agricultural production, natural resource management, and rural livelihood systems. One of the main lessons of participatory research is that involving stakeholders in the early stages of research and development leads to better targeting of technologies, a greater sense of local ownership, and often more economically secure livelihoods. Participatory research approaches have been shown to reduce the time between the initiation of research and the adoption of new technologies and to increase both the rate and speed of adoption. The process of participating in research can also have a significant impact on farmers' human and social capital.

Combining technical innovations with collective action initiatives has been shown to lead to substantial farmer benefits. A number of farmer-led research and extension (FRE) approaches incorporate collective action for different purposes and at different stages in the innovation process. Collective action can be useful in sharing knowledge, setting priorities, and experimenting with, evaluating, and disseminating technologies.

Participatory research and collective action tend to reinforce one another. Where strong norms of collective action and social capital exist, they create a climate conducive to joint experimentation and sharing of innovation. Collective action can be instrumental in motivating participation, coordinating the actions of multiple resource users, spreading risks, managing environmental spillovers, and scaling up the benefits of participatory research. When seeded by external facilitation and scientific partnership, a carefully nurtured process of participation also has the potential to strengthen social networking, cooperation, and organization.

COLLECTIVE ACTION RESEARCH PROGRAMS

Farmers and communities have used a range of FRE approaches based on collective action. This section describes some of the most widely applied participatory research approaches.

Farmer field schools (FFSs) emerged in Indonesia in 1986. By 1998 more than 1 million farmers had participated in FFSs in Indonesia alone, and the method had spread to 12 Asian countries. It also appeared in many African and Latin American countries, and the approach continues to spread globally.

The method typically brings together 20–25 farmers from a community for intensive, field-based learning by doing. It has been used mainly to train farmers in the principles of integrated pest management (IPM). Collective action in IPM is critical because reducing pest infestation depends on widespread adoption of the practices. FFS training, tools, and dynamics aim to build solidarity among participants, thereby promoting knowledge sharing, experimentation, adoption, and diffusion. In one Indonesian case, farmers broadened the scope of the project from targeting a single pest to adopting a more integrated crop management program for cassava production. Farmers employing the new method achieved a higher net income.

Local agriculture research committees (known by their Spanish acronym, CIALs) provide farmer-led research on crop technologies to communities. Communities interested in forming a CIAL elect a small team of community members to undertake the research. Through partnerships between farmers, extension workers, and scientists, researchers learn about the farmers' priorities and filter those up to research organizations to shape technology development. At the same time, farmers learn skills in research design and experimentation and gain access to information on new technologies from the scientists. Unlike the farmer field schools, CIALs are permanent and provide ongoing services. The two approaches are increasingly used to complement each other.

Because CIALs work to bring communities together to identify research priorities and learn from their results, their viability depends on large-scale cooperation and support. Joint experimentation is also fundamental. Collective action helps to spread both the experimentation risks and the labor burden, while also enabling more extensive and verifiable experiments. In Colombia and Honduras, CIALs have formed second-order organizations to provide credit, organize exchange visits, and train experienced members to become facilitators who can organize new CIALs.

Farmer research groups (FRGs) also carry out joint scientific experiments. They differ from the CIALs in size (FRGs have between 10 and 45 members) and because their members participate for themselves as individuals, rather than on behalf of the community. Often they build on existing local organizations.

A study of 21 FRGs in Kabale, Uganda, revealed that participation in these groups follows a U-shaped pattern. Participation is initially high when groups are formed, then declines as members drop out and motivation wanes. Once groups show successful results, more farmers join. The poorest farmers appear to participate in equal numbers with less-poor farmers, and women tend to dominate FRG membership, although men tend to occupy leadership roles in mixed groups.

Experiments are undertaken on a shared plot that is either rented by or donated to the group. All phases of experimentation, from land preparation to harvesting, are implemented collectively. Members develop common rules for the group's operation and membership. Including a sociologist among the external researchers collaborating with the group is instrumental in building the group's organizational capacity.

Farmer innovation approaches (FIAs) in Africa identify farmer innovators to promote indigenous knowledge. Their focus is mainly on soil and water conservation technologies.

Researchers and extension workers learn from and provide technical assistance to farmers on the technologies that farmers have already developed or help them to develop monitoring and evaluation processes. Researchers do not generally introduce new technology options.

Collective action takes place not during innovation, but rather during dissemination of the technology and its principles, as networks of local innovators are formed. These groups not only investigate one another's innovations, but also visit farmer innovators outside their regions and host other community members on their farms to exhibit their innovations and disseminate their knowledge.

Networking helps build innovators' self-esteem and strengthens their relationships with researchers and extension workers. Sponsoring programs actively promote individual innovators, not only locally, but also nationally and internationally, so that prestige and exposure are among the incentives for participation.

HOW DO FRE APPROACHES COMPARE WITH CONVENTIONAL RESEARCH?

Much participatory research focuses on farm- and plot-level technologies. FRE approaches that address landscape-level resources and technologies, particularly those held in common, are still the exception. Even participatory watershed research, which starts with a landscape perspective, is mostly oriented toward on-farm soil and water conservation measures. Addressing landscape-level resource management using FRE will undoubtedly require even greater attention to collective action than is already employed in crop and farm technology research. The challenges of fostering successful collective action around natural resource management technologies currently lead programs to focus on less complex systems.

The collective action needs for participatory research can be seen as a continuum (see the figure). On one end of the continuum are resources that are managed by individuals or households at a plot level and that generate few spillovers for their neighbors. Midway on the continuum are resources that encompass significant environmental flows, such as water or soils in a watershed or hillside context; involve many more stakeholders in resource management; and generate more innovations for their management. On the other end of the continuum are common property resources, for which both the costs and the benefits of management are shared by multiple users who may prioritize the ultimate use of those resources differently. In this case, research cannot be effective unless all

users are involved and there is agreement on which technologies are to be tested and the criteria to evaluate them.

Although this framework may be helpful for identifying important collective action constraints for landscape-level farmer research and extension, collective action for organizing farmer participation and knowledge sharing is likely to add considerable value to on-farm research. Collective action may also be necessary for effective scaling up of technologies. Empirical studies show that farmer participatory research, even if conducted at the farm or plot level, leads to rapid scaling up of results to landscape levels if the research is sufficiently linked to local social networks and is designed to enhance local human and social capacity.

Further stakeholder dialogue and research are needed to identify which approaches are most effective at strengthening collective action for FRE so that it

- better addresses landscape resource issues;
- fosters greater and more widespread human and social capital; and
- accelerates, improves, and scales up the outcomes of the innovation process.

Ultimately, the goal of refining farmer-led research and extension in these ways is to improve the livelihoods of the poor. ■

For further reading see the publications available on the Program on Participatory Research and Gender Analysis website at http://www.prgaprogram.org/

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Collective Action and Property Rights for Sustainable Development

Strengthening Collective Action

Bryan Bruns and Pakping Chalad Bruns

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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Through collective action, forest users, fishers, irrigators, herders, and other rural producers can improve and sustain resources vital for their lives. Inclusive institutions for collective action empower communities to protect and improve their livelihoods. Many communities of resource users possess long-standing traditions of local cooperation, though these traditions may have been weakened in more recent times. In other cases, collective action seems absent, even when it ought to offer substantial benefits for those involved.

What can be done when people seem unable or unwilling to act together to pursue their interests? Insights on factors crucial to stimulating and sustaining collective action have come from abstract game theory, laboratory experiments, historical research, case studies, and practical experience. This brief draws on this research to review how citizens, nongovernmental organizations (NGOs), government agencies, and others can strengthen collective action.

FACILITATING COLLECTIVE ACTION

Facilitators, community organizers, and similar change agents have catalyzed communities to organize bottom-up identification of priorities, planning, and action. In the Gal Oya irrigation system in Sri Lanka, institutional organizers helped farmers organize themselves, transforming a situation of many conflicts with the irrigation agency and among farmers into one in which farmers worked together to successfully repair irrigation canals, equitably share water during shortage, and cooperate effectively with the irrigation agency in planning and implementing irrigation system rehabilitation.

Facilitators in different programs have included recent university graduates, retrained agency field staff, local community members, and "farmer consultants." Facilitation approaches have built on earlier methods in community development and community organizing, combined with reforms to enhance the capacity of technical agencies to work with communities. Facilitators in legal empowerment programs have helped paralegals and others in the community learn about their rights and responsibilities and strengthen their ability to protect local rights and interests.

Changes in policies and regulations and in everyday attitudes and practices of agency staff can make it much easier for communities and agencies to work together in managing resources. Communities may already be capable of organizing themselves, independently or with modest help, such as in arranging elections. Where additional stimulus is helpful, facilitators can reduce the initial barriers and costs of organizing. Care is needed, however, to avoid dependence on facilitators and instead build sustainable local capacity. Facilitators can reach out to include poorer and more marginalized people in collective action.

PARTICIPATORY LEARNING AND ACTION

The popularity of participatory rapid appraisal (PRA) has highlighted the rich toolkit of techniques available for analyzing, planning, implementing, monitoring, and evaluating collective action in rural development and resource management. The effectiveness of participatory learning and action techniques is founded on principles of empowerment, community control, and respect for local knowledge. Joint walkthroughs, transects, sketch maps, scale models, cropping calendars, matrix ranking, buzz groups, and other techniques not only quickly generate valid information and support analysis by stakeholders, but also are fun for those involved. "Icebreaker" activities and listening skills exercises help bring groups together and build trust and mutual understanding. Including a diverse mix of participants—women, poor people, ethnic minorities, elders, youths, and others—encourages a full range of concerns to be voiced. Where conflicts among stakeholders are severe, alternative dispute resolution methods of negotiation, mediation, and arbitration may be useful.

Participatory application of planning methods such as logical framework analysis empowers local stakeholders to make decisions. Integrated pest management, which relies on coordinated action among neighboring farmers, has shown the value of integrating local and scientific knowledge. Technical tools, such as geographic information systems and computer models, can support better-informed decisionmaking by local stakeholders. Sustaining changes beyond the stages of initial enthusiasm requires good follow-through from planning to action and a supportive institutional environment.

REDESIGNING INSTITUTIONS AND INCENTIVES

When villagers have the authority to determine who harvests wood and other products from nearby forests, they can better guard against overexploitation and benefit from improved management. Many of the problems of initiating and sustaining collective action can be traced to inadequate incentives and to institutional arrangements that discourage and displace collective action. For example, state laws and regulations that deny local people the right to control local resources leave them unable to enforce sanctions against violators. In other cases governments want to delegate responsibilities, such as protection of tree seedlings, without securing the rights of users to share in the benefits of harvesting timber and other forest products.

Research has identified key design principles that promote collective action. Resource management institutions must adapt to local conditions, offering local organizations the autonomy to devise and revise their own rules. Participants will address problems they identify as important, so it is essential that the actions taken will benefit those involved. Groups need the power to set boundaries and control access to the resource, to monitor rule violations, and to enforce sanctions. Rules need to be workable in terms of local ideas and resources. For example,

fishers find it simpler to control locations and kinds of fishing gear rather than to regulate the amount that can be caught. Crafting and applying such rules depends on both local agreements and adequate legal backing from government. Small face-to-face groups with strong, shared interests can combine into larger federations. Where resource boundaries do not fit administrative units, resource user groups need support to organize themselves in suitably specialized organizations, backed by necessary legal authority, that still accommodate village and other administrative bodies. Incentives matter not just for ordinary resource users, but also for leaders and for those who spend long hours, often at night or in bad weather, patrolling forests, canals, or other remote areas. Local organizations need authority and autonomy to establish a structure that fits their conditions, with adequate incentives for members and leaders, enforceable sanctions against those who violate rules, and feedback mechanisms to learn from experience.

POLICY REFORMS

In programs such as irrigation and forest management, national governments are partially or fully devolving authority to user groups or local governments. States are not only withdrawing from some activities, but are also building capacity to provide new services such as technical advice, dispute resolution through courts and other forums, and regulatory arrangements to protect broader societal concerns. Strengthening the resource tenure of existing local institutions by, for example, formalizing community rights to regulate land use, reinforces incentives for collective action.

One of the most powerful tools available for promoting collective action lies in changing how governments provide financial assistance. Subsidies can be offered to stimulate, rather than displace, sustainable collective action. Social funds have pioneered creative approaches to financing for community infrastructure development. New approaches to agricultural extension allow users to choose among a variety of service providers. Grants, loans, vouchers, and demand-driven "menus" for training and other services can all be designed to increase incentives for collective action and local resource mobilization.

HARNESSING SOCIAL ENERGY

Successful change often depends heavily on intangibles: political will, trust, reputation, and legitimacy. When these are lacking, communications strategies—such as political advocacy, public relations campaigns, training programs, study tours, and dissemination of success stories—may be ineffective. They may even backfire, breeding cynicism and disappointment and discrediting future efforts. Where suitable conditions exist or have been created, good communications are key to bringing about change. Assurance that fellow resource users share a willingness to try new approaches, reinforced by visible support from leaders in high places in government, can be crucial in changing expectations and transforming decisions about joining in and supporting collective action.

POTENTIAL PROBLEMS

Communities are not homogenous, and attention needs to be paid to the implications of economic and social differences. Innovative efforts to initiate collective action should be based on a pragmatic assessment of the strengths and weaknesses of communities, markets, and governments and the opportunities for appropriately combining different institutions. Whereas local resource users possess valuable knowledge and social links that help create and enforce rules, governments often retain advantages in providing technical information, resolving disputes, and strategically promoting wider societal interests such as equity and environmental sustainability.

Governments have an important role in counterbalancing the potential for local corruption and other abuses. They can limit local elites' efforts to grab the lion's share of benefits from collective action. Government's role includes promoting democratic processes for choosing leaders and making decisions, establishing accountability mechanisms for reporting the use of funds, and taking proactive initiatives to help the poor, excluded, or disadvantaged to organize themselves and protect their interests.

Pilot projects often pioneer ideas about strengthening collective action. Success stories have, however, often benefited from extra attention, special resources, strong charismatic leaders, and other exceptional factors. Expanding innovations successfully requires developing approaches suited to actual conditions and sustainable on a routine basis with ordinary levels of resources.

CONCLUSION

There is no one best way, no magic bullet or uniform recipe, to strengthen collective action, in general or within a single sector. Research on the ecological dynamics of rangelands and fisheries, for example, has demonstrated the pitfalls of oversimplified management strategies that assume certain knowledge and stable conditions, instead emphasizing the need for well-informed local management able to cope with risk and uncertainty by adapting to changing circumstances. Research and experience show that reforms to strengthen collective action need to employ multiple approaches and to be customized by local resource users to fit their local conditions in ways that allow for continuing learning and adaptation. ■

For further reading, see *PLA Notes* (www.iied.org) featuring articles on participatory learning and action approaches; N. Uphoff, *Learning from Gal Oya: Possibilities for Participatory Development and Post-Newtonian Social Science* (Ithaca, NY: Cornell University Press, 1991); R. Meinzen-Dick, A. Knox, and M. Di Gregorio, eds., Collective Action, Property Rights, and Devolution of Natural Resource Management: Exchange of Knowledge and Implications for Policy (Feldafing, Germany: German Foundation for International Development [DSE], 2001); E. Ostrom, "Coping with Tragedies of the Commons," *Annual Review of Political Science* 2 (1999): 493–535 (http://polisci.annualreviews.org/cgi/content/full/2/1/493).

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Collective Action and Property Rights for Sustainable Development

Strengthening Property Rights for the Poor

John W. Bruce

2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

Focus 11 • Brief 16 of 16 • February 2004

WHO ARE THE LANDED POOR?

Although many of the poor in the developing world are landless, most of the rural poor have some access to land. These "landed poor" remain poor not simply because their holdings are small, but also because their land rights are weak and insecure. The uncertainty they experience undermines their incentives to make long-term investments in their land or use it sustainably. Their land has limited economic value because it cannot legally be transferred. The land users' weak tenure also limits their political empowerment. To the extent that land users must rely on the goodwill of authorities or landlords for continued access to the land that supports them, their political participation is inhibited by the threats of those who hold power over them.

The landed poor have many faces:

- They may hold the land in tenancy passed from father to son, in which landlordism is a class, caste, or ethnic phenomenon. Tenancy may have its roots in conquest that created subjects as well as tenants of the original owners of the land.
- They may be farmers under a system of leaseholds from the state or a collective and may be deprived of any long-term interest in their improvements on the land, even the homes they have built. Their leases may be full of "development conditions," opportunities for land administrators to extract bribes by threatening to find violations and terminate the leases.
- They may be land reform beneficiaries whose landholdings, because of neglect, paternalism, or political change, have never been legally regularized. They may be prohibited from leasing out the land even if they are ill or have no oxen to plow, or they may be barred from supplementing their income by working as hired labor. Without documentation, they may be forgotten and, after the settlement scheme authority has gone, vulnerable to land grabs by the powerful.
- They may be users of forestlands that their families have occupied and cultivated for a generation but who are barred from acquiring secure property rights because of its classification as a forest.
- They may hold land under customary tenure systems unrecognized by the state, with no legal basis for resisting the claim of the official or merchant who one day appears on their land with a title document granted by the national government.
- They may be women in societies where land passes from generation to generation in the male line and who only have access to land as daughters and wives. When land allocation decisions are made by men, a widow or divorcee is at the mercy of her husband's relatives and may be forced off the land or required to marry her brother-in-law to protect the rights to the land she farms.

STRENGTHENING THE PROPERTY RIGHTS OF THE POOR

Despite these different situations, guidelines can help direct efforts to strengthen property rights.

- *Trust land users with stronger property rights.* It may be argued they are not ready, they will abuse it, or they need supervision. But a half-century of experience has shown that owners, responding to the incentives implicit in ownership, produce better land husbandry than paternalistic schemes, which soon sour and often become corrupt.
- *Legislate for stronger property rights.* The state must provide a robust legal framework of rights for land users. Although in weak states the law often has little impact on the ground, an adequate legal framework is a first and essential step.
- *Improved property rights means different things in different contexts.* It may mean co-ownership of land for husbands and wives; empowerment of tenants to buy out their landlords; provision of unconditional, inheritable land rights to settlers; or state recognition that customary, community-based rights stand on a par with land rights created by national statute.
- *Adopt local definitions of tenure security when appropriate.* Adequate tenure security does not necessarily mean ownership in the Western sense. The question should always be: What do rural people need? Modest increases in tenure security can be transformative. Though some systems need greater transparency and accountability, many customary or community-based tenure systems can provide adequate tenure security.
- *Always ask, "Security of tenure for whom?"* Consider which beneficiary is most likely to use the land effectively. Titles are commonly awarded to male household heads, but others may be more likely to undertake investments in the land.
- *Protect common property rights.* The poor often depend disproportionately on common property resources. Some resources used in common, such as wetlands, forests, and pastures, may be secured only by strengthening community property rights. Tenure security is not only about individual property rights, but also about legitimate common property and state rights in some categories of land.
- *Provide for adequate proof of property rights.* In urban and periurban contexts and where rural land is highly valued, adequate proof may entail formal surveys, titling, and registration of holdings. Elsewhere, where land rights are of lower value and transferred largely within the community, adequate proof may involve demarcating community boundaries and empowering local communities to maintain simple but reliable records of individual and family landholdings and transactions.

- *Educate people about their rights in land.* Government agencies, nongovernmental organizations (NGOs), and the private sector, through campaigns and media initiatives, can all help educate people about their land rights. Rights not understood will not be defended, and rights must be defended every day or they will be lost to the powerful.
- *Establish adequate dispute settlement mechanisms.* Rights that cannot be defended against challenges provide no incentives and no security. Adequate mechanisms to settle disputes include adjudication or alternative dispute resolution, in courts or alternative fora, and must be accessible and affordable.

INSTITUTIONALIZING PROPERTY RIGHTS REFORMS

The steps identified here will not be achieved overnight. For most countries it takes 10 years to put successful tenure reform programs in place and another 20 to implement them satisfactorily. There are numerous pitfalls to be avoided in the process.

- *Be politically astute.* Whatever "experts" may see as the advantages of strengthening property rights, politicians often respond to other signals: new revenues from property taxes on rapidly appreciating land values, new political constituencies developed by empowering the previously neglected with property rights, or accommodation of the market-dominant classes by making land a commodity for raising capital. Painful compromises among divergent interests and objectives are needed to achieve reform.
- *Embody new property rights in law.* In times of real sea changes in the political economies of nations, legal reform can be forgotten and reforms processed administratively, without firm legal basis. This approach only invites challenges to new rights later, once the reform is achieved and the political impetus behind it wanes.
- *Exploit all possibilities for legal change.* All avenues, from national legislation to judicial reform through court decision to community-based reform of customs, can be effective on the ground.
- *Constraints in capacity and finance can undermine implementation.* Strengthened property rights systems are costly—they often require substantial state or community investment in systems for survey, adjudication, and titling, for registration of transactions and inheritances, and for dispute resolution. Many a property rights reform has stalled for lack of financial support.
- *NGOs can play positive roles in the reform process.* Nonstate organizations of the marginalized can voice the demands of the poor and press for reforms. Such organizations have skills in areas like rights education and dispute settlement that are vital to implementing reforms.
- *Replacing inadequate property rights systems needs care.* Where an existing system of property rights is judged inadequate, one must be careful in replacing it, particularly where it is culturally embedded. Attempts at reform of customary systems that do not succeed in changing behavior can create confusion and conflict between claims based on custom and others based in national law.
- *Equitable strengthening of property rights is the goal.* The rights of all stakeholders should be considered together. Reforms to strengthen the property rights of one individual or group, especially in customary tenure contexts, should not inadvertently weaken the property rights of others.
- *Be alert for unintended consequences.* Even well-conceived reforms can be hijacked by the powerful. A classic case is the appropriation of common areas by the powerful as land titling approaches, depriving the poor of a resource upon which they rely. Vulnerable groups are often unrepresented in local implementation authorities, and mechanisms must be built into the implementation process to ensure their participation in reform processes and reform benefits. And enactment of reforms of tenancy systems can, if enforcement is weak, lead to the expulsion of tenants from their holdings by angry landlords.
- *New property rights alone are insufficient.* Property rights reforms, particularly those seeking to strengthen the marketability of land rights, may be unable to achieve their goal when credit markets are badly distorted and the credit supply system is in its infancy.

CONCLUSION

Strengthening the property rights of the poor is a complex project. The landed poor are a heterogeneous group who hold rights to their landed assets in diverse and complicated ways. Efforts to increase the security of their tenure need to be sensitive to the specific circumstances that characterize each case, the existing legal conditions, the strength or weakness of available financial and property registration systems, the needs of each group of stakeholders, and the possibilities of unintended consequences. Common property rights must also be protected. ■

For further reading see World Bank, *Land Policies for Growth and Poverty Reduction*, Policy Research Report (Washington, DC: World Bank, 2003); Krishna B. Ghimire, ed., *Whose Land? Civil Society Perspectives on Land Reform and Rural Poverty Reduction* (Rome: Popular Coalition to Reduce Hunger and Poverty, International Fund for Agricultural Development, and United Nations Research Institute for Social Development, 2003); Camilla Toulmin and Julian Quan, eds., *Evolving Land Rights, Policy, and Tenure in Africa* (London: Department for International Development, Natural Resources Institute, and International Institute for Environment and Development, 2000).

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2020 FOCUS 11

February 2004

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