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DECENTRALIZATION: FINANCE AND MANAGEMENT PROJECT

Associates in Rural Development, Inc.

in collaboration with

Workshop in Political Theory and Policy Analysis, Indiana University
Maxwell School of Citizenship and Public Affairs, Syracuse University

**Social Capital, Self-Organization,
and Development**

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Prepared for:

U.S. Agency for International Development
Global Bureau Democracy Center
Contract No. DHR 5446-Z-00-7033-00

December 1994

FOREWORD

In 1988 Associates in Rural Development, Inc. (ARD), in collaboration with Indiana University's Workshop in Political Theory and Policy Analysis and the Maxwell School of Citizenship and Public Affairs at Syracuse University, began a research and development effort focused on decentralized public service provision. The Decentralization: Finance and Management Project (DFM), sponsored by the U.S. Agency for International Development (USAID), was designed to study problems associated with the failure of many development projects to achieve sustainable impacts--particularly those in rural areas managed by central government agencies. The project's research agenda has analyzed a variety of institutional arrangements and resource mobilization strategies to determine their effects on the sustainable provision of rural roads, irrigation infrastructure, health and education services, and the management of renewable natural resources. Field investigations and desk studies have also analyzed broader decentralization policies and issues relating to local government operations and finance.

In the initial years of the project, a series of state-of-the-art papers were prepared on the principal sectors of inquiry. These reports included a thorough review of the relevant literature and established a framework for field-level analysis. These early studies were the basis for two published books, several journal articles, and numerous conference papers dealing with the problems of rural infrastructure and irrigation management. In addition to these core research products, numerous policy studies, field research initiatives, and project designs and evaluations were conducted at the request of USAID missions in Asia and Africa and the central bureaus of USAID/Washington. These efforts provided project research staff the opportunity to test and refine analytic methods and to demonstrate the utility of institutional analysis to a variety of development problems.

At the conclusion of this major effort covering seven years and 15 different countries, a series of final papers has been prepared that synthesize the cumulative research findings and lessons learned from the project. These include a report summarizing four years of research and analysis on governance and management of irrigation systems in Nepal; a synthesis of several years of research on economic and institutional policy reform in Cameroon; an analysis of DFM research on decentralized public service provision in Africa; a research synthesis on local governance and management of renewable natural resources; a paper on the concept of social capital and its implications for development; and a synthesis of research on rural road maintenance. In addition, the DFM legacy includes two papers providing practical project design guidelines in the areas of rural infrastructure and natural resources and a final report summarizing the project's principal research and development accomplishments.

The DFM project staff from ARD, the Workshop in Political Theory and Policy Analysis, and the Maxwell School extend their sincere appreciation for the sponsorship of this project by USAID. The Agency's research programs aimed at improving our understanding

of the development process and thereby the effectiveness of financial and technical assistance represent a significant contribution to the donor community and its partners in the developing world. We would also like to acknowledge and thank the dozens of colleagues from the academic and development assistance communities as well as the citizens and representatives of host countries who have participated in our enterprise. Our group has learned a great deal from this project, much of which is reflected in this final series of documents. We hope that this learning experience has also benefitted our collaborators in the U.S. and abroad.

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Chapter I

DEVELOPMENT PROJECTS WITH AND WITHOUT SOCIAL CAPITAL

In the summer of 1991, two buildings stood in different parts of the village of Wereng, located about 50 km south of Jos, the Capital of Plateau State in Nigeria. Both were constructed to provide health-care services to local residents. Given the incidence of malaria, measles, and malnutrition in this village, the 550 families living in Wereng desperately needed convenient and low cost health-care services.

One building was located outside the village¹ on a steep hill overlooking the high flatlands, where the remains of a once active tin-mining industry lay in heaps here and there. This government dispensary was a large and substantial structure built in 1977 with a full front porch, a large reception area, a spacious examination room, and a dispensary. The front door was open, and my colleagues and I entered to find it virtually empty.² No patients, no doctor, no nurses, and no dispenser were to be seen. Even more startling, there was no furniture in the entire building except a table and a bench in the examination room, and a dilapidated set of shelves in the dispensary. Other than a few bowls and jars, nothing was on the shelves. Within a few minutes of our arrival, the dispenser greeted us, and spent several hours with us telling us about his background and why the dispensary was empty.

A much smaller building was located in the center of the village owned and operated as a private clinic and dispensary. When we arrived there, several villagers were waiting to see the "doctor." After seeing his patients, the pharmacist also told us his background, the encouragement he had received to set up a clinic in this village, and how his dispensary was the best stocked we had observed among the four regions we had visited in Nigeria.

The contrasts were striking. In terms of physical capital, the first building represented a major investment. The design of this building, like many other government dispensaries that we saw during the summer, was the standard plan for a village of this size. The materials were provided by Plateau State government. The justification for such large buildings was that it would be easier to upgrade them at a later time to provide additional services. The building was constructed by "volunteers" from the village who were promised better health-care services in return for their labor contributions.

The second building was much smaller and constructed by the owner in 1987 from locally available building materials. Even so, it had a small reception area and a laboratory which included a microscope used to examine blood and stool samples. A separate room was available for inoculations and injections and another for consultations. One room with a single bed was available for overnight stays. The owner planned to expand the clinic by adding a new room with additional beds. Apart from being licensed to sell drugs, the owner

was apparently not supervised by the local or state government. The second building contained a wide variety of medicines and drugs available at a modest markup in the price paid by the owner and purchased in the nearest larger town.³ The Chief of the village told us that the services provided by the private clinic were considered superior by local residents to those provided by the government dispensary. Residents would only go for free consultations to the government dispensary for minor problems such as a cold or runny nose.

Why the difference? Why did one dispensary have patients, furniture, medical equipment, and medicines while the other had few of any of these? Could it be that the proprietor of the clinic had better training so patients were willing to pay to visit a trained technician rather than obtain doubtful advice from a poorly trained functionary? We had already visited one village where the "doctor" in a government dispensary was actually hired and paid as the custodian and who had learned his skills observing medical workers for many years. The government dispenser in this village was, however, actually quite well-trained.⁴

Thus, a difference in human capital—the education and training of the two pharmacists—does not account for the difference in services provided. Nor did a difference in physical capital (i.e., the building). In this instance, higher levels of both physical and human capital did not translate into higher levels of services delivered to those who needed them. And, given the extreme poverty of the village, the problems of water-borne diseases in the area, and the poor health of children in the area, there was a substantial need to be served.

What are the differences, then, that help to account for one health facility being active and providing services evaluated positively by local residents and the other being moribund? Obviously, more than one factor accounts for the differences. The financial constraints facing all Nigerian governmental agencies in 1991, due to the effects of structural adjustments, had an impact on the lack of supplies on the shelves of the government dispensary. But this could not account for the absence of furniture.⁵ Nor, could it explain why in 1987, ten years after the public dispensary had opened, local villagers would encourage the setting up of a private clinic where they would have to pay for services when they had a local, public dispensary where services were free and drugs were sold at subsidized prices.

Another obvious difference is that one clinic was private and the other was a government facility. This affected the incentives of the two dispensers. One got paid (when government paychecks were actually issued on a regular basis) whether or not the villagers were satisfied with his services; the other was remunerated only if his services were valued by others. But attributing the success primarily to "private ownership" is too quick an answer and not all of the story.

In the first case, local residents were not involved in *any* of the initial decisions as to whether a local dispensary should be located in their village, where it should be located, how large it should be, what materials should be used in its construction, or even whether they should build it or not. Their only participation was the manual labor of constructing the building. Decisions about when the facility was supposed to be open, what services were supposed to

be available, and when medicines and drugs would be sent were made elsewhere with no input from the village. Decisions about who should be assigned to this post and how their performance was to be reviewed were also made elsewhere. Prior dispensers had not wanted the assignment in Wereng far from their families and other opportunities. The present occupant did want to be in Wereng. He had actually requested a transfer to Wereng where his family land was located and he could engage in farming to augment his low salary. But while he was happy with this assignment, his satisfaction came from his opportunity for private gain rather than anything to do with serving the residents of Wereng.

In the second case, the Chief of the village and local residents were involved in all major decisions to set up the clinic. The owner contacted the Chief of the village about the possibility of moving to Wereng to establish the clinic. The Chief interviewed him and discussed this possibility with the ward heads. To assist him in establishing a clinic, the Chief sold him a plot at a low price in a good location in the center of the village—as a contribution from the village. Similarly, he was allowed to buy a piece of nearby land at a reasonable price to set up his own farm. Surplus food from that farm was given by the owner to villagers who were malnourished. Similarly, local residents with their own surpluses would bring him crops for his own use and to be given to those in need. In addition to local residents participating in most of the decisions, they jointly addressed problems that they conceptualized as important. They developed new ways of organizing their assets and relationships so that some aspects of these problems could be better addressed. Their participation resulted in the development of new human, social, and physical assets which could then be used in the community to produce a higher flow of valued products for those affected.

The private clinic is tied into a rich network of reciprocal relationships even though it is privately owned and must earn a sufficient income to cover costs. Analytical models of arms-length market exchanges do not include the types of reciprocity found between the private clinic and villagers. To understand how this clinic can survive in a small village during an era of tough financial times, knowing about these ties is essential. The government facility, on the other hand, is hardly linked to the village at all. Analytical models of government service provision assume that public services will not be provided by private enterprises (or, at least not at the quality and quantity desired). But, in this case, the government facility produced no services while the private clinic was busy serving patients and had medicines on its shelves ready to dispense. Village residents were highly supportive of the private clinic and considered its presence a great asset to their community while considering the government facility as worth very little to them.

A fundamental lesson to be learned from this case, and many similar cases throughout the world, is that physical facilities do not operate or maintain themselves automatically. Nor is the allocation of trained personnel sufficient. *Social capital is a necessary complement for physical and human capital to have a long-standing impact.*

This lesson was learned repeatedly by those participating in the DFM project. The visit to Wereng was only one village of the many villages visited by DFM researchers in conducting the background research for the DFM study of *Decentralization: Improving Governance in Sub-Saharan Africa* (Garnier, et al., 1994). Ten local government units -- three each in Ivory Coast and Ghana, and four in Nigeria -- and villages within each of these local governments were visited during 1991 to assess the impact of structural adjustment on the effectiveness and efficiency of formally decentralized units of government.

Many of the communities studied demonstrated substantial organizational and resource mobilization skills. These activities were usually directed into those areas not yet fully dominated by central government regulations. Thus, in those areas of relative local freedom, rural residents frequently established their own institutions and mobilized their own resources to provide needed services. In some cases, these self-organized institutions were highly effective in reaching consensus on community priorities, mobilizing resources to achieve local priorities, organizing activities and investments, and arranging for the maintenance of local infrastructure by community residents.

But the margin of freedom allowed local communities was frequently not very large. Lack of financing and rule-making authority in many areas sap the capacity of local officials to solve local problems. Further, central governments retain strong control over local governments. Central governments can create, modify, and dissolve local governments independently ignoring the social capital that may have been created at a local level. Once the hard work of local residents is dissolved by central action, it is harder to get residents to participate in other kinds of projects. Why invest in local problem solving activities, only to have their hard work ignored, or worse, taken over by outsiders.

The repeated findings of the DFM project that infrastructure and other capital investments made by national governments with the assistance of international donors have not been sustainable (see E. Ostrom, Schroeder, and Wynne, 1993), raises a serious question why this has happened in so many developing countries during the past three or four decades. One of the reasons identified by the DFM project has been conceptual. Without understanding the importance of social capital and local institutions, national governments and donors have taken actions that destroyed some of the essential social infrastructure needed to make physical infrastructure operate. Since a source of the problem is conceptual, the next chapter will focus on the idea of social capital and its meaning.

Development activities that lack a sound conceptual foundation are fated to fail. Thus, the emphasis on the meaning of social capital in this volume is not simply an "academic" endeavor. Development workers need core concepts as much or more as social scientists. Consequently, the stress placed in this volume on conceptual development is intended to be a practical guide for development workers who are interested in doing more than distributing funds that bring temporary income to many individuals. Building social capital is a way that donors can use external funds to engender long-term sustainable development. A donor-assisted project that has facilitated the construction of human and social capital (as well as the

physical capital that is so much the hallmark of development projects), leaves behind a legacy that can accumulate over the long term. After developing the concepts of social capital in the second chapter of this volume, these ideas will be applied to an understanding of a successful donor-assisted project in a country where many donor-assisted projects have had few positive returns.

Notes

1. The government clinic was located outside of the village because it was intended to serve two villages and was placed on a hill located in between these villages.
2. My colleagues were Dele Ayo, Kenneth Hubbell, and Tina West. We were part of a team that studied "The Experience in Nigeria with Decentralization Approaches to Local Delivery of Primary Education and Primary Health Services," a report that is drawn on extensively in this introduction. Further details of health care in Wereng can be found in Ayo et al., (1992). The study in Nigeria was part of a larger study including Ghana and Cote d'ivoire, see Garnier et al., 1992 and Fiadjoe, et al. 1992.
3. The owner showed us medicine that he had purchased for hookworm at N7.50 which was for sale in his clinic at N8.50, a mark-up rate of 13 percent.
4. The government dispenser first received a Grade II Teaching Certificate and taught primary school for three years. After this, he attended the School of Health Technology in Jos for three years. At the time of our visit, he was studying to be certified as a Community Health Officer—the highest primary health-care certification.
5. The previous official left the facility without handing over official papers and with no furniture except the dilapidated shelves. The chief had given the new dispenser the table, and the church had given him the bench.

Chapter II

THE MEANING OF PHYSICAL, HUMAN AND SOCIAL CAPITAL

To understand why many highly centralized development efforts have failed, one needs to understand the importance of human and social capital as well as that of physical capital. All forms of capital are created by spending time and effort in transformation and transaction activities.¹ Developing capital involves making decisions that are inter-temporal in nature. Human and social capital may be developed as a by-product of other activities, while physical capital investment is usually a more conscious investment activity.

Physical Capital

Physical capital is the stock of material resources that can be used to produce a flow of future income (Lachmann, 1978). Physical capital exists in a wide variety of forms including buildings, roads, waterworks, tools, cattle and other animals, automobiles, trucks, and tractors, to name just a few forms that physical capital can take. "People form capital when they withhold resources from present consumption and use them instead to augment future consumption [or production] possibilities" (Bates, 1990: 153).

The origin of physical capital is the process of spending time and other resources constructing tools, plants, facilities, and other material resources that can, in turn, be used in producing other products or future income.² The construction of the government dispensary in Wereng was such a process. Funds that could have been used to supply current needs were used instead to purchase building materials. Time that villagers could have used for other purposes was devoted to constructing the facility.

The construction of physical capital involves establishing physical restraints that (1) create the possibilities for some events to occur that would not otherwise occur (e.g., channeling water from a distant source to a farmer's field), and (2) constrain physical events to a more restricted domain (e.g., water is held within a channel rather than allowed to spread out). Thus, physical capital opens up some possibilities while constraining others. A well-constructed building creates the possibilities of storing medicines and providing health-care services protected from the elements. It also implies that patients travel to the facility rather than medical assistance to the patient.

The intention to construct useful physical capital is not always fulfilled—as is obvious in Wereng. An investment in physical capital may not generate the improved flow of future services. An empty building with nothing being provided represents a failed investment decision. Physical capital may even have a dark side and generate more harms than benefits. Investments in a power generation plant, or other forms of infrastructure, may produce more negative externalities than the net benefits generated.

Human Capital

Human capital is the acquired knowledge and skills that an individual brings to an activity. The forms that human capital take also differ among themselves. A college education is a different type of human capital than the skills of a cabinet maker acquired through apprenticeship training. Human capital is formed consciously through education and training and unconsciously through experience.³ An individual who likes to swim, for example, is engaging in consumption activities but also investing in physical health. Health is an asset that is drawn on to achieve other goals. Thus, the investment in human capital may not have been made self-consciously but results from activities engaged in primarily for other reasons. Alternatively, some individuals hate to use stationary bicycles but do so because they know that aerobic exercise is essential for sustaining future capabilities. They exercise primarily to invest in human capital and then find ways to make this activity as pleasant as possible. Thus, both self-conscious and relatively unconscious investment processes go on when building human capital.

Both of the pharmacists in Wereng had invested their own time and energy in educational and training programs that increased their skills. Public treasuries had also invested in their human capital since education is highly subsidized in Nigeria and neither paid the full cost of their own education and training. Both had also learned how to farm and provide their own family with a reliable source of food. In one case, the prior investment was increasing the services provided to others. In the other case, the prior investment was not currently generating much of a flow of services for others. Human capital can be used for destructive purposes as well as productive ones. Organizational skills can be devoted to the establishment of legitimate, commercial enterprises or to creating a gang structure that preys on innocent people.

Social Capital

Social capital is the shared knowledge, understandings, institutions, and patterns of interactions that a group of individuals brings to any activity (Coleman, 1988; E. Ostrom, 1990; Putnam, 1993). In the establishment of any coordinated activity, participants accomplish far more per unit of time devoted to a joint activity if they draw on capital resources to reduce the level of current inputs needed to produce a joint outcome. They can be far more productive with whatever physical and human capital they draw on, if they can agree on a broad form of coordination and commit themselves credibly to a sequence of future actions. This agreement can be based on mutual learning about how to work better together. It can be based on one person agreeing to follow someone else's commands regarding this activity. Or, it can be based on the evolution or construction of a set of norms or rules for how this activity will be carried out repeatedly over time and how commitments are monitored and sanctions imposed for nonperformance.

One of the major lessons from the Decentralization, Finance and Management (DFM) project is that many development projects have confused the notion of participation with that of

building social capital -- a common understanding among participants about what should be undertaken in their community and how they will go about doing community activities (See Green, 1994; Schroeder, 1994b). Simply involving local people in participatory activities may impose high costs on them without bringing them substantial returns. Attending meetings and hearing speeches may not help participants re-think the problems they jointly face and come up with locally tailored solutions that they can begin to undertake on their own.

Social capital takes on many different forms. Putnam (1993) identifies social capital as involving networks, norms, and social beliefs that evolve out of processes that are not overtly investment activities (Putnam, 1993). Family structure is considered another form of social capital. Bates (1990), for example, summarizes major research on the Luo and Kikuyu of Kenya, the Bambara of Mali, and on East African pastoralists and clearly demonstrates that different types of lineage groups create different types of property rights and access to flows of future incomes.⁴ He points to the costs to individual families of belonging to extended lineages and the benefits that they obtain by spreading risk in those environments where ecological or economic variation is very high.

Patterns of trust and reciprocity are another form of social capital. When individuals learn to trust one another so that they are able to make credible commitments and rely on generalized forms of reciprocity rather than on narrow sequences of specific *quid pro quo* relationships, they are able to achieve far more than when these forms of social capital are not present. "In a reciprocal relationship, each individual contributes to the welfare of others with an expectation that others will do likewise, but without a fully contingent *quid pro quo*" (Oakerson, 1993: 143). Thus, investments made at one time period in building trust and reciprocity can produce higher levels of return in future time periods even though the individuals creating trust and reciprocity are not fully conscious of the social capital they are constructing.

Both evolved and self-consciously designed rule systems—and ways to monitor behavior and sanction nonconformance—are included as forms of social capital. Thus, crafting institutions—sets of rules that will be used to allocate the benefits derived from a physical facility and to assign responsibility for paying its costs—is a way to invest in social capital (E. Ostrom, 1990, 1992). The rules used by individuals to structure their patterns of relationships may enhance or retard the creation of other forms of social capital and also affect the level and impact of human and physical capital. As discussed below, rules relate to patterns of activities at several levels including day-to-day operational activities all the way to constitutional activities that create and recreate the general patterns of authority in a society. The type of rules that individuals will find productive depends upon the kinds of norms and patterns of reciprocity that already exist. Similarly, patterns of trust and reciprocity will depend to a large extent upon the types of rules that are crafted in any polity. Oakerson (1993) points out that modifying the structure of constitutions within a society is one technique for affecting the level of reciprocity—particularly, that between rules and those who are ruled.

To begin to modify a general constitution in which serious asymmetry exists, what needs to be done is to raise the price of rulership. To do this, one must find ways of introducing new elements of symmetry in order to leverage greater reciprocity from rules. Success will depend upon a capacity to sustain such relatively autonomous organizations as private businesses, labor unions, churches, and local governments, which are able to constrain the decisions of rules. . . . Only the development of countervailing structures of authority and power can introduce greater reciprocity into the general constitution of a society in which serious political asymmetries exist (Oakerson, 1993: 154).

The concept of social capital is a broader concept than any specific form of social capital included within its definition. *Norms* and *rules* are both considered forms of social capital, but they do not share all attributes (see, Crawford and Ostrom, forthcoming). The *norm* of reciprocity implies some levels of symmetry among those who engage in long-term reciprocal relationships. Other norms, however, are not based on symmetric relationships. The norm of deference to elders or to those with more status or authority is based fundamentally on a concept of asymmetric relationships. The norm of retribution can trigger quite destructive and escalating patterns of conflict and violence. *Rules* imply asymmetries between those assigned authority to monitor and enforce rules. *Rules* also contain a reference to a sanction that can be enforced if conformance to the rule is observed by such an authority.

What is similar among all forms of social capital is that those who devote time to constructing patterns of relationships among humans are building structures of capital whether consciously or unconsciously. There are consequently, important analyses to be undertaken of all forms of capital formation, maintenance, and dissolution. Other analyses will need to focus much on specific forms of capital such as family structure, gang structure, and various types of entrepreneurial structures, as well as generalized patterns of entrepreneurship.

To create social capital in a self-conscious manner, individuals must spend time and energy working with one another to find better ways of achieving outcomes. In Wereng, the Chief and the members of his ward council tried to find ways of reducing the costs of setting up a private clinic. Land was provided at a subsidized price in the middle of the village where health-care services could be easily provided to villagers as part of their everyday activities. The owner and the villagers give and take food surpluses as part of a rich series of reciprocal relationships that supplement the *quid pro quo* relationships that must also be present for the owner to make a living. Informal norms may be established without as much collective, self-conscious thought as is involved in creating new rules or establishing new entrepreneurial opportunities. Individuals facing a particular problem in a specific location and time decide to handle it in a particular manner. That decision seems to fit other situations that come along. After some repetition, the initial decision becomes a norm that most individuals in that community follow when they face this type of decision again. While the group may never have discussed together the establishment of the norm, the consideration of how best to act in

this situation will have been made by many separate individuals as they have faced similar situations over time.

Like physical capital and human capital, social capital opens up some opportunities while restricting others. A decision to establish majority-rule as the decision rule for making particular collective-choice decisions, for example, opens opportunities that did not previously exist. Voting does not exist in nature, and the opportunity to vote is created by rules. A rule that forbids a farmer from growing a particular water-intensive crop, rice during the dry season, for example, restrains activities to a more limited set than previously available. Or, a rule that villagers must construct health facilities changes the allocation of time from one activity to another. Thus, rules open up some opportunities while restricting others.

Sustaining Social Capital over Time

Simply agreeing on a set of rules is, however, rarely enough. Working out exactly what these rules mean in practice takes time. If those learning how to use a set of rules do not trust one another, further investments are needed in extensive monitoring activities. Appropriate sanctions for nonconformance must be developed. Conditions under which exceptions to rules can be made without endangering the basic ordering principles must be discovered and discussed. Conflict over rule interpretation and adjustment will occur, which if no facilities for conflict resolution are available may destroy the process of building capital before it gets very far. The time it takes to develop a workable set of rules, known to all relevant parties, is always substantial. If this is the first time a set of individuals has attempted joint activities, the time needed and the level of contestation involved in the process will tend to be higher than in settings where the same set of individuals have worked well together in the past.

Part of learning through experience is what happens when things go wrong. In all practical affairs, many things can go wrong. Everyone may not have received the same information about joint objectives, processes to be followed, and how one process feeds into another. Some may do their part while others fail to perform. Some may want to interpret a rule in a way that is harmful to the interests of others. There may not be fair and objective conflict-resolution processes available. Conflict may destroy prior lessons about how to work together and may reinforce prior doubts about the reliability and trustworthiness of some participants.

Thus, social capital is not only created, it can be weakened, destroyed, strengthened, or transformed. Social capital can be characterized as outdated, up-to-date, or ahead of its time. It may enhance the outcomes of a few without any impact on others. Or, advantages to the few may come at the expense of others. Alternatively, the advantages to a few may generate positive benefits for others. Social capital can have a dark side also. Cartels and organized crime are networks of relationships that lower overall productivity while generating disproportionate benefits for a small set of beneficiaries. A system of government based upon military command and use of instruments of force can also destroy other forms of social capital while building its own.

Differences between Social and Physical Capital

While social capital shares many characteristics with physical capital, it differs from physical capital in several respects:

- social capital does not wear out with use but rather with disuse;
- it is not easy to see and measure;
- it is hard to construct through external interventions; and
- the establishment of a strong state may reduce the level of social capital available for development in a country.

Many of these differences are due to the importance of shared cognitive understandings that are essential for social capital to exist and be continued from one generation to another. **First, social capital differs from physical capital in that it does not wear out with use but rather with disuse.** Social capital may, in fact, improve with use so long as participants continue to keep prior commitments and maintain reciprocity and trust. Using social capital for an initial purpose creates mutual understandings and ways of relating that can frequently be used to accomplish entirely different joint activities at much lower start-up costs (Putnam, 1993). It is not that learning curves for new activities disappear entirely. Rather, one of the steepest sections of a learning curve—learning to make commitments and to trust one another in a joint undertaking—has already been surmounted. A group that has learned to work effectively together in one task can take on other similar tasks at a cost in time and effort that is far less than bringing an entirely new group together who must learn everything from scratch. The fungibility of social capital is, of course, limited. No tool is useful for all tasks. Social capital that is well-adapted to one broad set of joint activities may not be easily molded to activities that require vastly different patterns of expectation, authority, and distribution of rewards and costs than used in the initial sets of activities.

If unused, social capital deteriorates rapidly. Individuals who do not exercise their own skills also lose human capital rapidly. When several individuals must all remember the same routine in the same manner, however, the probability that at least one member of a permanent group forgets some aspect increases rapidly over time. In addition, as time goes on, some individuals enter and others leave social groups. If newcomers are not introduced to an established pattern of interaction as they enter (through job training, initiation, or any of the myriad of other ways that social capital is passed from one generation to the next), social capital dissipates through turnover of personnel. Eventually, no one is quite sure how they used to get a particular joint activity done. Either the group has to pay most of the start-up costs all over again, or forego the joint advantages that they had achieved at an earlier time.

Second, social capital is not as easy to find, see, and measure as is physical capital. The presence of physical capital is usually obvious to external onlookers. Health centers,

schools, and roads are simple to see. Social capital, on the other hand, may be almost invisible unless serious efforts are made to inquire about the ways in which individuals organize themselves and the rights and duties that guide their behavior—sometimes with little conscious thought. Social capital is formed over time and is embedded in common understanding rather than in physically obvious structures.

Even when asked, local residents may not fully describe the rules they use. Robert Yoder warns those interested in helping farmers that they must probe deeply and in non-threatening ways to get adequate information on the rules used to allocate water and maintenance duties within irrigation systems. "Intimidated by the higher status of officials, they may fail to communicate the details of the rules and procedures they use to operate and maintain their system" (1994: 39). Common understanding is frequently hard to articulate in precise language, particularly when status differentials make communication difficult in the first place. If external agents of change do not expect that villagers have developed some ways of relating to one another that are productive in the setting in which they live, those who are trying to help may easily destroy social capital without knowing what they have done. If past social capital is destroyed and nothing takes its place, well-being can be harmed by external "help" rather than improved.

Walter Coward (1988) describes, for example, the efforts of government engineers to improve the operation of a water system in Indonesia by removing an old log that served as a "primitive" water divider and replacing it with a modern, concrete division box. The modern device, however, did not enable the farmers to allocate water consistent with the water rights of farmers on the two channels. Their indigenous structure had allocated water in proportion to their rights automatically. The property rights of the farmers were embedded in the way that the physical structure divided the water. In this instance, the construction of new physical capital without consulting the farmers did not permanently destroy the productive way that farmers related to one another. Soon after the engineers modernized the system, the farmers simply rejoined the two channels below the modern box and reinstalled a traditional device that allocated water between the two branches according to the property rights of those farming on each branch. This story has a happier ending than many efforts to improve irrigation systems by external investments in physical capital alone. Yes, the investment in modern engineering works was wasted, and farmers had to invest more time and effort in rebuilding the physical works to conform to their social capital. The farmers' organization and the set of mutually understood rights and duties was not destroyed, however, and the farmer could build a second structure to allocate water consistent with the rights and duties of farmers as locally understood. Other efforts to construct physical capital, as in Wereng, have not had such happy endings.

The researcher or project workers interested in social capital cannot assume from the outside that a group has (or has not) established common understandings that enable them to rely upon each other to behave in ways that are predictable and mutually productive. The presence of words on paper or a building with a name on the outside is not the equivalent of the common understandings that are shared among participants. The self-organizing processes

that social capital facilitates generate outcomes that are visible, tangible, and measurable. The processes themselves are much harder to see, understand, and measure.

Third, social capital is harder than physical capital to construct through external interventions. A donor can provide the funds to hire contractors to build a road or a health facility. Building sufficient social capital, however, to make an infrastructure operate efficiently, requires knowledge of local practices that may differ radically from place to place. Organizational structures that facilitate the operation of physical capital in one setting may be counter-productive in another. Local knowledge is essential to building effective social capital.

Creating social capital that makes physical capital operational over the long run is something that individuals who successfully use physical capital repeatedly do, but it is not as well understood as the technology of constructing physical capital. For private sector activities, an important aspect of entrepreneurship is bringing relevant factors of production together and *relating* them effectively from one to another. Aspects of these skills are taught in schools of management and learned in the workplace through experience. The incentive to create social capital related to private enterprise is attributed to the profit motive. A great deal of what private entrepreneurs do is to create networks of relationships that increase the profits that can be obtained. The entrepreneur then keeps the residuals from creating and sustaining social capital.⁵

The incentives and motivation of individuals who create public facilities and provide public goods and services is not as clearly understood as that of private entrepreneurs. In an earlier era, the theory of bureaucracy posited public officials who could ascertain the public interest and were motivated to achieve it. More recent analyses of public bureaucracy are less optimistic about the capacity of public officials to ascertain public interests or to undertake the least cost ways of providing and producing collective goods.

Instead of being viewed as if they were automata who do what they are told to do in the most efficient way, recent work on bureaucracies views them as being staffed by individual actors seeking their own interests. Pursuing their own interests may or may not generate net public goods, depending on how well the rules affecting their incentives help induce high performance. Thus, simply turning over the problem of creating social capital to make physical and human capital more effective to a public bureaucracy may not generate the preferred result. The social capital created may instead be the organization of limited networks of individuals or cliques that engage in mutual reciprocity at the expense of the larger group they are supposed to be serving.

Fourth, creation of a "strong" state may reduce the capabilities of other institutions to continue to build social capital. When national governments declare that they will provide all education and health services in a country and close down schools and hospitals run by religious groups, they destroy an immense stock of social capital in short order. Rarely can

this be replaced rapidly. Creating dependent citizens rather than entrepreneurial citizens reduces the capacity of individuals to generate capital.

Many local infrastructure facilities and public goods are, however, not provided either by public bureaucrats or private entrepreneurs but rather by those who directly receive the benefits of collective action. An example is the organization of an irrigation system by the group of farmers who will directly benefit from its operation (Benjamin, et al., 1994). When a group of potential beneficiaries contemplates providing physical capital to be jointly used in a local, public economy, they also face a lengthy process of trial and error social learning and of bargaining among the participants over the rules that they will use and how to use them. Given the multitude of nested collective-action problems involved in the creation of institutions, explaining how individuals overcome these problems is not easy. Further, the diverse sources of asymmetries among participants makes it even more difficult to explain how individuals solve thorny distribution problems (see Libecap, 1994; Hackett et al., 1994a, 1994b; Johnson and Libecap, 1982; Hackett, 1993).

Processes that create social capital do occur, however, in thousands of disparate local settings. Similar processes occur at the international level (Young, 1982; Keohane, 1989; Dasgupta and Mäler, 1992; McGinnis and Ostrom, 1993; Haas, Keohane, and Levy, 1993). An extensive literature including many case studies describes institutions that have been constituted by those affected in all corners of the world.⁶ Recent work on institutional analysis and institutional change begins to provide a solid theoretical foundation for understanding the conditions needed for individuals to craft or evolve their own institutions and enforce these institutions themselves (see Bates, 1988; Calvert, 1994; Libecap, 1989; North, 1990; E. Ostrom, 1990; E. Ostrom, Gardner, and Walker, 1994; V. Ostrom, Feeny, and Picht, 1993).

Capital and Development

All forms of capital are needed for any economy to grow. The essential role of capital is acknowledged everywhere. Unfortunately, money is sometimes equated with physical capital. Money is, however, not the same as physical capital. Money is the means by which some forms of physical capital is purchased, such as equipment or building materials. Money, like many resources, can be used as well for consumption or sit unused as a store of value. Many types of capital can be created without money, or with very little involved, based on the time and energy spent by individuals in building tools and facilities, learning skills, and establishing regularized patterns of relationships with others (see Schroeder, 1991; 1994a and 1994b).

Many investments made to increase capital structures and encourage development have focused almost entirely on physical capital, and to a lesser extent, on building human capital through education and training. Much less effort has been devoted to learning about the forms of indigenous social capital that could be drawn on effectively to enhance the other investments. What has been overlooked (with notable and successful exceptions) is the importance of social capital. This is a problem in primary health care and education in many

developing countries (see Garnier, et al., 1994; Fass and Desloovere, 1994; Green, 1994). It is also a major problem in regard to irrigation in Asia where irrigation can make a major difference in crop yields per unit of effort or land (see Benjamin, et al., 1994).

Many investments made by donors during the past three decades have focused almost entirely on physical capital, and to a lesser extent, on building human capital through education and training. Little effort has been devoted to learning about the forms of indigenous social capital that may have been drawn on effectively to enhance the other investments. Rather, the presumption has been that building physical facilities and training government officials would be sufficient to jump-start economic growth and better living conditions.

What has been overlooked almost entirely (with notable and successful exceptions) is the importance of social capital. The success of the Marshall Plan was an inappropriate model to adopt. The countries of Europe had indeed suffered massive destruction of physical capital. The rapid infusion of new physical capital created the conditions for several economic "wonders" to occur. Early development theorists paid little attention to the fact that the social capital of European nations was largely intact—or even strengthened through the massive amounts of teamwork organized during the Second World War and in its immediate aftermath.

When massive amounts of physical capital were introduced by donor countries into the countries of Africa, Latin America, and Asia that had been through long periods of colonization, little attention was paid to the massive destruction of social capital that had occurred under colonization. Tribal communities in India, for example, had organized themselves for centuries to derive their food, fodder, tools, and building materials in a sustainable manner from forest lands that they governed and managed as common property. The British government did not recognize community ownership and, in fact, passed legislation during the 1860s to create a Forestry Department and to exert monopoly power over ever greater territories (Guha, 1983). By the time of independence, the Government of India exerted full control over more than 40 percent of the total forested area of India. Similar stripping away of the legitimacy of local institutions occurred throughout Asia, Latin America, and Africa.

To the extent that attention was paid to the earlier social capital of the people living in these areas, the assumption was that the former patterns of relationships were "primitive" and not worth saving. Many colonial and post-colonial officials felt that prior institutions had to be destroyed before development could really occur. The diversity of different ways of life was seen as an obstacle to be replaced by modern, centralized institutions that could energize economic activity from the capital.

To integrate what was perceived as overly fragmented ethnic and clan-based political orders, considerable backing was given to regimes that exerted dominance over others. One model of political order was perceived as the appropriate way to organize for development: the strong executive, "winner-take-all," forms of political order. Fearful of disorder in the Third World,

donor countries taught the elite of the newly independent countries a new form of social capital—how to develop networks of private enrichment from the public treasury. And, develop these networks they did. Personal enrichment in the form of Swiss bank accounts was a major preoccupation of many leaders (see Wunsch and Olowu, 1990; Sawyer, 1992). The novels by writers such as Chinua Achebe reflect the pain and suffering felt by many citizens of the ex-colonies to see their own leaders adopting the rent-seeking strategies of those who had little interest in building public trust and the wealth of those they supposedly served (on rent-seeking behavior and its drag on development, see Bates, 1987 and North, 1990).

Rent seeking by national officials continued unabated for many decades because of the lack of institutions that could constrain central governments. Economic development came in Europe after various monarchs were forced to make credible commitments to reduce their interference in the evolution of private-market institutions. Kings needed sources of revenue. Over the centuries, Parliaments wrested credible commitments from impoverished monarchs to fore swear policies that obstructed the evolution of private property and market institutions (North and Weingast, 1988). Between the rents obtained by skimming the revenue from the international sale of agricultural or mineral products and donor assistance, central governments in the Third World have had little need to develop major sources of tax revenue from internal sources. As Jane Guyer (1991) so cogently expressed it, central governments achieved "representation without taxation." Representative bodies have focused more on how to divide the pie than on how to build economies that produced larger pies.

Now that the cold war is over, the flow of aid revenue to developing countries will no longer be so large and based on a country's strategic position in a bipolar world order. This is, and will be for some time, a very painful and dangerous time for the people of developing countries. Leaders who have been advantaged during this era of easy money will find it difficult to switch from playing distributional games over a dwindling pie to encouraging capital formation activities to increase the size of the economic pie for all.

Even assuming that all involved in policy making sincerely want to increase the productivity of their economies and were willing to do "the right thing," do we know enough about how effective capital is developed and sustained that a sure fire list of recommended strategies could be presented and defended? If by strategies one means all purpose remedies that are guaranteed to work in all developing countries, the answer is obviously no.

We know that institutions and their effect on incentives is a critical factor affecting how physical and human capital affect productivity and growth. Well developed market institutions, for example, generate incentives for private entrepreneurs to invest in physical, human, and social capital. The result of these investments, when matched effectively to local conditions, is substantial economic growth due to increased productivity. We also know that a polycentric public sector with active specialized and general units organized at a local, regional, and national scale helps individuals to solve problems that are not effectively solved through the operation of markets (see V. Ostrom, Feeny, and Picht,

1993; V. Ostrom, 1991). An active and entrepreneurial public sector invests in infrastructures (roads, schools, irrigation systems, power generation, etc.) and produces public or common-pool resource goods (public health, natural resource regulation) that enhances the productivity of the private sector (E. Ostrom, Schroeder, and Wynne, 1993). And the growth of a private sector can provide the income to build and maintain more infrastructures and public goods. It is these mutually re-enforcing sets of relationships between private and public sector investments and activities that one can call economic development.

What the last several decades of experience with the effects of donor investments and advice have illustrated is a lack of knowledge about the steps to be taken to achieve entrepreneurial private and public sectors. Something is missing in the efforts to invest in capital and create institutions that generate incentives leading participants to devise mutually supportive growth processes. For several decades the accepted formula for jump-starting development processes has been to make external funds available to invest in physical infrastructure. Billions of dollars have been spent building highways, irrigation systems, power generation and transmission facilities, and providing technical assistance to the governments of developing countries related to the use of the new high-tech physical capital put in place. The overall dismal record is well known. Many of the projects have not been sustainable (E. Ostrom et al., 1993). That is, after the project has been completed, the net flow of costs has exceeded the net benefits of the project. Further, the massive loans assumed by developing countries have proved to be more of a burden to long-run development than the desired stimulus to further capital investment and economic growth.

In recent years the failures of the "infrastructure first" strategy have become more obvious. Other favorite panaceas have been recommended. Recognizing that large public bureaucracies can be a burden that represses, rather than stimulates, private initiative, efforts to achieve structural adjustment have been favored. Privatization has been a slogan masquerading as a workable policy in many lists of conditions precedent. But without a solid knowledge of the physical and technical attributes of a sector and the presence or absence of supportive cultural and institutional capital, privatization can simply be the transfer of valuable assets from public ownership to private ownership by a small group of politically well-connected individuals. Creating private monopolies is not necessarily an improvement over public monopolies.

The difficulty of sustaining collective action over the long term, where contributions are costly and benefits are hard to measure and dispersed over time and space (Olson, 1965), has led many to presume that only interventions from state agencies could provide adequate infrastructure in developing countries. Further, where technical knowledge and economies of scale are involved, it has often been presumed that this external force should be a large, central government. If collective action did occur at a local level, it was feared that it would be undertaken by those who already have substantial assets and power and who could guarantee themselves that the return they receive would be greater than the costs they invest. If the elite obtained most of the benefits, this would further exacerbate the differences between the haves and the have-nots in rural areas of developing countries (see papers in Pant, 1984). Central governments have been seen as the agent of change who can break the

control of wealthy land owners in rural areas who obtain a disproportionate share of whatever suboptimal collective action is undertaken. Evidence from many diverse sectors in many countries obtained by DFM researchers has repeatedly challenged this presumption.⁷ Much of this evidence has been synthesized in other reports. In the next chapter, we will focus specifically on how the diagnostic tools developed as part of the DFM project can be applied to understand how projects with a different paradigmatic view of the role of central government have been able to design successful intervention strategies.

Notes

1. Transformation activities take one set of physical inputs and transform them into another set of outputs that may then be used in still further transformation activities or be finally consumed. Transaction activities are the relationships among the individuals involved that take time and energy to accomplish the transformation activities. See E. Ostrom, Schroeder, and Wynne (1993) for a detailed discussion of transformation and transaction costs involved in the provision and production of goods and services.
2. Cattle have frequently been a major form of capital accumulation in Africa. Robin Fielder (1973: 351; as cited in Bates (1990) notes that the Ila of Zambia often say that: "Cattle are our Bank." Fielder continues to explain:

By this . . . they mean a deposit account where their property is saved and where it will increase in value the longer it stays there. Cattle are regarded very much as shares and investments in capitalist societies. . . . There is no mystery about it at all: the investment is a very sound and highly rational one, and every Ila, educated or otherwise, is imbued with its sense from the time he herds his father's cattle as a small boy (1973: 352; as cited in Bates, 1990: 155-156).
3. Parents often invest in the education of their children not only to enhance their children's future income but also to enhance the income of the parents, especially in developing countries. In Zambia, Robert Bates indicated that: "Parents paid the expenses of educating [their children], imparting sufficient skills that they could successfully compete for jobs in the cities of the Copperbelt. The costs of education were high. . . . But so too were the returns. For adults devoted resources to their children not only because they loved them but also because they expected later remittances of goods (soap, bedding, building materials, clothes, and prepared foods) and money from children who held jobs in the towns. . . . Taking into account the magnitude and duration of the costs incurred in schooling, the period of waiting for a child to gain employment, and the subsequent magnitude and duration of the payments of remittances, the rate of return to expenditures upon children lay in the range of eight to ten percent" (Bates, 1990: 154-155).
4. The broad-based lineage structure of the Luo in Kenya, for example, enables individuals to spread risk. "They can disperse their cattle to family members located in contrasting settings; drought in any particular area is therefore likely to affect but a small portion of the individual's herd. They can gain access to gardens in different ecological zones. . . . The lineage form of property rights thus provides insurance (Bates, 1990: 158).
5. John R. Commons (1957) stressed the difference between the plant, on the one hand, and the going concern, on the other. The going concern included the working rules that enabled those in the going concern to relate to one another in a productive fashion in using a plant.
6. See F. Martin (1989/1992), Common-Pool Resources and Collective Action, vols. 1-2 and Hess (1994) Common-Pool Resources and Collective Action, vol. 3, for extensive bibliographies of case studies describing institutions related to the use of common-pool resources (CPRs). These bibliographies are mounted on the IU-B Libraries Gopher under the menu "Workshop in Political Theory & Policy Analysis." To access the gopher via the Internet, gopher to: lib-gopher.lib.indiana.edu (129.79.34.15) port 3080.
7. Research has been undertaken in Bangladesh, Cameroon, Cape Verde, Chad, Ghana, Indonesia, Ivory Coast, Mali, Nigeria, Niger, Nepal, Tanzania and Zaire and in relationship to the provision of education, health, renewable natural resources, irrigation, roads and the more general activities of designing, financing, constructing, maintaining, and regulating the use of infrastructure. See Siegel, 1994.

Chapter III

DIAGNOSTIC ASSESSMENTS OF INSTITUTIONS AND INCENTIVES OF ACTORS

When physical and human capital are allowed to go to waste or are used inefficiently, analysts need to inquire why. Rarely are there single answers to this question. Each of those affected by such inefficiencies, are usually trying to do the best they can given the incentives they face. Incentives can, however, lead individuals to act in ways that do not produce as many net benefits as could be achieved with further investments of complementary combinations of physical, human, and social capital. Investment in capital takes resources. Time and effort are frequently among the more important resources used in capital formation. The amount of time and effort required to change practices from less efficient to more efficient is frequently far greater than recognized.

Diagnosis requires analysts to identify what is problematic about current results obtained by actors who are engaged in linked activities dependant upon information they obtain and incentives they face in a particular setting. For there to be a problem, the results obtained must be evaluated as being less desirable than other feasible outcomes. To understand a problem one has to identify the actors who are involved. Then one needs to ask why these actors are achieving less than they could. To do this, one has to dig below the surface of their day-to-day operations to analyze three broad factors: (1) physical-technological attributes of the goods they are producing, distributing, selling and/or using; (2) their shared knowledge, understandings, and levels of trust and reciprocity; and (3) rules used to regulate what must, must not, or may be done by participants in different stages of their activities (for further descriptions of this type of diagnostic assessment, see E. Ostrom, 1991; E. Ostrom, Schroeder and Wynne, 1993; and Schroeder, 1994). In this chapter, we will proceed to illustrate this diagnostic process by first examining the processes that have been frequently utilized in Nepal with the intention of enhancing the productivity of farmer-managed irrigation systems. Then, we will examine a successful effort to intervene which used a different method that overcame many of the problems facing earlier efforts to use donor-assisted projects trying to increase agricultural productivity in one of the poorer countries of the world.

Assisting Farmer-Owned Irrigation in Nepal

The Problem

Throughout the world, farmers living near to potential sources of water have organized themselves to design, finance, operate, and maintain irrigation systems to provide water to their own fields. By making substantial investments in this type of physical capital, farmers greatly enhance the productivity of their own land and labor as the agricultural yield they can obtain when irrigation water is available is usually far in excess of the yield when they depend on rainfall alone. Farmers thereby create jointly owned "hydraulic property" through

these investment efforts (Coward, 1986). Many of these systems operate effectively over long periods of time requiring little or no help from others. However, other farmer-owned systems are constructed with such limited financial resources (frequently due to problems in obtaining credit) and inadequate technical and/or managerial know-how that they do not operate effectively. At times farmers give up and lose their past investments.

Donors and national governments interested in improving agricultural productivity have tried for several decades to help those farmer owned systems that are not performing as well as others (see Yoder, 1994). Most of the efforts have involved donor funding of host-country building of new irrigation systems to replace the systems constructed by the farmers. Tragically, the agricultural productivity of many of these systems has not improved, or even declined, after major investments in new physical capital. Thus, the problems facing any donor-assisted project in Nepal are how to identify the physical-technological nature of the problem and how past efforts to improve physical capital had been undertaken. To do the latter requires identifying the actors involved and incentives facing these actors, the type of common knowledge, trust, and reciprocity involved in these prior efforts, the rules used in designing projects, and the resulting processes and outcomes. With this information, successful projects can be designed that achieve the desired outcome of increasing agricultural productivity and leaving behind more social capital than existed prior to the project.

The Setting

Nepal is 141,000 square kilometers in area or about the size of the state of Wisconsin in the U.S.A. It is a landlocked country with India on the south, east, and west, and the People's Republic of China on the north. The country is famous for the Himalayas and contains within its borders the highest mountains in the world, but it also has lands that are only 90 meters above sea level in the Terai on the Indian border. Most of the people of Nepal live in the middle hills and the flat plains, the Terai, adjacent to India on the south.¹

The people of Nepal are as varied as the geography. Speakers of Tibeto-Burman languages have their ancestral origins to the north and east. People speaking Indo-European languages are probably more recent arrivals. Although Nepali is the official national language, Nepal now has approximately forty different languages spoken within its borders. There are, at present, approximately 18,000,000 people in the country and the population growth rate exceeds 2 percent per annum. Although the population ranks among the lowest in South Asia, Nepal's population per arable hectare is among the highest in Asia. The population density in the hills is variously estimated to range from 450 to 650 persons per square kilometer of cultivated land. Rice is the most important crop when irrigation water is available. Maize is the major crop where irrigation water is not available.

The Physical-Technological Nature of the Goods Involved

Once an irrigation system is constructed, a common-pool resource (CPR) is created. CPRs are natural resources or constructed facilities where solving the problem of excluding beneficiaries is non-trivial and benefits are subtractable (see E. Ostrom, Gardner, and Walker,

1994). Once water is flowing in a canal, it is not costly for a farmer, whose fields are adjacent to the canal, to construct an opening to allow water to flow onto the farmer's land. If *any* farmer can take water from a system -- whether or not the farmer contributes to the cost of providing the system (by participating in governing the system and by contributing labor, materials, or irrigation fees) -- few incentives exist for any other farmer to contribute. If farmers do not contribute to the provision of the system, then whether the condition of the system deteriorates or not depends on whether a governmental agency (or a donor) assigns public officials to operate and maintain the system and the incentives of the public officials who are assigned these tasks.

The second key characteristic of all CPRs is that the flow of benefits produced by a CPR is subtractable. The water that a farmer takes out of an irrigation canal is subtracted from the volume of water in the canal and is not available to other farmers except as drainage occurs in a system. Both CPRs and private goods share the characteristic of subtractability. The water used by one farmer is not available for use by other farmers. A wide variety of allocation rules can potentially be adopted to regulate who receives water, when they receive it, and under what conditions. Whatever allocation rules that officials and/or farmers attempt to establish for an irrigation system, temptations always exist to cheat by taking more water than authorized, taking water at a time that is of more value to the individual farmer than following rules, by contributing less inputs than required given the water allocated, or in some other way not following rules. Rice farmers in particular prefer to keep their rice paddies flooded continuously since rice is intolerant to drying and highly tolerant to excess water. Extra water helps to keep weeds under control.

In addition to two attributes that irrigation systems share with all CPRs, irrigation systems are also characterized by: (1) non-stationary resource units and (2) physical differences among head-end and tail-end locations on an irrigation system. Irrigation systems are like fisheries in regard to non-stationary resource units and like rivers used to carry away pollutants in regard to the difference between head and tail positions on a water course. The availability of non-stationary resources is more difficult to measure and predict than when resource units are stationary like trees or grasses. Thus, the task of devising authority rules to allocate irrigation water is far more challenging than the task of devising authority rules to allocate the right to harvest thatch on land owned by a village in common (see Agrawal, 1994). If a reservoir stores water related to an irrigation system, some of the uncertainty about the quantity of water available is reduced and water releases can follow predictable patterns so that farmers can plan when (and sometimes) how much water will be available.

In Nepal, most irrigation systems are run-of-the-river systems without storage. Consequently, farmers face considerable uncertainty about the timing and quantity of water that will be made available to them except during the monsoon season when water is usually available in substantial quantities and the problem may be one of too much water rather than lack of water. In run-of-the-river systems during the dryer months, the temptation to take water when it is available, whether one has a right to it or not, are greater than when water has is kept in storage for later allocation and use.

The second attribute of many surface irrigation systems is the strong asymmetries among participants created by the physical differences at the head-end versus the tail-end of an irrigation system. Farmers located high in the system have an opportunity to take water with little effort and do not feel the effect of the scarcity their actions produce on those lower in the system. Further, farmers located high in the system receive fewer benefits from work devoted to repairing canals -- even the canal that passes by their own farm. This asymmetry is a result of the cumulative nature of the process of water loss along a stretch of a canal.

Farmers can increase the level of delivery efficiency by allocating time and resources to repair and upkeep of main and branch canals of their system. Farmers located high in the system, however, do not fully perceive the extent of benefits produced by maintenance activities since benefits are compounded along the length of the watercourse. A farmer who was solely responsible for maintaining the canal passing by his farm outlet, could increase the delivery efficiency in his own reach a small amount -- say 1 percent. If all farmers along the reach were to increase the water delivery efficiency of their own reach by the same small amount, however, the sum of all these improvements would be quite substantial.

The importance of this cumulative asymmetry is the challenge it adds to the problem of providing irrigation systems over time. Not only is there a free-riding problem, but the farmers at the head of the system would have a hard time fully comprehending how much harm they generate for those lower in the system by not investing adequately in the maintenance of the canal reaches located higher in the system. Solving this problem calls for the design of rather extraordinarily clever rules to insure that sufficient resources are generated to overcome the typical problems of free-riding, made even more difficult by the added problems of asymmetry.

Irrigation systems differ in regard to other physical factors. The presence or absence of storage strongly affects how an irrigation system is operated. In Nepal, most systems are run-of-the-river systems so there is not great variation among Nepal systems in regard to storage. There are, on the other hand, substantial difference among Nepali systems in regard to the permanence of headworks, whether canals are lined or not, the terrain in which an irrigation system is located, the physical layout of the system (length of canals, number of branches, size of service area, etc.).

Most research on irrigation has focused on the effect that changing physical variables, such as creating permanent headworks and lining canals, has on various aspects of the technical operation of a system. How these variables affect the incentives of participants has not been extensively explored. The quantity of resources needed each year for maintenance will usually be less on irrigation systems with "modern" physical works such as lined canals and permanent headworks than on systems without them (Lam, Lee and Ostrom, 1994). Unless the changes in these physical structures are undertaken with a consciousness that they will affect the other forms of capital needed to run a system, however, they may be destructive (E. Ostrom and Gardner, 1993).

Past Efforts to Improve the Physical Capital of Nepal Irrigation Systems

Many efforts to improve the operations of farmer owned irrigation systems have also focused on the physical capital aspect of irrigation systems and ignored the human and social capital aspects. Donor-assisted projects are usually funnelled through national irrigation agencies who are then responsible for designing, constructing, and maintaining the new systems once they are in place. To illustrate how these interventions have frequently operated in Nepal, I will briefly describe the process of "improving" the Chiregad Irrigation System located in the Dang District of Nepal.²

The construction of the Chiregad system began in 1983 under a joint project of the USAID funded Rapti Integrated Rural Development Project and the Nepal Department of Irrigation. Construction was completed four years later. The land served by the system is estimated to be between 302 and 425 hectares. The new system was constructed in an area already irrigated by five irrigation systems constructed, governed, and managed by the farmers who owned the land served by their systems. The existence of these systems was not even recognized by irrigation officials. The construction of this system was planned and designed solely by Department of Irrigation engineers. Farmers in did not have any role in the process of designing or constructing this system. A new and permanent headworks was constructed as well as a lined main canal and branch canals. The field channels in the system, however, are basically the same as those used for the five farmer-owned systems. The new construction has shown several serious design and construction flaws. The design engineers did not pay attention to the loose and sand-like soil in the region. As a consequence, the new deep-cut canals are frequently blocked with mud and cause serious difficulties in operations and maintenance. Slides along canal alignments and poor drainage have caused serious problems at many locations of the system. Hilton (1990) writes,

Main canal slides of sufficient magnitude to fully block the flow of water in the system have apparently been occurring on an annual basis. A long stretch of the main canal was covered in order correct this problem, but two slides blocked the main canal south of Bagar in 1989/90. The problem of sliding has been quite acute in Rajpur. In 1989/90 agricultural season, slides were so frequent in the branch that the *mauja* (village) received water only twice. Sliding and erosion were so severe on the Kanjuwar branch that the mauja received water only once, and that was apparently well before 1989/90.

. . . Because the branch [Mairawa canal] incorporates neither outlets nor drains, excess water can only flow to the tail area. . . . This apparently happened frequently in the 1989/1990 agricultural year, and caused crop damage and erosion on the farmers' land at the branch tail. The problem was so serious, in fact, that one farmer at the tail declared he would destroy the canal upstream of his land if the problem were not corrected for the upcoming paddy season (1990: 87).

After construction, a water-users committee was formally established by DOI as a mechanism described as one to facilitate farmers' participation in irrigation management. Irrigation

officials played an extremely important role in the process of forming a water-users committee. The way that a committee was established in these systems is similar to what has happened in many agency-constructed systems in Nepal: irrigation officials came to the system to summon farmers to a meeting and to inform them that a water-users committee had been established in their system. The officials simply appointed the *Pradhan Pancha* (chairman) of the local panchayat to be secretary of the water-users committee, and the secretary in turn appointed other members to the committee. As a result, while the *Pradhan Pancha*, who owned *no* land in Chiregad's service area was given a crucial role in the committee, the *aguwas* (water managers) of the five farmer irrigation systems serving the area incorporated were not even included on the committee. The water-users committee was designed to be a unitary organization for the entire new system. In other words, other than a committee at the system level, no organization formally exists at lower levels. As both systems are characterized by a number of branch canals at which communities with distinct interests are located, such a unitary institutional arrangement is highly questionable. During her fieldwork, Hilton (1990) found that no members of the user's committee could provide her information about the characteristics of the system and how the system actually operated. The water user committee has rarely met and undertaken few activities.

The user committee was established without any effort to understand how farmer organizations had been organized. Each of these organizations were related to a *mauja* (village) and coordinated the efforts of farmers in that village in regard to both water distribution and maintenance. The rules for each *mauja* differed for water distribution and for resource mobilization related to maintenance. It would appear that the farmers in each organization were able to design rules that suited the local situation. Further, these organizations were strong enough initially to continue operating in a low key manner to help with water distribution and maintenance of the system. These traditional organizations are not "legal" and are not explicitly recognized by the Department of Irrigation. Consequently, their legitimacy and authority have been subject to continuous challenge, and have been eroding.

The five farmer systems used to be able to provide adequate water to farmers located in all five *maujas*. After the Chiregad system was constructed, farmers in only three of these five *maujas* consistently received water from the new system. One of these *maujas* faces the problem of low reliability of water delivery in the monsoon season, as the canals are often damaged by floods. Another *mauja* faces the problem of excess water due to poor drainage. Thus at the end of this effort to improve agricultural productivity through an investment in physical capital, a smaller service area is being served; water deliveries are unreliable; a newly established, formal, users' committee is non-functional; and the five farmer organizations that used to keep their systems operating well have been severely weakened. Not only is the physical capital of dubious value, a substantial reduction in social capital has resulted from this process.

While thousands of farmer governed irrigation systems in Nepal have received no more than occasional small-scale support from their local district, those that have been the object of external interventions have frequently had a similar experience to that of Chiragad. Systems

that could have used new physical capital ended up with new headworks, new canals, and new gates, but not necessarily operating at better than the earlier systems. The reduction in the amount of land actually served is not unusual nor is the weakening if not destruction of the farmer organizations that had existed at a prior time.

The Actors

The farmers of Nepal are noted both for their ingenuity in constructing and maintaining their own irrigation systems in difficult terrain but also for their indigenous engineering capabilities reflected in the miles of terraced paddy fields seen by anyone flying over the hills of Nepal. While there are many perverse incentives to overcome in constructing and maintaining an irrigation system, many farmers have taken the initiative to form organizations that successfully change incentives so that they are able to mobilize substantial resources to construct and maintain their systems and to allocate water in what is considered by participants to be fair and reliable. Others have been defeated at the substantial task of creating the appropriate forms of social capital needed to overcome their problems.

Communication and transportation networks have always been limited in Nepal. Thus, farmers living in one small valley may know very little of what is going on elsewhere except the limited news that comes to them about activities in Kathmandu, the capital city. Each group of farmers who contemplate building an irrigation system, maintaining it themselves, and developing methods for allocating water, must therefore draw on the experience of others living very close to them. Farmers have not been able to learn from the experience of those living at some distance. Thus, innovations in physical, human, and social capital developed in one small district may spread within that region but not to other parts of the country.

Currently, most professional staff on government-organized irrigation systems in Nepal are employed within a civil service system. Promotion in the Department of Irrigation, like that in many other government agencies in Nepal, is largely based upon seniority, the evaluation of superiors, and qualifications. Seniority has effectively become the more important criterion for promotion while evaluation has been increasingly abandoned by superiors as a motivational tool. When seniority becomes the basic criteria for promotion, there is little incentive for officials to be actively involved in solving farmers' problems. In an incentive structure such as this, irrigation officials who do not commit serious public mistakes or offend their superiors, will eventually be promoted. Individual initiative and creativity are discouraged. Such a situation becomes even more perverse when politics affect the promotion decision of a civil servant. Facing an incentive structure in which pleasing politicians instead of hard work pays off, there has been a strong temptation for officials to assist other officials in their rent-seeking activities.

Corruption pervades the day-to-day operation of the Department of Irrigation in many petty and far from petty forms. The most serious corruption in the use of public funds comes from large government contracts. Politicians try to bring government contracts to their districts as a way of winning political support but also as a way of receiving "commissions." Contractors provide a percentage of "commissions" to the appropriate field representative of the

government, who, after taking his cut, would pass on the rest up the bureaucratic hierarchy to the higher level government officials who arranged the commissions in the first place. A contractor describing the system concluded by saying that "in Nepal, only corruption is on an organized basis!" (Benjamin, 1989: 259). There is a strong incentive for civil servants in many countries to join the bandwagon of corruption. A civil servant working in an agency where corruption is widespread will find that the only options open are to cooperate in the corruption, to be isolated by colleagues, to ask for a transfer, or to quit. If he does not cooperate, he will be harassed by his co-workers or transferred by superiors anxious that their share of the illicit proceeds arrive as promised. The pressure to conform is strong. And, given the low salary levels of many civil servants, foregoing the income associated with "accepted" practices is also extremely difficult.

Professional engineers have undertaken higher education in order to gain the status associated with the profession of engineering. Engineers build things and that is where the status is in engineering. Being assigned to the Operations and Management (O&M) part of irrigation is considered undesirable both from the perspective of the status of that position and the financial support given to the division. Funding is weak in operation and maintenance. The specific assignments made to DOI officials in the field provide them with many fewer opportunities for personal income enhancement through the contractual process. Officials may find themselves engulfed in high levels of conflict among village factions and dissatisfied farmers.

Common Knowledge, Trust, and Reciprocity

Farmers who have successfully constructed and maintained an irrigation system over a long period of time have to have achieved a high level of common knowledge about the hydrology, weather patterns, soil conditions of their local environment and about the other families who are dependent on the same system. Farmers may not be literate and may not know the scientific terms used or theories that explain the phenomena they have come to know so much about, but they can tell you exactly which parts of a river or channel are subject to slides and how much rain normally comes during monsoon. They have also had to work out arrangements whereby either they have established effective levels of trust and reciprocity or they have designed institutions that monitor each other's behavior sufficiently that they can all be assured that rules are being followed to a large extent. These patterns can rapidly be destroyed if an area is subject to substantial change with new settlers who arrive rapidly without sufficient time to acquire the common knowledge of others with whom they need to work. There is nothing automatic about the acquisition of effective common knowledge and modes of working together.

Engineers also share a high level of common knowledge about the technologies they have studied. But, they may also share a view of farmers as ignorant due to their lack of literacy and education. Thus, even though engineers and farmers could learn a lot from one another, they frequently do not communicate with one another very much. In a caste society, the difference in social status between many farmers and those who are officials and engineers also creates a large chasm between these two groups.

Rules-in-Use

In most external interventions, multi-national donors have tended to negotiate directly with a national government to provide funds (through grants and loans) to the national government. Donors expect that national government officials will be the implementors of the project. The "rules-in-use" are negotiated between the donor and the national government. The presumption in the agreement is that a national government will take only those actions which are legal within the context of its own country and that local farmers do not need to have a voice in this process. Given the principle of absolute sovereignty, the only rules formally involved in most donor-assisted projects are those which impose rights and obligations on the national government. Rarely are there provisions in these agreements that require a national government to do an institutional assessment of the nature of property rights that already exist in an area and how a new or improved system might affect the rights and duties that have already been developed in this setting. Thus, the project "rules" replace locally developed rules-in-use without even a recognition that years of effort to develop local social capital may be eradicated by a bulldozer toppling an old, primitive water divisor that allocated water according to the rules that farmers had developed over a long period of time.

The Resulting Process and Results

As a result of incentives facing farmers and irrigation officials in many donor assisted projects, few systems achieve levels of net benefits close to those projected in initial planning documents after completion of the projects (for documentation, see Benjamin, Lam, Ostrom and Shivakoti, 1994). The actors involved and incentives they tend to face in "standard" programs are illustrated in the left-hand column of Table 3.1. The right hand column of Table 3.1 illustrates the contrasting configuration of actors, incentives, and results obtained in a program that used a different logic to assist farmer-organized irrigation systems in Nepal.

In the "standard" programs, farmers initial efforts to communicate with design engineers are not taken seriously. After several rebuffed efforts, farmers take a "wait and see" attitude toward the new project. If they had been organized previously, they may find ways of re-organizing after the project is completed so that they can achieve as good or high levels of productivity. So during these phases, design and construction engineers pay primary attention to the incentives they face within bureaucratic organizations and in their relationships with contractors. They achieve higher personal rewards by designing larger projects with higher benefit-cost ratios. Since the financing is handled at such a high level and farmers are not expected to pay fees to cover the costs, few actors have any incentive to keep the costs low. Nor are there very many actors concerned with the quality of construction.

At the operational phase, an underfunded government agency is expected to operate a large and sophisticated new system. The officials on the payroll may not even be provided bicycles to get out to the various gates that they are supposed to open and close to operate the system. These gates may simply be left open so that the farmers can return to their methods of regulation through adding stones and mud to a canal. Or they may be broken by the farmers so they can get water through rather than waiting for an official who rarely comes.

Table 3.1: Actors and Their Incentives in "Typical" External Intervention and in WECS/IIMI Project

	In Typical Program	WECS/IIMI Program
Design	<p>Engineers</p> <p>Use their own measurements and maps to determine size and layout of system. No attention paid to private water rights. Overestimate service area in order to increase benefits in project plan.</p>	<p>Engineers</p> <p>Use own measurement and maps supplemented by farmers' knowledge of local problems. Only marginal changes in system layout and size are considered. Must satisfy farmers in order to get their sign-off on design.</p>
Financing	<p>Donors</p> <p>Supply funds subject to agreement with host country. Water fees, if collected, not allocated to project. Big projects are favored over many smaller projects due to monitoring costs. More productive investments may be overlooked and low return investment made.</p>	<p>Donors and Farmers</p> <p>Donors provide grant and loan funds. Farmers contribute some funds and labor. Investments made where farmers have assigned high priorities.</p>
Construction	<p>Private Contractors</p> <p>Provide commissions to supervising officials and may lower construction standards.</p>	<p>Local farmers supplemented by project engineers or private firms</p> <p>Farmers learn technical knowledge and monitor use of materials carefully.</p>
Operation	<p>Government Agency</p> <p>Small staff of government officials willing to let the more powerful and wealthier farmers obtain much of the water.</p>	<p>Farmers</p> <p>Allocate water themselves. Monitor water allocation. Withhold water temporarily from those who do not contribute to maintain or try to break rules. Each assured others are complying, so most comply.</p>
Maintenance	<p>Government Agency</p> <p>Maintenance budget is low. Will try to get farmers to do annual maintenance, but farmers may not be willing to do much.</p>	<p>Farmers</p> <p>Undertake maintenance. Monitor each other's contribution. Each watches the contributions of others, so most comply.</p>
Use	<p>Farmers</p> <p>Those at head end of system will take as much water as they can, ignoring adverse effects on others.</p>	<p>Farmers</p> <p>Water used more equitably throughout the system.</p>
Results	<p>Investment in upgrading physical capital does not generate expected net benefits and frequently leaves farmers worse off after project completion.</p>	<p>More accomplished for funds allocated because of farmers' efforts. Increased productivity of systems after completion.</p>

The officials may try to get farmers to help out in the Spring with the maintenance of the system. They may or may not be undertaken by the farmers depending on how much maintenance affects the amount of water they obtain. Thus, maintenance may be provided at a very low level and the system may deteriorate relatively rapidly. But frequently, the new irrigation system does not make it easy for the earlier indigenous organization to continue in practice. The farmers assert that the government is now in charge and should now operate and maintain the system. If farmers located near to the head end of the system can obtain water without much maintenance effort, they are freed of the mutual obligations that had earlier existed and can ignore the consequences of their lack of inputs on others. Without annual meetings where information is shared about the condition of the system and the need for mutual interdependent activities, farmers may not gain new levels of common knowledge and may lose much of what they previously had.

An Example of a Successful Intervention

Because of their detailed understanding of the processes involved in many donor-assisted projects and a deep awareness of the sophistication of many farmer-governed systems in Nepal, an intervention strategy was designed by Prachandra Pradhan and Robert Yoder that overcame many of the perverse incentives that have typified many prior efforts. This a project funded by the Ford Foundation and designed by the Nepal Water and Energy Commission/Secretariat, and the International Irrigation Management Institute in Nepal (WECS/IIMI). This successful intervention worked with the same kind of physical and technological world as prior projects. But the concepts of who was an important actor and how to build rules-in-use that helped farmers build on their prior social capital to create better governance systems were radically different. In the WECS/IIMI project, farmers were an integral part of the process. Further, their knowledge of local time and place contingencies was respected. And, their prior rules-in-use were respected even though the project exposed them to other farmer managed systems that had more effective rules-in-use. The presumption was that the farmers themselves would need to revise their own rules-in-use to match their local circumstances rather than the project taking that responsibility itself.

As a result of the long-standing research and action program of Robert Yoder (1986) and Prachandra Pradhan (1989) in Nepal, they had become aware of a large number of highly successful farmer-governed irrigation systems that had survived for long periods of time achieving agricultural yields far above the average in Nepal. Due to poor roads and communication networks, farmers in one area were virtually unaware of what farmers in other areas were capable of doing. Farmers in many areas could also effectively utilize modest levels of new physical capital.

Under the WECS/IIMI project, a preassessment was made through a rapid appraisal of the capabilities and limits of 119 farmer-organized irrigation systems in the Indrawati Basin in the Sindhu Palchok District of Nepal. As a result of this process, they identified 19 irrigation systems that had at least some levels of organization that were operating and that could substantially benefit from better alignment of canals, new materials for aqueducts, and modest lining of the canals. To obtain external aid, the farmers had to agree to several conditions³:

- the farmers would form a water users organization in order to identify existing and future water users and a plan for water allocation approved by all identified water users.
- the farmers would prepare an initial plan for the improvements and for the future operation and management of the system.
- the farmers would determine requirements for required but unpaid labor and set the rates for paid labor (within guidelines set by the project). Money saved by lower labor rates could be used to accomplish still further improvements.
- the organization would appoint a management committee to assist the field engineer in carrying out both the site investigation, design work, and day-to-day implementation activities.
- the farmers would keep records of their expenditures and of decisions made at meetings that were to be available to anyone who asked to see them.

The project hired engineers who would listen to farmers and stressed the design of improvements that the farmers themselves could operate and maintain and that would make a big difference in the operation of the system. The designs were shown to the farmers who made suggestions for improvements. Farmers had to sign off on the designs, so there was a considerable amount of time and effort put into learning from the farmers about how these systems operated and blending the knowledge brought by the design engineers with the local knowledge of the farmers. Once agreement was reached on how each improvement would be designed, the farmers ranked the improvements into a first, second, and third level priority as they perceived their importance. Farmers were told that funds definitely would be provided to do the first priority improvement. If the farmers contributed sufficient labor during the construction phase, the project would try to make the funds go as far as possible to cover second and third priority improvements. (Many of the systems were able to construct all of the desired improvements because of the resources that the farmers themselves contributed).

The training program was among the more ingenious aspects of this project. It involved farmer-to-farmer training in institutional design. Farmer representatives were taken from the systems in the project area to irrigation systems in other districts (similar in terrain) where farmers had designed particularly effective governance structures. The farmer representatives (1) attended an annual meeting of one of these systems, (2) toured the entire length of the farmer-governed system discussing why the farmers had used different kinds of physical weirs (mechanisms to divide water among branches of the canal) and how these were related to water rights, and (3) participated in a special session where they could ask the local farmers many questions about the patterns of association that had evolved on the successful systems. In other words, the program enabled farmers, who had developed successful social capital in one setting, to impart that knowledge to other farmers from a similar setting. Given that the visiting farmers could tell rapidly that the farmers in the systems they were visiting were doing much better than they were, the visiting farmer representative took this training

program very seriously. This was not a lecture by some college grad telling them the principles learned from a textbook. This was a group of similarly situated farmers telling them how they had been more successful in achieving collective action through their own investment in rules that had been tested in their local circumstances.

The proof of the effectiveness of this development project is in two forms (WECS/IIMI, 1990; Lam and Shivakoti, 1992). The first is in the increased agricultural productivity of the systems. Tables 3.2 and 3.3 both present key indicators of agricultural productivity that demonstrate that there was a marked difference after the project than before. In a separate evaluation of this project undertaken as part of the DFM research effort, Lam and Shivakoti (1992) show that not only was there a significant difference in the agricultural productivity but that the project has generally enhanced the productive capabilities of the systems. As they conclude after extensive statistical analysis of the impacts of the intervention on how inputs are transformed into outputs, "the productivity of the systems after intervention is high on average, [and] its variations depend less on the change in various input variables. The levels of productivity of the systems after intervention have become higher and more stable" (Lam and Shivakoti, 1992).

The second set of important results is the difference in the social capital that was constructed by the farmers themselves. A survey was conducted one year later to ascertain what governance and management differences could be observed (Yoder, 1991). In all 19 of the systems, farmers indicated a stronger sense of ownership. Leadership had changed in 11 of the systems, but was now clearly defined in all 19 systems. Nine of the systems reported changes in the rules they had developed for operation and maintenance and formal meetings with recorded minutes have continued after project completion. "In all systems there has been more cooperative effort to maintain the canal during the monsoon" (Yoder, 1991: 13). The variety of rules adopted, ways of handling maintenance responsibilities, and ways of monitoring conformance indicate that farmers have not just copied something that an official has shown them but have struggled with developing their own workable systems. The project has encouraged a slow development of rules rather than the rapid passage of rules that will not work. They have also had to learn how to enforce their own rule. Several of the project-assisted systems have branched into new agricultural products that they could not have grown before due to the unpredictability of their systems.

Still, further social capital formation is in the making as a long-run result of this project. Some of the farmers from the more successful systems have set up a consulting firm and are running a limited number of training sessions each year that have greatly augmented their own income. The Institute of Agricultural and Animal Sciences is planning to develop an Association of Farmer-Governed Irrigation Systems and has started to publish a Nepali-language newsletter that highlights developments of interest to self-organized farmers and elucidates successful efforts made by different kinds of farmer-governed associations.

Table 3.2

Irrigable Area and Cost of Improvements to FMIS in Sindhupalchok

System	Existing command area (ha)	Command Area Expansion (ha.)	Total irrigable area (ha)	Project grant (NRs)	Cost per irrigable hectare (NRs)
Chhahare	126	37	163	126,615	777
Naya Dhara	55	55	110	139,720	1,270
Besi	65	20	85	119,839	1,410
Dhap & Subedar	30	35	65	85,000	1,308
Soti Bagar	19	11	30	150,699	5,023
Dovanesar	2	10	12	74,807	6,234
Magar	100	43	143	160,805	1,125
Siran Tar	18	6	24	136,789	5,700
Majha Tar	71	16	87	114,321	1,314
Ghatta Muhan	23	10	33	124,321	3,767
Bhanjyang Tar	21	14	35	65,178	1,862
Tallo Jhankri	18	13	31	91,707	2,958
Chholang Khet	23	14	37	116,066	3,137
Chapbot	12	5	17	71,630	4,214
Baghmarra	3	6	9	44,433	4,937
Siran Baguwa	18	19	37	57,488	1,554
Majha Baguwa	13	20	33	113,541	3,441
Tallo Chapleti	8	15	23	78,065	3,394
Total	625	349	974	1,871,024	
Average cost/irrigable ha					1,921
Consultant & WECS supervision				1,192,747	
Tools supplied				82,182	
Farmer training				55,000	
Average cost of supervision/ha					1,356
Total cost of improvement/ha					3,286

Source: WECS/IIMI, 1990: 29 and Lam and Shivakoti, 1992.

Table 3.3

Area Growing Irrigated Crops in Winter Season Immediately Before and After Assistance (ha)
and Head and Tail End Cropping Intensities

NAME OF SYSTEM	POTATO		OILSEED		WHEAT		VEGETABLES		HEAD INTENSITY		TAIL INTENSITY	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Chhahare	0.2	2.5	N.A.	N.A.	N.A.	N.A.	0.1	1.6	200	167	200	192
Naya Dhara	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	200	200	200	200
Besi	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	200	235	200	235
Subedar	0.2	0.4	3.0	12.0	6.0	15.0	0.2	0.4	250	270	250	270
Dhap	0.2	0.4	3.0	12.0	6.0	15.0	0.2	0.4	250	290	250	250
Soti Bagar	0	0.6	0.2	2.5	6.0	15.0	0.2	0.4	150	215	150	215
Dovan Swar	0	0.5	0	0	1.0	2.0	0	0.2	300	200	300	200
Magar	0.5	2.5	0	1.0	N.A.	N.A.	0.5	1.3	190	194	190	200
Siran Tar	0.5	0.8	3.5	3.5	N.A.	N.A.	0.2	0.5	255	200	255	250
Majha Tar	0.8	3.0	2.5	3.0	3.0	15.0	0.5	1.5	300	230	300	230
Ghatta Muhan	0.3	0.8	0.6	1.3	10.0	10.0	0.5	1.0	271	290	271	270
Bhanjyang Tar	0.4	0.4	0.5	1.5	3.0	6.0	0.5	0.6	260	300	260	220
Tallo Jhankri	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	200	270	200	270
Chholang Khet	0	4.6	2.0	3.5	63.0	63.0	0	1.5	220	235	220	220
Chapbot	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	270	300	270	270
Baghmara	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	300	300	300	300
Siran Baguwa	2.5	5.5	3.5	8.5	10.0	15.0	0.5	1.5	300	295	300	285
Majha Baguwa	0	5.0	0	7.5	0	20	0	2.0	280	300	280	300
Tallo Chapleti	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	250	300	N.A.	300

Source: WECS/IIMI, 1990: 29 and Lam and Shivakoti, 1992.

Conclusion

An analysis of a success case has been used to illustrate the concepts elucidated in this report and the general findings of the DFM project that citizens have many more capabilities to create social capital, mobilize local resources, and build sustainable relationships than is perceived through the lens of current development theories. How should projects go about building social capital? The most important change in project design is a change in philosophical approach. Instead of presuming that there is nothing on the ground and that all development activities are the result of external change, a project desiring to help build social capital presumes that some local norms and rules already exist and that the first task is to understand this existing social capital.

A project that helps to encourage the development of social capital has an initial respect for the capabilities of all participants. Instead of looking for buildings or written documents as the definitive signs of local organization, it invests in learning about how local actors perceive the opportunities and constraints in their world and about the norms and rules that are observed in a local community. It presumes that if intelligent people are undertaking activities leading to undesirable results, that the incentives individuals are facing are wrong. It focuses on those incentives and tries to find ways of mediating to change perverse incentives into ones that help individuals jointly produce better outcomes and higher benefit-cost relationships.

Social capital is created and maintained by the very process of working more effectively together. It can be eroded by lack of attention to the underlying nature of the goods, to the kind of trust and reciprocity that exists, or to rules that individuals themselves have developed in their efforts to devise workable allocation formulas for required inputs and distribution of benefits. It is definitely destroyed by breach of prior commitments that remain unsanctioned. Any effort to impose universal rules on individuals undertaking widely diverse activities in different ecological niches will undermine social capital that is well-matched to local circumstances. Rapid changes in population or in relative prices of important input factors will be major exogenous shocks to existing forms of social capital that may or may not be overcome depending on how creative and autonomous local public and private entrepreneurs are in adjusting to exogenous change. Thus, projects that encourage large scale resettlements are always bound to challenge the viability of any social capital that already exists.

Even when effective social capital has been developed, as in the project described in this chapter, major exogenous shocks may threaten its long term sustainability. Significant changes in agricultural prices or new opportunities for labor away from the irrigation systems in Sindhu Palchok could challenge the viability of the institutional arrangements that have been constructed over time in this setting. But this success case should be able to cope more effectively with external changes than many programs given the encouragement of open forms of communication and arenas for joint problem solving. Once participants learn they can solve some problems effectively by adjusting their own rules and procedures, their capabilities for adjusting in the future are far better.

Notes

1. See Benjamin et al., 1994 for an in-depth analysis of farmer organized and government organized irrigation systems in Nepal, the resulting incentives facing officials and farmers, and extensive performance analysis.
2. The information about the Chiregad system used in this analysis is based upon the work of Hilton (1990) and Shrestha (1988) plus a short visit to the site during the spring of 1989 by the author.
3. My thanks to Robert Yoder for reviewing an earlier draft of these conditions and supplying me with a carefully revised list of conditions.

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