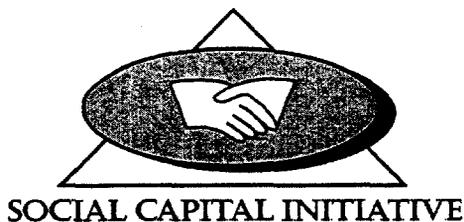


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*Social Capital Initiative
Working Paper No. 13*

**MAPPING AND
MEASURING SOCIAL
CAPITAL:**

**A CONCEPTUAL AND EMPIRICAL
STUDY OF COLLECTIVE ACTION
FOR CONSERVING AND
DEVELOPING WATERSHEDS IN
RAJASTHAN, INDIA**

By Anirudh Krishna and Norman Uphoff

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(by Anirudh Krishna and Norman Uphoff)**

FOREWORD

There is growing empirical evidence that social capital contributes significantly to sustainable development. Sustainability is to leave future generations as many, or more, opportunities as we ourselves have had. Growing opportunity requires an expanding stock of capital. The traditional composition of natural capital, physical or produced capital, and human capital needs to be broadened to include social capital. Social capital refers to the internal social and cultural coherence of society, the norms and values that govern interactions among people and the institutions in which they are embedded. Social capital is the glue that holds societies together and without which there can be no economic growth or human well-being. Without social capital, society at large will collapse, and today's world presents some very sad examples of this.

The challenge of development agencies such as the World Bank is to operationalize the concept of social capital and to demonstrate how and how much it affects development outcomes. Ways need to be found to create an environment supportive of the emergence of social capital as well as to invest in it directly. These are the objectives of the Social Capital Initiative (SCI). With the help of a generous grant of the Government of Denmark, the Initiative has funded a set of twelve projects which will help define and measure social capital in better ways, and lead to improved monitoring of the stock, evolution and impact of social capital. The SCI seeks to provide empirical evidence from more than a dozen countries, as a basis to design better development interventions which can both safeguard existing social capital and promote the creation of new social capital.

This working paper series reports on the progress of the SCI. It hopes to contribute to the international debate on the role of social capital as an element of sustainable development.

Ismail Serageldin
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MAPPING AND MEASURING SOCIAL CAPITAL:

A CONCEPTUAL AND EMPIRICAL STUDY OF COLLECTIVE ACTION FOR CONSERVING AND DEVELOPING WATERSHEDS IN RAJASTHAN, INDIA

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MAPPING AND MEASURING SOCIAL CAPITAL:

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EXECUTIVE SUMMARY

Social capital is a popular current concept in the development literature and in development agencies. But is it real enough to be measured in the field and validated with reference to the achievement of desired outcomes of development programs? Is it something that could be purposefully increased? This paper reports on the observed relationship between social capital and development outcomes in 64 villages of Rajasthan, India. All of these participated for the last seven years in an Indian government and World Bank-funded program for watershed conservation and development. They provide an empirical basis for evaluating whether social capital can be identified and evaluated in quantitative terms.

The database includes 2,397 individual interviews, with an equal number of men and women, 64 focus group interviews with village leaders and elected representatives, and other relevant village- and household-level data obtained from official records. By stratifying the villages in terms of *high*, *medium* or *low* performance in their restoration of degraded or vulnerable common lands, we can assess concretely whether certain social-structural and/or cognitive variables associated with social capital are good candidates to explain differences in measured demonstrations of *mutually beneficial collective action*, the benefit flow that we associate with and expect to observe from the "asset" of social capital.

We find that an index of such social capital variables is related positively and consistently with superior development outcomes both in watershed conservation and in cooperative development activities more generally. In addition to social capital, we find two other variables – political competition, and literacy – also having some significant associations with the measured development performance. Other factors that were expected to be associated with superior outcomes based on theories and hypotheses in the literature are not, however, confirmed by data analysis using correlation, regression and factor analysis techniques.

We look at village performance within the Rajasthan watershed development program because its program components are by their nature collective (and not individual) undertakings. Watershed development activities are thus a good domain for examining social capital, we argue, because the collective action required produces benefits both for downstream residents and for subsequent generations over and beyond what benefits are derived in the short-run within communities.

An index of common land development (CLDI) was constructed to compare the results of local development efforts across villages. But before testing whether better performance was associated with measures of social capital, we examined a range of other hypotheses that are proposed in the literature and by practitioners in the area. We found that none of the alternative hypotheses – relative need, input and support of government staff, modernization and economic development indicators, and social heterogeneity and stratification – was supported by the data as a predictor of collective development activity.

Before investigating the association between social capital and CLDI, we further checked to see how well this index correlated with other measures of development-oriented collective action. Three measures were combined to assess local initiatives: community undertaking of other development projects, collective representation of local interests to higher-level authorities, and satisfaction levels related to four services provided by the government. High and significant correlations observed between CLDI and these other measures indicated some apparent basic community-level propensity at work, contributing to mutually beneficial collective action across diverse areas related to development. The four separate measures were combined through factor analysis into a single index of development-oriented collective action (DCAI).

We next tested whether and how these two indexes related to these two indices, CLDI and DCAI, viewed as dependent variables, may be related to social capital, seen as an independent variable. Measures of social capital found to be useful in other parts of the world appeared to have little relevance in the Rajasthan context. No formally constituted associations, sports clubs, literary societies and the like, exist in 36 of our 64 villages. Where they exist, such associations are mostly government-sponsored, not voluntary, and are not even very active. Newspaper readership is also very low; more than 70 percent of our respondents had never read a newspaper. Reflecting how inappropriate these measures are for this kind of socio-economic setting, we found that an index of social capital constructed out of these measures had no significant association with either CLDI or DCAI. Thus measures developed in other parts of the world, such as northern Italy, have little relevance for assessing development potentials and performance in an environment like that of rural Rajasthan.

A locally validated measure of social capital was constructed by combining responses to six interview questions, three related to structural (network and role) forms of social capital, and three to cognitive forms (norms, values, attitudes and beliefs). We discuss this analytical formulation of social capital in the opening section of this paper and operationalize it in Section VI. These two sets of variables were found to be highly correlated among themselves. With the aid of factor analysis, we combined these six variables into a single Social Capital Index (SKI). This index was found to be highly correlated with a wide range of behaviors and properties commonly associated with social capital, including trust, informal networking and mutual support, reciprocity, and solidarity.

We then examined the association between SKI as an independent variable and the two dependent variables, CLDI and DCAI. Social capital as represented by the SKI was found to be both positively and significantly associated with both measures of development performance.

Two other variables, political competition and literacy, were also consistently significantly related with these dependent variables in multiple regressions, though less powerfully, while several other factors commonly supposed to affect development outcomes were no more significant in multivariate than in univariate analysis.

After examining the effects of social capital as reflected in our index, we investigated some correlates of social capital. As before, this inquiry was theoretically informed. Using household-level data, we checked which variables, associated with what body of literature, might be associated with social capital. The following variables were found to have some statistically significant associations with social capital: information, participation in decision-making, the existence of rules, prior experience with collective action, as well as historical legacy.

Our data indicate that "history" matters, but by itself it does not strongly determine a household's or village's stock of social capital. Intra-district differences are much greater than the inter-district differences that can be attributed to socially formative experience in previous generations. Purposive action to enhance social capital can be undertaken, we conclude, by acting upon its other constituents. This report is not complete, however, as we have not tried to spell these out yet, or to propose a process for social capital formation. First we want to discuss our findings with colleagues and villagers in India. Our research findings will then provide a basis for some prescriptive conclusions.

I. INTRODUCTION – LOCATION, CONCEPTS AND METHODOLOGY

A. The Rajasthan Watershed Development Program: A promising site for inquiry into the nature and effects of social capital

Watershed development offers an important arena for investigating the empirical correlates and origins of social capital – considered here as a source (capital stock) for *mutually-beneficially collective action* (flow) – and for assessing its levels and impacts in participating villages. Protecting and improving soil, water and plant resources in a catchment area is something that can be done, at best, only incompletely by individual activities and investments. Indeed, measures to forestall erosion in a single location may accelerate it elsewhere. There can be some benefits from conservation measures in the short-run, but major benefits accrue to downstream communities and subsequent generations. This is a situation where one would expect *social capital* to be more significant in explaining successful program implementation.

The 64 villages comprising our data base have all been participating in the Rajasthan state government's programs for integrated watershed development which are funded by the World Bank and the Government of India (GOI). These programs were launched in each participating village at about the same time, nearly seven years ago. This provides enough time, we believe, to be able to investigate the causes and correlates of differential community-level performance in watershed programs that reflects people's cooperation to create public as well as private goods.

More than 70 percent of Rajasthan villagers are dependent on agriculture and animal husbandry for their livelihoods. Agriculture is mainly rainfall-dependent in this region; there are no major canal systems in this area. Water drawn from wells and tubewells irrigates less than 20 percent of the crop area of any village. Animal husbandry serves both as a source of supplementary income and also as insurance against failure of uncertain and risk-prone cropping operations. On average, each household owns eight farm animals, mostly cows, sheep and goats. Though richer households own more cows and buffaloes than do poorer ones, most households own at least some farm animals, and even the poorest households draw support from the small numbers of sheep and goats that they own.

All households are dependent to quite a significant extent on village common lands for obtaining fodder for their animals (Jodha 1990; Brara 1991; Krishna 1997). Nearly half of all land of each village is not privately owned but vests, instead, with the state government or with village *panchayats*, units of local government with jurisdiction over one to four villages depending on size. In addition to serving as a source of fodder, such common lands are also the most important source of domestic energy in the form of fuelwood.

Development of village common lands which could increase the production of fodder and fuelwood was a key component of watershed development. Many of these common land areas were on the verge on becoming – or had already become – wastelands. Abysmally low

growth rates of biomass on these lands have restricted quite sharply the total offtake of fodder and fuelwood.¹

Between five and eight residents in each participating village were elected by fellow villagers to a User Committee (UC). The program expected this group to organize and manage, on behalf of the village, a variety of soil and water conservation works on common lands, such as planting trees and grasses, enforcing rules for protection and extraction, and fencing these lands against stray cattle and human encroachment. With project advice and assistance, these activities were expected to sustainably enhance fodder and fuelwood yields on these lands. The Committee worked with government staff to draw up and implement a development plan for the common lands of its village. Its members were wholly responsible for formulating and implementing local rules that would govern the sharing of costs and the distribution of benefits.

Common land development was a need felt keenly and collectively by residents of these villages. Of 2,397 respondents interviewed, 2,123 (89%) included “improvement of common lands” among the three most important development needs they identified, along with drinking water, schools, and improved (metalled or paved) roads.

Under the program, villagers must contribute at least 10 percent of program costs, with benefits shared among them according to the rules that their UCs devise and which they approve. Eighty-eight percent of all respondents stated that they had themselves, or through their representatives, participated in decision-making, and 87 percent felt that the program had delivered tangible benefits to the community, a remarkably positive evaluation for any public-sector program in India.

Although common land development (CLD) represents a collectively organized response to a need felt acutely by most villagers, program results have varied considerably from village to village. In terms of objective indicators (survival rates of trees, grass harvests per capita, etc.) as well as subjective evaluations (levels of individual satisfaction), high-performing villages stand out quite sharply from low-performing ones.

We undertake to explain variations in performance levels first by considering a number of alternative hypotheses, each corresponding to a prominent theoretical argument in the social science literature on development. Before considering explanations of village performance that derive from the concept of social capital, alternative strands of explanation should be examined. As seen below, however, none of these hypotheses shows any significant strength when evaluated across a very large and diverse set of communities. The process of village selection and household sampling is described in detail at Annex 1.

¹ Before program implementation, common lands yielded on average less than 75 kilograms of grass per hectare. *More than ten times this amount* was observed being harvested after program implementation. Baseline Survey Report, College of Technology and Agricultural Engineering, Rajasthan Agricultural University, 1993.

B. Concepts

There is, unfortunately, more demand for rigorous conceptualization of “social capital” than there is supply. Although the term is widely used both in the social science literature and in development agency discourse, most uses are more descriptive than systematically analytical. In this work we aim to make analytical and possibly theoretical contributions to an understanding of social capital that is rigorous but also useful for development work.

We started with the approach known as “subordinate conceptualization,” breaking the concept into major components. We recognize that the study of other forms of capital or resources in economics would be much less advanced today if there had not been some basic *distinctions* made within what are otherwise very large and diverse categories. It has been very important to distinguish renewable from non-renewable natural resources, skilled from unskilled labor, and physical from financial capital.

We next concluded that if the concept of social capital is to mean anything more than social organization or social values, it needed to have some basic characteristics in common with the general concept of capital that has been elaborated within the discipline of economics. The core meaning of capital is that it represents a *stock* of assets that yields a *flow* of benefits, such as income streams. It is essential not to confuse these two categories: stock and flow. Capital represents the former, and while it may be identified and valued by the latter, it should never be equated with the latter.

What is the *flow* that is associated with (results from) social capital? By what fruits will we know it? We propose that the stream of benefits, the social income or revenue flow from social capital, is *mutually beneficial collective action* (MBCA), as suggested at the outset of this study. This is a matter of definition.

Both practicality and parsimony suggest that there is no need to invoke an explanation as complex – and still controversial – as social capital for purely individual action. What purely economic analysis and theory have found difficult to explain is behavior that involves cooperation for mutual advantage, where transaction costs are plentiful and deterrents such as free-riding abound. That there is such a thing as MBCA is an empirical fact, and individualistic self-interest-maximizing concepts of motivation often do not do justice to this phenomenon.

The concept of social capital has been proposed not just to account for individual behavior – people’s willingness or predisposition to act cooperatively for mutual benefit – but to deal with more aggregated phenomena: why whole societies may be more productive than an aggregation and evaluation of their material resources can explain. There is a growing suspicion, even among fairly materialistic economists, that some factors in the social, psychological or cultural realms can make for wholes that are more than the sums of their parts, with non-material causes having significant material affects.

A central analytical characteristic of MBCA is that it produces *positive-sum* outcomes. People by working together and helping each other can all gain – not necessarily equally and

not necessarily at all points in time, but to their mutual and respective satisfactions over time.² Such relationships at the individual or group level aggregate to provide possibilities for cooperation at national or societal levels which are conducive to productive behavior that is different from, and over and above, individual self-interested activity. This is the understanding of social capital with which we start, influenced by our reading of the literature, and which we are examining and testing empirically in this study.

We propose that there are two main kinds or categories of social capital: *structural* forms, and *cognitive* forms. Both pertain to and affect social relationships and interaction and both affect and are affected by expectations. The first category facilitates MBCA through established *roles* and *social networks* supplemented by *rules*, *procedures* and *precedents*, while the second predisposes people toward MBCA on the basis of shared *norms*, *values*, *attitudes* and *beliefs*.

These two kinds of social capital are interactive and mutually reinforcing, but they are distinguishable from one another in the following ways. The first is relatively *objective*, in that it includes things that are *visible* and can be *devised* through group deliberation; the second is essentially *subjective*, being a matter of how people *think* and *feel*. The first form of social capital is *external* in that it can be observed and can be modified directly, while the second form is *internal*, residing within people's heads, not easily changed.

Both forms qualify as capital because both require some *investment*, of time and effort if not always of money. A variety of resources are required to establish roles, rules, procedures and precedents. The same can be said for norms, values, attitudes and beliefs, though they are less tangible.

It is not our purpose here to present and analyze these concepts in any detail. This we have done in recent chapters for a book on social capital (see footnote 2). In Annex 2, we lay out these understandings of social capital in a summary and paradigmatic way. The foregoing discussion should be sufficient to introduce the theoretical framework within which our empirical work in Rajasthan proceeded.

The questions that were asked of villagers in our sample of rural communities were constructed to get at structural forms of social capital (roles, social networks, rules, procedures or precedents) or cognitive forms (norms, values, attitudes or beliefs). The roles of most interest were those of decision-making, mobilization and management of resources, communication and coordination, and conflict resolution. The subjective factors we considered included trust, solidarity, cooperation and generosity as primary forms of cognitive social capital, with honesty, egalitarianism, fairness, participation and democratic governance as secondary forms. These factors could be tested by quantitative analysis alongside

² These considerations are explored in more detail in Uphoff (1996), especially Chapters 12 and 13, and in Uphoff (1998) and Krishna (1998). While predatory groups such as the Ku Klux Klan or the Aryan Nation can have high solidarity, trust and other elements that are associated with social capital, their antagonistic purposes disqualify these components as social capital. In economic terms, one can say that Pareto optimality sets a limiting condition on what qualifies as social capital.

measures of other possible explanations for why some communities more than others undertook more, and more successful, MBCA.

C. Database

Sixty four villages were selected, 16 in each of four districts of Rajasthan. These four districts – Ajmer, Bhilwara, Rajsamand and Udaipur – were chosen because they represented two different approaches, respectively, those of the World Bank’s and those of the Indian government’s watershed development programs in that state. To ensure spread and range for the dependent variable, villages were selected to reflect *high*, *medium* and *low* levels of program performance, judged on the basis of information available prior to field investigations. The numbers of high-, medium- and low-performing villages were distributed practically evenly across the four districts. Annex 1 discusses selection and sampling procedures in detail.

The database for this study consisted of the following:

(a) Interviews with 2,397 individuals. Households were selected on the basis of simple random sampling in each village. To have a gender-balanced sample, one man was selected at random from all odd-numbered and one woman from all even-numbered households in the sample. A profile of respondents is attached at Annex 3. The mostly poor, uneducated, agriculture-dependent nature of the region’s population is represented quite well by the sample.

(b) Focus group interviews with village leaders. A standard instrument was used to interview User Committees in each village. Field investigators also measured average fodder yields and plant survival rates on site in each village after drawing a sample from the areas planted under program auspices.

(c) Data obtained from official sources: From the Census of India and from the state government’s departments of agriculture, watershed development, elections, local self-government, land records, cooperatives, and animal husbandry.

Data were collected at two levels: the village (n = 64) and the household (n = 2,397). Evaluation of social capital and institutional achievements could be carried out separately at the level of village or household given these parallel data sets.

Parts II through VII below consider relationships at the village level. The village has been and continues to be a fundamental unit of local community in India (Beteille 1996; Schomer et al. 1994; Srinivas 1987). It is relevant, therefore, to examine social capital at this level. Data collected originally at the village level are supplemented by considering the village means and standard deviations for household-level data in the respective villages.

In addition, household-level social capital can be examined through these data. Analysis of relationships at the level of individual households is presented in Part VIII after first examining relationships conceptualized and assessed at the village level.

II. CONSTRUCTING A FIRST DEPENDENT VARIABLE: THE COMMON LAND DEVELOPMENT INDEX (CLDI)

An overall Common Land Development Index (CLDI) was constructed out of six individual elements, all highly correlated with one another and all loading commonly on a single factor when examined using the methodology of factor analysis. The six different criteria of measured performance in watershed development that comprise the CLDI are:

1. Quantity of work: Percentage of a village's total common land area that has been developed so far under the program (coded WS2).
2. Quality of protection: Survival rates for trees and shrubs planted under program auspices (coded WS3).
3. Productivity: Quantity of fodder and fuelwood harvested in the last year, measured in headloads per family (coded WS4).
4. Voluntary action: How often in the last five years the User Committee voluntarily replanted and filled gaps in its forested areas (coded WS5).
5. Diversification of activities: How many times in the past five years the User Committee also took up other community development activities not directly related to watershed development (coded UC5).
6. Support for local contributions: If watershed development were to start afresh in the village, what percentage of total costs villagers would be willing to bear (coded UC25). While this represents a more subjective assessment than the other measures, it reflects villagers' willingness to mobilize local resources, an important factor.

These six measures are quite highly correlated with one another, with all correlation coefficients significant at a 0.05 level or better. Not surprisingly, factor analysis points to one common factor on which all six of these elements load quite highly.

Table 1. Common Land Development: Factor Pattern

		<u>FACTOR 1</u>
WS2	Quantity of Work	0.59601
WS3	Quality of Protection	0.69309
WS4	Productivity	0.82895
WS5	Voluntary Action	0.81953
UC5	Diversification of Activities	0.85734
UC25	Support for Local Contributions	0.65181

This single common factor has a communality of 3.514, which would account for almost 60 percent of the combined variance of the six individual elements. The scree plot presented in Annex 4 shows a sharp discontinuity, or “elbow,” between Factors 1 and 2, reinforcing our conclusion that these variables together represent a single common factor.³

The Common Land Development Index (CLDI) was constructed by taking a simple sum of scores over these six items, after first standardizing them by rescaling the values so that each had a maximum range of one. Each variable thus had an equal weight within the index.⁴ With six items combined to form the CLDI, a village could score a maximum of six points only if it ranked in the top bracket in each of the six individual categories.

Table 2. CLDI and its Components

	WS2	WS3	WS4	WS4	WS5	UC5	UC25
<u>CLDI</u>							
High: score of 3 or above (n = 15)	2.93	1.80	3.00	3.00	2.00	2.00	1.40
Medium: score of 1.5 to 3 (n = 23)	2.43	0.78	1.65	1.65	0.61	0.70	0.65
Low: score of less than 1.5 (n = 26)	1.23	0.50	1.00	1.00	0.23	0.12	0.31

CLDI correlates quite highly with each of its six components.⁵ Each of the individual correlations among index components is significantly positive at the 0.0001 level, with a value of 0.60 or higher (see Annex 5). The distribution of village CLDI scores is shown in Figure 1 on the next page.

Once this index had been constructed, we proceeded to test it as a dependent variable against a range of variables, representing alternative hypotheses that could explain collective action.

³ The conclusion about a single common factor is given added weight by observing that root mean square off-diagonal residuals = 0.107, which is well within the acceptable limit of 0.126 suggested by Harman’s criterion for a sample size of 64. Kaiser’s Measure of Sampling Adequacy: Over-all MSA = 0.81.

⁴ An alternative index which weighted the individual items by their factor scores was highly correlated (correlation coefficient = 0.97) with CLDI, indicating that the index is robust against alternative weighting schemes.

⁵ Cronbach’s Alpha coefficient = 0.89

FIGURE 1. VILLAGE SCORES ON THE COMMON LAND DEVELOPMENT INDEX (CLDI)

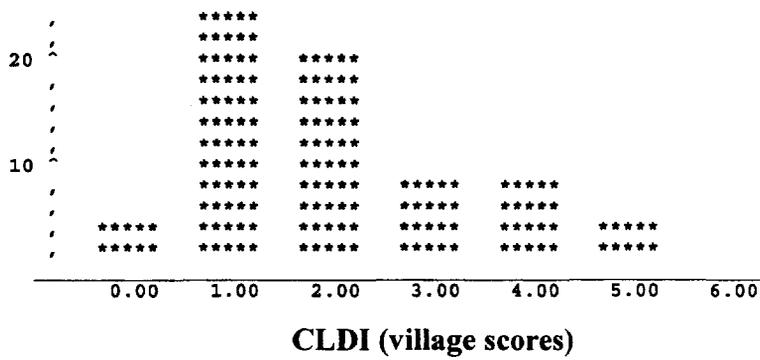
N = 64

Mean = 2.104

Std. Dev. = 1.23

Skewness = 0.73

Number of Villages



Highest score: 5.05 (Cheetakhera, Ajmer district)

Lowest score: 0.20 (Malakhera, Ajmer district).

III. TESTING ALTERNATIVE HYPOTHESES

The hypotheses examined in this section all propose a single primary cause to account for the occurrence and effectiveness of collective action. Accordingly, we initially examine the independent variables operationalizing each of these hypotheses separately, i.e., in isolation from other hypotheses. We later examine the effects of multiple presumed causes working in combination. Annex 6 provides correlation results for each of the hypotheses considered in this section.⁶

These hypotheses are often simply stated but they represent nonetheless complex bundles of causal factors. We tried to operationalize each with concrete measures that reflect the determinants proposed in the literature and are quite specific and quantifiable. Our study was not designed to examine these respective hypotheses in detail, so we are assessing what we considered to be the best available measures of these factors that could influence MBCA outcomes rather than – or more than – social capital.

1. **Relative Need:** Cooperative behavior is sometimes explained by the extent to which people benefit from working together. Perhaps differences in MBCA for watershed development are caused by the degree of privation which makes collective action beneficial for persons engaging in it. Though all villages in the sample face shortages of fodder and fuelwood, some among them are more acutely affected by scarcity than others. An explanation of collective action based on a rational-actor premise would predict that communities whose members have a greater sense of deprivation and more acutely experienced common need will be more likely to establish and operate effective UCs for this purpose (Gurr 1970, Wade 1994).

Two sets of variables were analyzed to assess *relative need*:

– **COWUNITS:** This variable measured the pressure of animal population upon available grazing land. Where such pressure is great, the rewards from increasing the production of fodder from common lands would be greater. Since animals of different sizes have different feed requirements, we standardized for size and thus for grazing pressure by converting all animals into “cow units,” using formulae that are widely used by animal husbandry experts. The total number of cow units in a village divided by the area of available grazing land gave a measure of COWUNITS for each village. According to the relative-needs hypothesis, the greater the population pressure on grazing lands, the more readily should villagers combine to effect common land development. This hypothesis predicts that COWUNITS will be significantly and positively related to CLDI.

– **MOISTRES:** How important are common lands to villagers? This was assessed by considering the ratio of rainfed (unirrigated) cropped area to irrigated cropped area. The relative-need hypothesis holds that when villagers are more dependent upon

⁶ In addition to CLDI, Annex 6 also reports correlation results for another dependent variable, DCAI, which is developed in the next section of this paper.

rainfall for their total crop production, they should participate more actively in watershed development. High values of MOISTRES should therefore coincide with high values of CLDI.

Result This hypothesis was not supported by the data, at least in its monocausal form. Correlation coefficients between CLDI and either of the relative-needs variables are not significantly different from zero.⁷

- 1a. **Relative Need of Powerholders:** A refinement of this hypothesis should be considered. According to Knight (1992), collective action is most likely to arise on occasions when the powerholders in a society are most in need of the rewards likely to result from such action. In the context of the present inquiry, CLDI might be expected to be higher when the powerholders of the village are most in need of fodder or fuelwood. We examined the relevance of this hypothesis by looking at the distribution of animal ownership by households. The higher the standard deviation of animal ownership in a given community, the more likely it is that richer households control disproportionately larger numbers of animals. A larger SD of animal ownership should, according to this hypothesis, be associated with higher CLDI.

Result In fact, a small negative correlation was found to exist between these two variables, which was not, in any case, significantly different from zero. The Knight hypothesis does not appear to apply to these watershed situations.

2. **Government Staff Support:** The watershed development program was initiated by a government department. Even though most program details, implementation, and management were provided by the elected User Committees, the largest share of program funds were provided by the government. Government staff were expected to provide technical support to UCs. Differences in the motivation and competence levels of government staff assigned to work with different villages, and in the extent to which they participated in the community's activities, could potentially account for differences in program performance.⁸ Senior government officials, with whom we discussed this study, expected this variable to account quite satisfactorily for the observed differences in CLDI.

It is difficult to measure the caliber of government staff directly. Given the difficulty that officials had in visiting these often very remote villages, poorly served by infrastructure, we think a measure of government staff interaction with UCs, reflecting motivation, gives a good indication of external support for communities' watershed development efforts. Two questions were included for this purpose in the focus group questionnaires:

⁷ The correlation coefficient between CLDI and COWUNITS had a small negative value (-0.136), while that between CLDI and MOISTRES had a value of 0.06. Neither coefficient was significant at even a 0.1 level.

⁸ Since all villages within the sample have need for common land development and all were assisted financially by the program, the availability within any subset of villages of highly motivated government staff assistance can serve as one indicator of *relative opportunity* (cf. Eisinger 1973; Tarrow 1994).

UC24: How frequently did staff of the government's Watershed Development Department visit your village? and

UC26: Suppose that 100 percent of all villagers recognize the person who is the headmaster of the village school. On such a scale, what percentage of village residents do you think would recognize the local staff of the Watershed Department?

Responses to these two questions were averaged to arrive at the variable OFFINPUT (range 0.5 to 4). A higher OFFINPUT score should correspond, according to this hypothesis, with higher values of CLDI.

Result The observed correlation coefficient was small (0.062) and not significantly different from zero. Correlating CLDI separately with each of the two questions, UC24 and UC26, does not change the results. Neither coefficient is significantly different from zero. By itself, thus, staff input does not appear to account for inter-village differences in program performance. We did find subsequently, however, that in combination with social capital measures, a positive association does show up, though not very strongly, between government staff input and program performance. Without sufficient levels of social capital, this variable shows no significant effects.

3. **Modernization:** Hypotheses 3a through 3c below test alternative specifications of a village-level variant of the "modernization" hypothesis (e.g., Lipset 1960, 1994; Bollen and Jackman 1985). The assumption is often made that communities which are in some sense more "modern," i.e., more closely linked to external market, more advanced in terms of mechanization of production, better served with infrastructural facilities, etc., will also be more progressive and willing to engage in behavior that improves people's condition.

Modernization is expected to go together with the existence of both norms and networks that facilitate collective action. It is expected to promote the emergence of values and attitudes that facilitate reciprocity, cooperation and a preference for bargaining and accommodation in everyday dealings. Modernization is also expected to go together with the development of associations, including market, political and social associations, which help knit people together in networks of mutual support.⁹

Three different sets of variables were used to assess any association that "modernization" might have with our dependent variable, CLDI.

- 3a. **Commercialization:** Villages that are more closely connected to the market economy, it is suggested, will more quickly seize upon any opportunities that become available for development. This hypothesis was tested by analyzing two variables:

⁹ There is, of course, the converse hypothesis that more "traditional" communities and societies would be more likely to act collectively. Our analysis would support this counter-hypothesis if a strong negative relationship was established.

V10 – DISTMKT: Distance to market town, measured in kilometers, and

V11 – FAREMKT: One-way fare to market town, denominated in rupees.

Result Neither DISTMKT nor FAREMKT had any significant correlation with CLDI. The coefficients of both correlations were not significantly different from zero, and the coefficient for DISTMKT even had a small negative value.

3b. **Mechanization:** MECHZN represents the number of tractors and mechanical threshers in the village, reflecting the degree to which agriculture, the main economic activity, has "progressed" beyond essentially manual labor. This variable did not have any significant correlation with CLDI either.

3c. **Infrastructure:** Villages having more "modern" infrastructure facilities might also be expected to be more disposed to undertake development activities. Five types of facilities were considered.

- Educational facilities (CH19)
- Health Care facilities (CH20)
- Communication facilities (CH22)
- Transport facilities (CH24)
- Electricity (CH26)

Villages were given scores, ranging from 1 to 5, depending upon the level to which they are served by each type of infrastructure. In the case of educational facilities, for example, a village served only by a primary school got a score of 1, one with a middle school got 2, with a secondary school got 3; villages with a high school and a junior college got scores of 4 and 5, respectively. Other infrastructure facilities were scored similarly according to the highest level of service that was provided in that village.

Scores received for one sort of facility are quite highly correlated with scores received on each of the other facilities, and also with the size of a village's population. In general, larger villages tended, not surprisingly, to have more and better infrastructure than did smaller ones. Given the close correlations among the respective scores, it was appropriate to combine them into a single score. The variable INFRASTR added up the scores that each village had for the five different types of infrastructure.

Result The overall correlation coefficient of INFRASTR with CLDI was small (0.004) and not significantly different from zero. Taken individually, none of these five types of facilities was at all significantly correlated with CLDI either.

Annex 6 reports all these correlation results. Villages which are more commercial or more mechanized or better served by infrastructure facilities were not found to have higher levels of collective action compared to others. The "modernization" hypothesis thus was not

supported by the data gathered. By the same token, less “modern” villages did not score higher on CLDI.

4. **Literacy:** In Third World countries, especially India, it has been argued that education is by itself the single most important variable responsible for economic as well as civic growth (Almond and Verba 1963; Dreze and Sen 1995). Differences in literacy levels should correlate positively, if this hypothesis is true, with scores on the CLDI index.

Result Of the hypotheses examined so far, this one alone appears to have some relevance as a single independent variable. The correlation coefficient between literacy measured as a percent of total population and CLDI was positive (0.282) and significant at the 0.05 level. We also tested female literacy (FEMLIT) and the proportion of population with high school or higher education (HIGHED1) separately. But neither of these variables correlated significantly with CLDI.

5. **Heterogeneity and Stratification:** According to some social science analyses, it is thought that more homogenous populations facilitate collective action, while populations divided by caste, class and faction deter it (e.g., Inayatullah 1972, Johnston and Clark 1982). We focus on caste here since it is widely regarded as the most divisive influence in Indian villages, as well as on economic differences. Two sets of variables were constructed to assess the divisive influence of caste:

– NCASTES reflects the number of castes residing in a village. This ranges from a low of 2 to a high of 21. Villages with more castes should face more impediments to collective action, so one would expect a negative correlation between NCASTES and CLDI.

– CASTEDOM represents the number of households in a village from the numerically largest caste measured as a percentage of the total number of village households. The higher this proportion is, the easier it should be to mobilize collective action because there is a dominant group to take leadership, compared to a more pluralistic situation. According to this way of understanding social dynamics, higher values of CLDI should be associated with higher CASTEDOM.

Result Neither the expected negative correlation between NCASTES and CLDI nor the expected positive correlation between CASTEDOM and CLDI was observed. Both coefficients were not significantly different from zero.

There was no significant correlation of CLDI with either a third variable, SCSTPERC, which measured the combined proportion of scheduled caste and scheduled tribe populations in a village, or a fourth variable, village standard deviations of landholding, which represented the inequality of land ownership in the community.

Socially and economically heterogeneous villages thus were *not* less likely to act collectively compared with those with more homogenous populations. This may be surprising

to some, though some previous cross-national analysis that we have done of the connection between local organization and rural development performance also found no statistically significant association with social homogeneity (Esman and Uphoff 1984: 116-18, 160-62).

CONCLUSION

None of the alternative hypotheses considered by themselves holds up with this sample of 64 villages from which detailed data were collected and analyzed. Only literacy had a demonstrably significant correlation with the dependent variable, CLDI.

Combining Independent Variables

Perhaps one or more of these variables might have some significant effects when examined in combination with other variables. Since theory provides no guidance about which causes should be combined, we consider a simple linear model, taking independent variables from each of the alternative hypotheses considered earlier.¹⁰ The results of this analysis are reported at Table 3 on the next page.

Once again, only the variable LITERACY has a significant coefficient, and none of the other variables had a coefficient significantly different from zero. Alternative specifications of the model were introduced, but the results did not change to any considerable degree. The variable LITERACY is significant within any alternative specification. None of the other variables is significant under any alternative specification (at 0.1 levels or better).

It is surprising that only one of the alternative hypotheses provides a variable that has a significant coefficient in regression with the dependent variable. Though it is significant, we note that the variable LITERACY can account by itself for a little less than 8 percent of the variance in the dependent variable ($R^2 = 0.079$ in a bivariate regression, i.e., after removing all variables found to have non-significant coefficients). To account for differences in CLDI we must examine other variables that were measured in our field studies. We will return to LITERACY as a factor affecting development cooperation and performance in a later section where we deal with social capital and institutional supports.

¹⁰ Since skewness is between -1 and +1 for each variable, there is no empirical indication for making non-linear transformations.

Table 3. OLS Regression of Variables Corresponding to Alternative Hypotheses on CLDI as Dependent Variable

Hypothesis	Intercept	Coefficient	Std. Error
	Independent Variables	-0.0238	1.96
Relative Need	MOISTRES	0.004	0.014
	COWUNITS	-0.16	0.13
Staff Quality Modernization	OFFINPUT	0.415	0.278
	DISTMKT	-0.019	0.04
	MECHZN	-0.046	0.034
	INFRASTR	-0.117	0.08
Literacy Heterogeneity	LITERACY	0.097**	0.03
	NCASTES	0.08	0.07
	CASTEDOM	0.468	1.19
	n	64	
	R ²	0.342	
	Adj. R ²	0.177	
	F-ratio	2.076	
	F-probability	0.058 DW=1.69	
Note: *p<= .05; **p<=0.01; ***p<=0.001			

IV. CONSTRUCTING A BROADER MEASURE OF COLLECTIVE ACTION FOR DEVELOPMENT (DCAI)

We understand social capital most simply as cognitive or institutional assets that create propensities for mutually beneficial collective action (MBCA). These arise from roles, networks, and other social relationships that facilitate such cooperative behavior, or from norms, values and other cognitive commitments that predispose people to work together to mutual benefit.

Specific empirical correlates of social capital may vary across cultural contexts. Norms and associational forms that assist collective action in one cultural milieu may not be so supportive or conducive in another. It is quite obvious that some sorts of networks may facilitate collective action in a given environment while other forms inhibit it. It is not the networks *per se* that are important so much as the *meanings* that these networks hold for members and the possibilities for collective action and personal benefit that they open up.

Associating MBCA with particular norms and networks must be validated empirically in any particular cultural context. But norms and networks as social phenomena will be found to varying extents everywhere. Exactly how one assesses *trust*, for example, will vary across cultures and social settings, but the phenomenon of trust is important everywhere for encouraging people to work together toward mutual benefit.

Before setting out to look for norms, organizations and other phenomena that are associated empirically with development-oriented collective action within the cultural setting covered by the database, we first want to assess the robustness and breadth of our dependent variable. Does CLDI represent only one set of actions that translate into good performance within a particular sector, such as agriculture or animal husbandry? Or does CLDI correspond more broadly to a general propensity for collective action at the village level?

We address these questions by looking at three other variables in addition to CLDI. These reflect collective action in other areas that are related to development at the village level.

- * COMMPROJ measures the number of community development projects that were implemented to completion in each village within the last five years. These projects typically are school buildings, approach roads, and the like which were proposed and implemented by the villagers. Significant among these were projects undertaken under a state government scheme announced in 1992 for which villagers needed to collectively put up 25 percent of the funds to be eligible for support.
- * COLLREP reports the number of instances within the past five years when villagers have organized themselves and collectively represented some grievance or demand to a high administrative official or ruling party politician.
- * SERVESAT measures villagers' satisfaction levels with four services that are provided commonly by the government in all villages. Satisfaction levels rated from 1

(lowest) to 5 (highest) were measured separately for: basic health services, the village primary school, the local land revenue official (known as the *patwari*), and the agriculture cooperative. Scores over these four measures were averaged to produce a combined index. For a village to register high satisfaction across all four sectors indicates not just that government agencies are performing well but that people in the village are working together both to demand good service and to help achieve this.

Simple statistics measuring each of these variables are as follow:

Table 4. Three Other Measures of Collective Action

Variable	Mean	Std. Dev.	Minimum Value	Maximum Value
COMMPROJ	2.84	1.56	0	6.0
COLLREP	1.09	1.31	0	5.0
SERVESAT	2.32	0.87	0.75	4.25

If these separate measures of collective action in four separate spheres all correlate well with each other, then a case can be made that there is a single underlying propensity which supports mutually beneficial collective action in diverse areas of development activity.

Considering the values of SERVESAT, COLLREP and COMMPROJ corresponding with high, middle and low values of CLDI, a broad convergence appears. Villages which rank highly on the CLDI index also have high scores on each of the other three indices.

Table 5. Collective Action for Development

CLDI	COMMPROJ	COLLREP	SERVESAT
High (score more than 3)	5.53	2.40	3.17
Medium (score between 1.5 and 3)	2.65	1.00	2.36
Low (score less than 1.5)	2.04	0.42	1.81

High and significant correlations obtained among all pairs formed by these variables, indicating an apparent common propensity at work in diverse areas for collective enterprise, particularly as it relates to development. All of the correlations are quite high and significant at the 0.001 level. These results are reported at Annex 7.

Combining the four separate indices into a single index, DCAI, provides us with a single composite measure that reflects development-oriented collective action more broadly than any individual measure. The method of combining these variables along with the

rationale for doing this are provided in Annex 7, which also reports the results of factor analysis.¹¹ DCAI as a composite measure is scaled on a range from zero to hundred. Figure 2 on the next page shows the distribution of villages in our sample according to this index of collective action for local development.

IMPLICATION

Because of the high correlations that exist between CLDI and *three* other independent manifestations of development-oriented collective action, we think it is reasonable to conclude that CLDI is closely associated with a general propensity for collective action at the village level. Villages with a high propensity for MBCA have done better for themselves not only in the watershed development program; they have also outperformed other villages in carrying out a number of other aspects of development where collective action was required.

Residents of villages that have done relatively poorly in the watershed development programs have not been able to attract or undertake as many government projects. They have not been as active in making representations to higher-ups, and they appear less able to enforce accountability and performance from local-level government functionaries. The level of services that they obtain leaves them feeling less satisfied than their counterparts in high-collective action villages.

Villages that show higher levels of collective action in one sphere of development activity also exhibit higher levels of collective action in other spheres. It is probable that a single underlying cause or combination of causes can account for such widespread manifestations of collective action. The leading candidate to explain this commonality is social capital, but this is a conclusion best deferred until after we have some independent measures of social capital.

¹¹ Correlation coefficients between DCAI and each of its four components are as follows:

CLDI	SERVESAT	COMMPROJ	COLLREP
0.87914	0.76473	0.83386	0.81446

Cronbach's Alpha Coefficient = 0.881.

Correlations between DCAIND and the alternative hypotheses examined earlier are reported in Annex 6. Once again, only LITERACY among the alternative explanations had any significant coefficient.

**FIGURE 2. DEVELOPMENT-ORIENTED COLLECTIVE ACTION:
VILLAGE SCORES FOR COLLECTIVE ACTION INDEX (DCAI)**

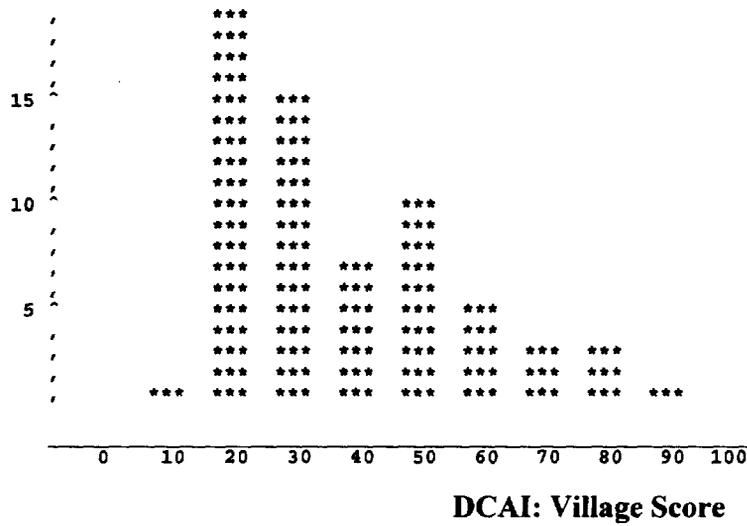
N = 64

Mean = 37.7

Std. Dev. = 18.53

Skewness = 0.844

Number of Villages



V. TRACING THE EMPIRICAL CORRELATES OF SOCIAL CAPITAL

Our search for independent measures of social capital relevant to the specific cultural and historical context we are studying in Rajasthan, India is necessarily exploratory in nature. We started out by considering some measures that have become widely accepted in the literature, namely of associational memberships.

Following Putnam et al. (1993), we tried first to construct an index of social capital based on measures operationalizing the following variables: (a) number of formal associations in each village, (b) voting turnout, i.e., proportion of eligible voters casting ballots in the last general elections, and (c) newspaper readership. Respondents were asked how often they read a newspaper; responses were coded from 1 for 'Never' through 4 for 'Every Day.' The number of associations and voting percentage were obtained from the village-level database, while newspaper readership was averaged from household data for corresponding villages. Statistics for the overall sample are shown in the table below.

These three variables were regressed against our first dependent variable, CLDI. None of the three independent variables had a coefficient that is significantly different from zero. The regression model as a whole also did not have any significance, as indicated by the F-statistics that can be seen in Table 7.

Table 6. Voting Turnout, Newspaper Readership, and Number of Associations

VARIABLE	MEAN	STD. DEV.	MINIMUM VALUE	MAXIMUM VALUE
Voting Turnout	66.14	11.55	41.0	94.32
Newspaper Readership ¹²	1.52	0.38	1.03	2.56
Number of Associations	0.53	0.68	0	3

¹² Newspaper Readership was scored as follows:

Question: How often do you read a newspaper?

- Never: [1]
- Once a month: [2]
- Once a week: [3]
- Every day: [4]

Here we consider responses to this question averaged over each of our 64 villages.

Table 7. OLS Regression of Voting Turnout, Newspaper Readership, and Number of Associations on CLDI as Dependent Variable

	<i>Coefficient</i>	<i>Std. Error</i>
Intercept	1.286	1.152
Independent Variables		
Voting Percentage	0.001	0.015
Newspaper Readership	0.399	0.440
Number of Associations	0.286	0.252
n	64	
R ²	0.045	
Adj. R ²	-0.0074	
F-ratio	0.858	
F-probability	0.469	

Perhaps more important than the fact that none of these three variables was statistically significant in regression analysis was the fact that they did not co-vary together in the same direction. Unlike in the analysis reported by Putnam and associates, there is no single factor on which all these variables load statistically in common.¹³ Further regression of these variables on the other dependent variable, DCAI, did not provide any significantly different results.

In a cultural setting quite different from that of northern Italy where Putnam's study was focused, one has to search for different, more appropriate measures of social capital. A measure of newspaper readership is likely to reflect only a small proportion of residents of Rajasthani villages.¹⁴ Measures that rely on counting the number of formal associations are also not very relevant to northern Indian villages. Over half (36) of the 64 villages that we studied had no formally registered voluntary associations in operation; another 23 had only one such association, and of the remaining five villages, four had two and one had three formal associations.

With very few exceptions, the associations that do exist are mostly government-sponsored youth clubs or *mahila mandals* (women's groups). These groups were set up at the direction of the government to assist in social and economic development; thus they do not have a voluntary grassroots origin. Interviews with village leaders in a sample of eight villages (of the 28 where such groups are in existence) indicated that most of these groups are defunct anyway, and nearly all have very small memberships, less than 20 in general, with

¹³ Factor analysis indicates three separate factors corresponding to each of these three separate variables, and these account, respectively, for 39 percent, 35 percent and 26 percent of the total variance.

¹⁴ 1,709 respondents (73 percent of the total) never read a newspaper; another 401 (17 percent) read newspapers once a week or less.

hardly any close ties existing among members. So the measures that Putnam et al. employed tell us little about social capital in this society.

Informal, rather than formal, networks are far more profuse and relevant within this context as they probably are in many other developing country contexts.¹⁵ We concluded that it would be more appropriate to ask people about their *cognitive maps* of social relations, the beliefs that people hold about the types or sets of persons with whom they will act in a given situation. The sentiments they have toward these other people in the set act as a bond which enables them to work together when a specified task is to be performed or when a particular contingency arises.

Potentials and predispositions for such networking are, we think, a better indication of collective action capacity in this cultural situation than is membership in any well-defined or formal groups. We thus looked at informal networking by examining people's responses to different sets of questions concerning their social relationships and how they think about these.

SUMMARY OF RESULTS

Before proceeding, let us summarize and recapitulate the results of the analysis so far. We started with a sample of 64 villages, each of which had taken part in a program for developing common lands in order to serve both conservation and production goals in watersheds across four districts of the state of Rajasthan. Each village started work about the same time, with the same broad objectives and opportunities for funding. In each village, residents elected a User Committee to represent and to implement their collective will. Developing common lands with the objective of enhancing fodder and fuelwood production has very high priority for virtually all villagers of this region, particularly for the poor.

Some villages performed markedly better than others. Scores on the Common Land Development Index (CLDI) range from a high of 5.05 (of a possible 6) to a low of 0.2. Differences in program performance are not evidently explained by differences in relative need for program activities. There is no association, for instance, between the relative need for grazing land in a village and its performance score in reclaiming common land.

Similarly, there is no association between development performance and the evident amount of external assistance. Each village was assisted by the government agency with an equal level of funding and an equivalent intensity of staff input. Differences in staff input do not by themselves appear to have any association with program performance. Something else seems to be at work.

¹⁵ This finding may not be unique to the north Indian context. In his work on social capital in contemporary Russia, Richard Rose indicates that far more people there rely on informal compared to formal networks and on everyday mutual support groups that do not keep any formal membership records. Richard Rose, "Social Capital: Definition, Measures, Implications," paper presented at a World Bank workshop on Social Capital, April 16-17, 1996.

Levels of modernization and connections with the market economy do not help us either in accounting for differences in program performance. Neither commercialization nor agricultural mechanization nor infrastructure development has any significant statistical association with program performance.

On the other hand, performance scores for the watershed program activity correlate quite highly with some other measures of development performance. Villages that have done well in terms of common land development have also been successful in initiating and implementing a substantially higher proportion of community development projects. Residents of these villages more often act collectively to seek political or administrative redress for their commonly felt grievances, and they have achieved more satisfactory levels of services from local-level government agencies.

The initial dependent variable for the study, namely CLDI, corresponds quite well with a broader measure of development-oriented collective action, our variable, DCAI. Effective and mutually beneficial collective action in one development arena is observed to be matched by similar action in other arenas. A single basic propensity or capacity for collective action furthering development aims seems to be evident. This sets high performing villages apart from others that have so far not succeeded as well in collective efforts for advancement.

This propensity corresponds at least in its consequences with what is commonly understood as *social capital*. But we should not move prematurely to this conclusion. The presence or absence of what can be specified as social capital should be independently verified. Norms and features of social organization that underpin mutually beneficial collective action should be identified and evaluated separately from their effects.

Instruments used to measure social capital in other parts of the world seem to be of little value in Rajasthan. No significant association was found to exist between development performance and indicators of social capital that have been cited most often in the literature. Neither individually nor together did density of associations, participation in elections, or newspaper readership appear to have any connection to development performance. More valid measures of social capital need to be devised that are appropriate to the social and cultural situations we are concerned with, more similar to those in most developing countries than is the setting studied by Putnam and his associates.

VI. MEASURING SOCIAL CAPITAL IN RAJASTHAN

To be relevant to development efforts in Rajasthan, indicators of social capital need to correspond with the pattern of life in this largely agrarian setting. Measures of the structural or network component of social capital have to relate to the types of networks or mutual support organizations that are found in this state. We started by considering the types of activities with which people of this area are commonly engaged.

Not all activities observed in this area can automatically be considered as locally appropriate measures of social capital. Some activities are strongly individualized in their performance, while others are more typically undertaken together with other persons. Agreeing with Coleman (1988: S100-101), we think that social capital “exists in the *relations* among persons.” Only those activities that are not mostly or usually undertaken in isolation from other people can be considered valid ground for finding the structural and cognitive components of social capital.

In the questionnaire we devised for this study, we included questions related to a large number of locally relevant activities. The responses we received indicate that some few of these activities have a strongly individualistic performance among the people who live in this area. Activities for which more than 80 percent of respondents showed an individualistic inclination were, therefore, excluded from the scope of our social capital inquiry. Only responses to the remaining questions were considered.

Responses to six separate questions have been combined together to construct an index of social capital which appears on conceptual as well as on empirical grounds to be valid for this region. It integrates structural and cognitive dimensions of social capital. Three of the six items relate to social relationships, to networks, or more broadly to the *structure* of social interaction. Given that formal associations are virtually absent in these villages, informal networks and established roles were assessed:

1. If a crop disease were to affect the entire standing crop of this village, then who do you think would come forward to deal with this situation? Responses could range from “Every one would deal with the problem individually,” scored 1, to “The entire village would act together,” scored 5. The average response score over all 2,397 individuals was 2.4.¹⁶
2. Who in this village has historically looked after the common pasture lands? Responses ranged from “No one does anything,” scored 1, to “We all discuss and jointly decide what is to be done,” scored 5. Average of all responses had a value of 3.2.
3. Suppose two people in this village had a dispute with each other. Who do you think would resolve this dispute? Five alternative responses were offered: “No

¹⁶ The full range of responses to each of these six questions is presented in Annex 8.

one,” scored 1, through “Their neighbors,” scored 3, to “The entire village collectively,” scored 5. The average response was 3.5.

The other three items relate to *cognitive* phenomena regarding social relationships, specifically certain norms, values or attitudes that represent a sense of solidarity and mutual trust.

4. Suppose some children of the village tend to stray from the correct path, for example, they are disrespectful to elders, they disobey their parents, are mischievous, etc. Who in this village feels it right to correct other people’s children? Four alternatives were posed: “No one,” scored 1; “Only close relatives” scored 2; “Relatives and neighbors,” scored 3; and “Anyone from the village,” scored 4. Average response was 2.5.
5. Which among the following is the most important reason why people in this village plant and protect grasses and trees?¹⁷ The four alternatives, ranging from a purely instrumental motive, were: “Because fodder and fuelwood are in short supply,” scored 1, to community-mindedness, “Because this activity keeps the villagers united,” scored 4. The average response was 2.0.
6. Suppose a friend of yours in this village faced the following alternatives: which one would he or she prefer?
 - To own and farm 10 bighas¹⁸ of land entirely by themselves (scored 1)
 - To own and farm 25 bighas of land jointly with one other person (scored 2)

This last item operationalized in practical terms the factor of *trust* that is commonly included in most treatments of social capital. The second alternative would give each person access to more land (12.5 bighas), but they would have to work and share produce interdependently. Many persons, especially in villages that scored low on the preceding five questions, preferred to have less land so as to not depend on cooperative relations with others. This question was worded so that the respondent was not making a statement about his or her own level of trust, but rather about how he or she thinks others in the village will assess this tradeoff. So this item reflects a village-level characteristic rather than just individual attitudes.

Responses to these six questions, shown in Annex 8, are quite highly correlated among themselves, and they load commonly on a single factor.

¹⁷ Questions 2 and 5 might appear to bear some association with factors constituting our first dependent variable, the Common Land Development Index. To anyone concerned about including them in the social capital index and then comparing this index with the CLDI, we point out two facts. First, the association did not change significantly even when these two variables were taken out. Second, as seen in a moment, significant and quite large associations exist between the social capital index and other measures of trust and network intensity, indicating that an index comprised of these six variables is quite a good indicator of social capital in general.

¹⁸ A bigha is a local unit for measuring land. One bigha is roughly equal to one-fourth of a hectare.

Table 8. Social Capital: Factor Pattern

	<u>FACTOR 1</u>
Dealing with crop disease	0.73052
Dealing with common pastures	0.64826
Settling disputes	0.73272
Dealing with errant children	0.72029
Value placed on unity	0.78680
Trust placed in others	0.66859

The single common factor accounts for 3.28, or about 55 percent of the combined variance.

These six separate variables we have combined into a *Social Capital Index* (SKI). Each variable is given an equal weight within the index, which is obtained by summing across the scores after first dividing each variable by its range, so that each variable has a maximum range of one. A further transformation results in an index that has a range from zero to hundred. This latter transformation is useful at a later stage for interpreting regression results.

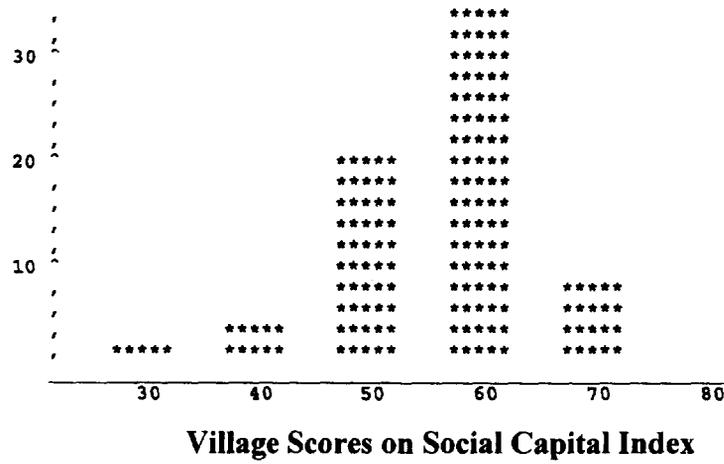
Village scores on the Social Capital Index are depicted in Figure 3 on the next page. On the range from zero to hundred, about a quarter of all villages score below 50, while another quarter score above 62. The combined index is highly correlated with its constituent parts.¹⁹ It also correlates well with other responses relating to norms and networks, suggesting that this is a fairly robust measure of social capital for this cultural setting.

¹⁹ Cronbach's Coefficient Alpha = 0.855. Individual correlations with the index are all 0.75 or higher.

FIGURE 3. VILLAGE SCORES ON THE SOCIAL CAPITAL INDEX (SKI)

N = 64 Mean = 56.26
 Std. Dev. = 7.99 Skewness = -0.70

Number of Villages



Highest Score: 67.46 (Sangawas village, Rajsamand district)

Lowest Score: 33.41 (Akhepur village, Bhilwara district).

Social Capital Index, Trust, and Informal Networks

The combined index also correlates well with other responses relating to norms and networks. Our theoretical justification for SKI is that it combines structural and cognitive aspects of what is understood as social capital, reflecting how predisposed and able people are through a combination of roles, procedures, values and beliefs to act cooperatively in support of each other.

Villages that have high scores on the Social Capital Index (SKI) also score highly on other variables measuring trust and associationism, which are both emphasized in the literature on social capital. The significant and high correlations that exist between this index and these other variables support the notion of a generalized measure of social capital that informs this study, formulated in terms appropriate for this setting.

Significant correlations were observed to exist between the Index and the following attributes. Coefficients reported below are all significant at 0.01 level or better.

– Other indicators of *informal networking and mutual support*, e.g., If some epidemic were to occur among cattle or humans in this village, what do you think the people of this village would do? (Will they act unitedly?)

(correlation = 0.771)

– Other measures of *trust*, e.g., Suppose some person from this village had to go away for a while, along with their family. In whose charge would this person leave their fields? (Can only close relatives be trusted, or a larger group of villagers?)

(correlation = 0.645)

– *Reciprocity*, e.g., People here look out mainly for the welfare of their own families, and they are not much concerned with society's welfare. How strongly do you agree or disagree with this statement? (Strongly agree scored as 1, strongly disagree as 4)

(correlation = 0.492)

– *Solidarity*, e.g., Is it possible to conceive of a village leader who puts aside his own welfare and that of his family to concern himself mainly with the welfare of village society? (Impossible =1, Possible=2)

(correlation = 0.42)

– Expectations about *future cooperation*, e.g., What do you feel is likely to happen once government funding for the watershed program comes to an end? How likely is it that villagers will themselves come forward to protect these investments and undertake further developments of their own accord? (Will not be able to protect by themselves = 1, Some protection is possible, but not as much as before = 2, Villagers will protect these areas but not plant afresh or develop any new areas = 3, Villagers will carry on and develop more areas by themselves = 4)

(correlation = 0.612)

– Concern for *future generations*, e.g., Which of the following statements would you agree with: When people have urgent economic needs, they should be expected to exploit natural resources as much as needed, or Natural resources belong to future as well as present generations, so people should never exploit them so as to diminish them for the future. (Should exploit for present need = 1, to Preserve for future = 3)
(correlation = 0.392)

Within the societies that we are studying, our measure thus aligns itself broadly and quite well with several other attributes that are associated with what is increasingly appreciated as a substantial if not directly observable property, *social capital*.

We look next to see what relationship our index has, if any, with the two dependent variables, CLDI (performance in the watershed development program) and DCAI (development-oriented collective action). To facilitate comparison and interpretation, each of these indices has also been transformed to have a range from zero to 100.

VII. SOCIAL CAPITAL AND DEVELOPMENT PERFORMANCE

Our measures of social capital in Rajasthan have a significant and positive association with development-oriented collective action at the village level. Villages with high levels of development performance usually also have high scores on the Social Capital Index, though this is not a sole determinant of performance.

In bivariate regression on the Development Performance Index, Social Capital has a coefficient of 0.821, significant at the 0.01 level ($R^2 = 0.125$). A similar result holds for our other dependent variable, the Common Land Development Index (CLDI). Once again, social capital has a significant and positive coefficient in regression against the dependent variable (0.879, significant at the 0.01 level), but once again the fit is imperfect. Figures 4 and 5 show the association graphically.

Though social capital has, on the whole, a positive relationship with the two dependent variables, this association is not enough to account for a major part of the variation in these variables. While social capital does make a difference to the values of these indexes, some other variables also need to be considered within the analysis.

Since none of the theoretically introduced variables examined in Part III, except literacy, were significantly associated with our two dependent variables, we looked at other variables which, in association with social capital, might help account for variation in the levels of development-oriented collective action.

Our database enabled us to construct three other measures, each an index representing some political quality or property of village social life which correlate with collective action and development performance to some significant degree. The first of these refers to the number and depth of *divisions*, often described as factions, that exist within the village. The second measure expresses the attitudes and beliefs that villagers have about the *honesty/dishonesty* of fellow villagers. The third measure represents the level of *political competition* in the village. In this section, we describe these measures and look for associations that each might have with the dependent variables.

FIGURE 4. SOCIAL CAPITAL INDEX AND DEVELOPMENT-ORIENTED COLLECTIVE ACTION (DCAI)

Village DCAI Score

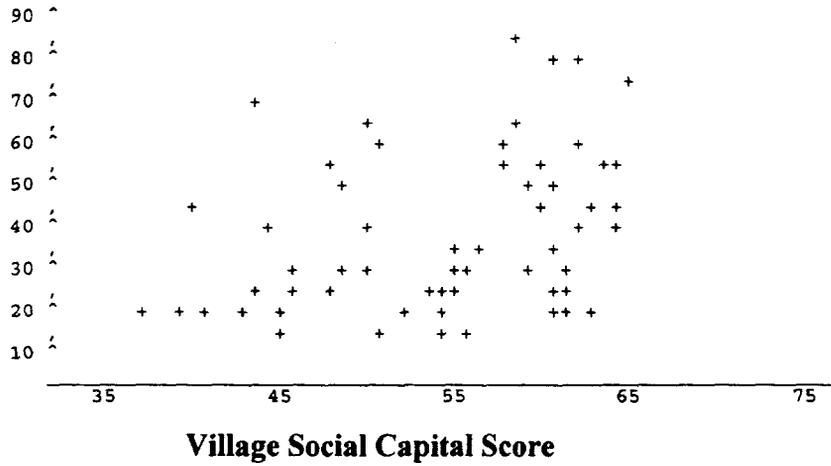
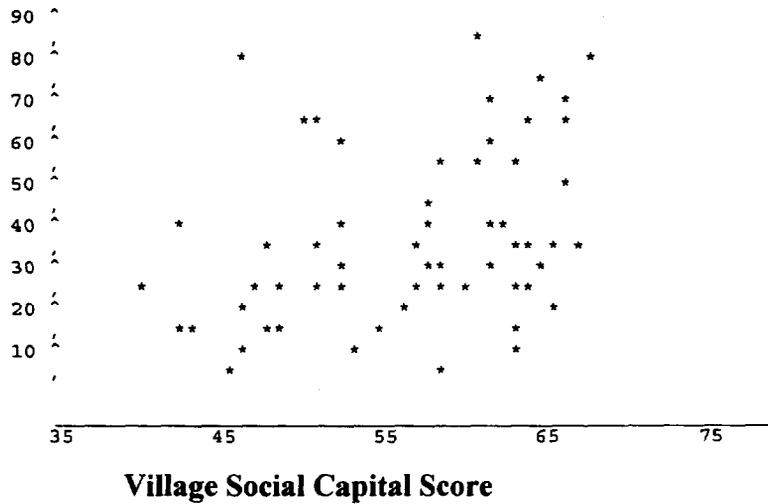


FIGURE 5. SOCIAL CAPITAL INDEX AND CLDI

Village CLDI Score



Divisions and Factions

In order to assess the separate and combined influence of all sorts of divisive factors at village level, we asked respondents a series of five questions. To what extent, we asked, do differences such as the following tend to divide people in your community?

- Differences in education?
- Differences in wealth?
- Differences in caste?
- Differences between young and old?
- Differences between old inhabitants and new settlers?

Responses to each of these questions were scored as follows: “Not at all” was scored as 1, “Somewhat” as 2, and “Very Much” as 3. In factor analysis, responses to the five questions loaded together very clearly on a unique common factor.

Table 9: Divisions and Factions: Factor Pattern

	<u>FACTOR 1</u>
Differences in education	0.95297
Differences in wealth	0.96684
Differences in caste	0.74319
Differences between young and old	0.67121
Differences between old inhabitants and new settlers	0.80964

The single common factor accounts for more than 70 percent of the combined variance of these five separate variables. The summated score on these five variables was thus combined to form a single variable, reflecting the combined divisive influence of these five constituent variables in any particular village. The composite variable, labeled DIVISION, is constructed by transforming the calculated variable to have a range from zero to 100.

Attitudes and Beliefs Regarding Honesty

Three variables were combined together to form an index on this subject, reflecting *tolerance for dishonesty*, a negative factor for social capital.

- Whenever it is to their advantage, people will tell lies. To what extent do you agree with this assertion?
- It is not necessary for a leader to be exactly honest in public dealings if he knows this will interfere with getting his work done. To what extent do you agree with this statement?
- If a leader in local government is highly skilled, one should overlook minor instances of dishonesty. Do you agree or disagree with this statement?

Response scores for each of these questions ranged from 1 for “strongly disagree” to 4 for “strongly agree.” High scores on the combined index reflect, therefore, attitudes and expectations about honesty prevailing in the village. The variable, TOLDISHON, was constructed by summing across the three scores, and then transforming this calculated variable to have a range from zero to 100.

Political Competition

An index of political competition was constructed by analyzing the number of votes polled by different candidates in the last-held elections for the village *panchayats*. Panchayats in Rajasthan as in the rest of India are units of local government.²⁰ The territorial domain of a panchayat usually includes between three and five villages, although larger villages can constitute their own panchayat. The jurisdiction of a panchayat is divided into wards, with residents of each ward electing their own member (called a *panch*) to the panchayat council. A ward may comprise a whole village, a hamlet, or part of a village. Since the ward is the unit of action for panchayat election purposes, we compute the index at this level. Figures were averaged across wards to get a village-level index.

We use the Herfindahl-Hirschmann “concentration index” which relies upon the inverse of the sum of squares of vote shares obtained by each candidate to an election. For each ward, we take the share of total votes cast in favor of each candidate. These vote shares are then squared, and the squared shares are totalled across candidates. The inverse of this total constitutes an index of political competition.²¹

Villages in which a single candidate obtained all of the votes will score 1 on this index. Villages in which two candidates divide the vote equally among themselves will have a score of 2, while those in which the vote is divided equally among three candidates will score 3. The actual scores obtained among our 64 villages range from a low of 1 to a high of 2.11. The variable POLCOMP is obtained by transforming the range of the calculated index from zero to 100.

Political competition was included in our analysis following a round of field visits by Krishna in May to August 1997. Visiting a subset of villages within the sample, it appeared to Krishna that solidarity, reciprocity and community would not be sufficient by themselves to account for instances of high development performance. Somewhat surprisingly, collective action appeared to work best when accompanied by political competition at the local level. Attending meetings of panchayats and User Committees and speaking with leaders and other villagers, Krishna found high levels of debate and competition co-existing alongside high levels of solidarity in the high-performing villages. To put his observations to more rigorous testing, data on political competition were collected and analyzed for all 64 villages.

Annex 9 reports correlation coefficients between pairs formed by the four indices, Social Capital (SKI), TOLDISHON, DIVISION, and POLCOMP. Not one of these correlation coefficients was significant at the 0.05 level. At the 0.10 level, there is a small positive correlation between TOLDISHON and DIVISION, and a small negative correlation between SK and TOLDISHON. (Since TOLDISHON is negative for social capital, it is not surprising that it was higher where there was more divisiveness and lower where there were more indicators of greater social capital.)

²⁰ We are not here going into the debate about the effectiveness of panchayats, either as units of governance or as units of development planning and implementation. There is a vast and contentious literature dealing with these matters. The interested reader is referred to Baviskar and Attwood (1995) and Kaviraj (1997) for discussions of these issues.

²¹ We thank Walter Mebane for suggesting this procedure, which is described in detail by Taguepaara and Shugart (1989).

Significantly, there was no correlation between SKI and DIVISION, indicating that even where divisions do exist between rich and poor, young and old, high and low caste, educated and illiterate, new settlers and old residents, levels of social capital are not affected by these differences. Also, the absence of any significant correlation between DIVISION and POLCOMP indicated that factionalism at the local level does not necessarily translate into more active competition for political power.

These three possible explanatory variables, relatively independent of each other, were used in multiple regression analysis for the dependent variables, along with our Social Capital Index, SKI. We can in this exercise reconsider the other presumed independent variables that correspond to the alternative hypotheses examined earlier, looking at them in association with social capital and the other variables.

Tables 10 and 11 report the results of multiple regression analysis. We first considered broad development performance as our dependent variable. Then we considered performance in the watershed development program with CLDI as the dependent variable. To facilitate interpretation of results, each of these variables was rescaled to have a range from zero to hundred, resulting in the transformed variables, DCAINDEX and CLDINDEX, respectively. Each column of the following table corresponds to a particular specification of the regression model.

Model 1 takes the four variables, Social Capital, Divisiveness, Tolerance of Dishonesty, and Political Competition. Only the coefficients of Social Capital and Political Competition were significant.

Models 2 and 3 bring into the analysis the alternative hypotheses rejected earlier in bivariate regression. In order to check whether village size has any impact on development performance, we also consider village population as another variable for analysis.²² None of the “modernization” variables results in any significant coefficient. In alternative specifications of the model, neither mechanization, modernization nor distance-to-market had any significance either.

Similarly, none of the stratification variables seems to have any significant impact upon development performance, as neither NCASTES nor DIVISION had a significant coefficient.

When we included the three Putnam variables alongside SK and Political Competition, to test whether these variables attain any significance in multivariate regression, once again these variables – voting percentage, newspaper readership, and number of associations – failed to produce statistically significant coefficients.

²² Depending upon which hypothesis we select, village size could have either positive or negative effects on development performance. If one follows Olson (1965), smaller villages should be better at engaging in collective action than larger ones. On the other hand, larger villages are more likely to have available an effective *k-group*, such as can carry the collective development effort by itself (Hardin 1982).

**Table 10. OLS Regressions on Development Performance,
with DCAINDEX as the Dependent Variable**

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Intercept	-18.90 (24.68)	-34.3* (18.04)	-44.239** (17.627)	-40.93** (16.89)
<i>INDEPENDENT VARIABLES</i>				
Social Capital Index	0.689** (0.276)	0.691** (0.272)	0.721** (0.288)	0.703** (0.261)
Divisions and Factions	-0.001 (0.041)			
Tolerance for Dishonesty	-0.051 (0.064)			
Political Competition	0.42*** (0.121)	0.38** (0.118)	0.376** (0.120)	0.391*** (0.117)
MECHZN			0.205 (0.337)	
INFRASTR		-1.31 (0.884)		
LITERACY		0.732* (0.355)	0.471 (0.321)	0.596* (0.298)
NCASTES		0.123 (0.690)		
POPULATION		0.005 (0.003)	0.002 (0.003)	
N	64	64	62	64
R ²	0.277	0.354	0.331	0.315
Adj-R ²	0.226	0.283	0.271	0.286
F-ratio	5.453	5.018	5.536	8.91
F-probability	.0009	.0004	.0003	.0001
DW	1.973	2.02	1.946	1.959
Note: Standard errors are in parentheses. *p<=0.1; **p<=0.05; ***p<=0.001				

Only two variables were consistently significant. The coefficient for the Social Capital Index was robust and substantial, no matter what other variables were considered in addition. The size of this coefficient stays within a range from 0.69 to 0.72, implying that a one-percent increase in social capital is associated on average with a 0.7 percent change in collective action for development.

The coefficient for the Political Competition Index was also consistently significant and robust, no matter what the alternative specifications. This coefficient stayed within a range from 0.38 to 0.42. A one-percent change in political competition would be associated with a 0.4 percent change in collective action. This was, in fact, a surprising result of the data collection and analysis, not initially included in our analysis of social capital, but added on the basis on village observations and conversations and then investigated using voting data not dependent on our survey. Whether it would loom this large (or larger) in other settings remains to be investigated elsewhere.

Literacy is the third variable that achieved significance. A one-percent change in literacy is associated with a change in development performance that ranges from 0.47 to 0.73.²³

Before interpreting these results any further, let us also review the results of regression analysis on the second dependent variable, the Common Land Development Index (CLDINDEX). Recall that this index measures the results of performance in the watershed development program, so it is a narrower measure than DCAINDEX.

Table 11 on the next page reports these results. Variations in the level of program performance were associated with all those factors that were significant in our analysis of the broader development variable. Social capital, political competition and literacy are once again significant variables. In addition to these three influences, however, one more variable got support in this analysis of CLDINDEX. The amount of staff input was moderately significant, at the 0.1 level. The coefficient for this variable, when standardized on a zero-to-100 scale, was about 0.25. If one controls for differences in social capital and political competition, a one-percent change in staff input thus would be associated with a 0.25 percent change in program performance. However, the coefficient for this variable is not as robust as those of the other three variables. The effects of staff inputs are evident, further, only when more of these are made in combination with high levels of social capital and political competition.

²³ Admittedly, the R^2 is somewhat low for this analysis. This does not mean that the variables identified by us do not matter. On the contrary, the reassuring t-ratios and F-statistics in regard of Model 4 imply that although social capital, political competition and literacy are significantly associated with the dependent variable, some other variables (and/or some other functional forms) might also be considered. Multicollinearity is low to moderate in each of the four models we investigated. The highest value of the Condition Index, for Model 4, for instance, was 9.61. White's general test revealed no significant heteroskedasticity in the model. We have introduced other theoretically-informed variables within the analysis, but without achieving any significant results. We have also tried various bits of "data mining" by introducing other "likely" variables, and we have experimented with a host of non-linear functional forms, but overall R^2 remains in this range. Inferences regarding statistical significance and relative magnitude of coefficients did not change even as non-linear forms were specified. We would appreciate any helpful suggestions that readers might offer.

Table 11. OLS Regressions on Common Land Development Index, with CLDINDEX as the Dependent Variable

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Intercept	-48.81* (25.64)	-60.56** (21.92)	-69.536** (21.71)	-68.84** (21.48)
<i>INDEPENDENT VARIABLES</i>				
Social Capital Index	0.728** (0.286)	0.762** (0.262)	0.748** (0.268)	0.781** (0.263)
Divisions and Factions	0.026 (0.041)			
Tolerance for Dishonesty	-0.001 (0.068)			
Political Competition	0.513*** (0.128)	0.496*** (0.124)	0.472*** (0.125)	0.470*** (0.124)
MOISTRES ²⁴		0.029 (0.164)		
STAFF INPUT			0.216* (0.124)	0.210* (0.122)
INFRASTR		-1.43 (0.97)		
LITERACY		0.549* (0.306)	0.566* (0.332)	0.539* (0.309)
POPULATION			-0.001 (0.004)	
N	64	62	62	64
R ²	0.320	0.406	0.370	0.368
Adj-R ²	0.274	0.342	0.315	0.325
F-ratio	6.948	6.370	6.703	8.462
F-probability	.0001	.0001	.0001	.0001
DW	1.66	1.792	1.576	1.572
Note: Standard errors are in parentheses. *p<=0.1; **p<=0.05; ***p<=0.001				

²⁴ Neither this variable nor the other variable, COWUNITS, related to the Relative Needs hypothesis, turned up with a significant coefficient under any alternative specification of the model. Similarly, none of the Modernization variables were significantly associated with the dependent variable. Variables related to social heterogeneity were also not significant for the analysis.

IX. EXAMINING CONSTITUENTS OF SOCIAL CAPITAL

Social capital is manifested in the relations among people, as Coleman has suggested, but it resides in people's minds. The roles that people perform, recognize and accept – and the norms, values, attitudes and beliefs that they hold – structure people's relationships with each other. Coming into play when people interact with one another or plan to interact, social capital is an attribute that exists basically at the level of individuals. However, norms, values, attitudes and beliefs acquire efficacy to the extent that they are *shared*, and roles, networks, rules, procedures and precedents cannot operate without whole sets of individuals agreeing on them. So social capital is a product of collective thinking and activities. It thus has emergent properties that make it more than the sum of individual actions and cognition.

What goes into the formation of social capital? The constrained view presented by Putnam et al. (1993) is that social capital is mostly historically created and determined and can hardly be enhanced within the short term. This view is challenged by other visions of collective enterprise found in the literature.

Ostrom (1990) emphasizes that collective action becomes successful when individuals in a community commonly abide by rules that have been constructed collectively. More than force or outside coercion is involved; internalization of rules among community members is what helps induce compliance. Members' socialization results in rule-compliant behavior particularly when members have previously participated in the process of rule-formation.

Comparative studies of local institutional development by Esman and Uphoff (1984), Uphoff (1986), and others (Korten 1980, Rondinelli 1993) affirm that participatory action is an important factor in successful development at local levels. The findings of Esman and Uphoff's study of local organizations for collective action in rural Third World communities find support in Sabel (1994). Quality circles, just-in-time inventory systems, and the like are most productive when they form part of what Sabel describes as a "discursive institution," one in which individuals learn together by monitoring their own and others' behaviors. "Community, taken as the historical alignment of interests of a group's members, is neither a necessary nor a sufficient condition for cooperation." Cooperation arises, rather, when individuals submit themselves to the process of participative decision-making and "learning by monitoring," according to Sabel.

Though not dependent upon particular alignments arising from the distant past, cooperation, once it is achieved, can provide cognitive and emotional scaffolding for cooperation in the future. Hirschman (1984) suggests from his study of local development behaviors in Latin America that prior experience with collective action can help energize new common endeavors. People who have worked together in the past, fashioning suitable roles and appropriate attitudes, can bring the same to bear upon the problems they might face together in the future.

In this part of the analysis, we test these alternative hypotheses relating to the formation of social capital. Household-level social capital is taken as the dependent variable

for analysis, and various strands of explanation are examined for the bearing each may have on the production of social capital at this level. The results of data analysis are given in Table 13.

HISTORY matters, it is revealed by analysis of our data, but history we find is hardly determinate. Historically there are marked differences between the northern districts of Ajmer and Bhilwara, and the southern ones, Rajsamand and Udaipur, in terms of outside interference in local affairs versus allowing communities to operate in a reasonably self-managing way.

Until the time of India's independence from British colonial rule, Udaipur and Rajsamand had experienced unbroken rule for more than ten centuries by a single dynastic ruling house (Mewar), even fourteen centuries by some accounts. Arrangements worked out with the colonial power made continuation of princely rule a condition for payment of tribute to the British. Local independence of action was curtailed to some extent by this agreement, with British oversight provided by a Resident deputed to the Mewar court. But local autonomy was relatively sustained.

Ajmer and Bhilwara have shared a more turbulent history. In the twenty centuries preceding British rule for which recorded history is available, no single king or dynasty was able to assert its control over this region for more than a single generation, at most two.

Ajmer has been for most of its history a battlefield among competing claimants. Because of its strategic position in the Aravalli range of mountains, Ajmer was prized by the imperial Mughal power. Ruled by the Mughals for sporadic intervals in its history, Ajmer was finally annexed by the British and ruled directly by a British Chief Commissioner.

Bhilwara, situated directly south of Ajmer and directly north of Rajsamand, was put together as an administrative district after independence, with some parts of its territories taken from the Ajmer Commissionariate, and other parts from the northern (and more turbulent) part of Mewar.

Two consequences derive from these differences in historical background. First, villages of Udaipur and Rajsamand districts have historically experienced relatively stable rule over much longer periods compared to villages in the other two districts. Second, the rules themselves and the manner in which they have been experienced by villagers have had continuities with local tradition in Udaipur and Rajsamand; this was not the case in the other two districts.

We find that households of Ajmer and Bhilwara districts tend to have lower levels of social capital, an average of eight points less, than those of Udaipur and Rajsamand districts, which can be attributed to this erosion of village-level structures, and perhaps to its history of unstable rule. Measured on a hundred-point scale, the average level of social capital for households of Ajmer and Bhilwara districts is 54 and 53 points, respectively. Rajsamand and Udaipur districts have average scores of 63 and 62 points, respectively.

Average scores, however, conceal the vast differences that exist among villages within each district.

Table 12. Social Capital Scores by District

<i>DISTRICT</i>	<i>Average Score</i>	<i>Maximum Score</i>	<i>Minimum Score</i>
Ajmer	54	97	30
Bhilwara	53	88	27
Rajsamand	63	93	38
Udaipur	62	97	33

Variations within districts are *several times larger* than the observed variations in average levels across districts. History cannot account for the large intra-district variations.

To find factors associated with inter-household differences within districts, we consider some other variables associated with alternative explanation that were mentioned at the start of this section. We consider them in turn after reporting their statistical contributions to an explanation of social capital at the household level. The results of the data analysis are given in Table 13.

DEMOGRAPHIC VARIABLES

None of the demographic variables – age, gender, or family size – was found to have a significant coefficient. While gender has a small positive coefficient, with women scoring 0.41 points higher than men on a 100-point scale, this was not statistically significant. Length of residence within the village was also not significantly related statistically with social capital. Alternative formulations of the regression model did not change these results.

WEALTH AND STATUS

In some studies of social capital (Grootaert 1998; Narayan and Pritchett 1997), wealth and income have been found to be positively related to households' levels of social capital. The argument made in support of this finding is that members of households that are richer will have more leisure time to devote to associational membership. Higher levels of associational activity are associated, in turn, with higher levels of social capital.

No relation was found in our data to exist between wealth and social capital, however. Measuring wealth in terms of landholding, and alternatively in terms of farm animals owned, the two measures of wealth and income-generating assets most relevant for this context, produced no statistically significant coefficients.

Table 13. OLS Regression of Social Capital on Household Attributes, with Household-Level Social Capital as the Dependent Variable

	<i>Coefficient</i>	<i>Standard Error</i>
Intercept	27.38***	2.49
Hypotheses And Independent Variables		
A. PRIOR EXPERIENCE (cf. Hirschmann 1984)		
– Experience of collective action within the last 12 months	5.27***	0.27
– Prior collective management of common lands	0.74*	0.30
B. RULES (cf. Ostrom 1990)		
– Clear and fair rules relating to common land development	4.85***	0.66
C. PARTICIPATION (cf. Esman and Uphoff 1984)		
– Participative decision-making vs. decisions by chiefs alone	1.09*	0.58
– Decisions made by all vs. decisions by technical specialists	2.09***	0.57
D. INFORMATION		
– Number of sources of information	0.80***	0.15
E. EDUCATION (number of years)		
	-0.59	0.45
F. STATUS		
– Landholding	0.04	0.02
– Caste status	-0.16	0.27
G. DEMOGRAPHIC VARIABLES		
– gender (male=1, female=2)	0.41	0.56
– family size	0.08	0.12
– length of residence in the village	-0.25	0.20
H. HISTORY (District Dummy Variables)²⁵		
<i>Bhilwara</i>	-1.69*	0.81
<i>Rajsamand</i>	8.60***	0.83
<i>Udaipur</i>	8.03***	0.84
N = 1,451		
R ² = 0.453		
Adj-R ² = 0.447		
F-ratio = 79.24		
F-prob. = 0.0001		
DW = 1.690		
Note: *p<=0.1; **p<=0.05; ***p<=0.001		

²⁵ Ajmer was considered as the baseline against which the other three districts were compared. There is, therefore, no separate dummy variable for Ajmer. Coefficients for the three district dummy variables should be interpreted as the additional points on the social capital scale scored, on average, by villages of these districts compared to those of Ajmer.

Poorer households are as likely to have orientations associated with high social capital as their richer, better endowed counterparts in the same village.

Similarly, caste as a measure of social status also had no significant association with social capital. Higher-caste villagers do not manifest higher levels of social capital.²⁶

EDUCATION

Surprisingly, education did not have a statistically significant association with social capital at the household level. The regression coefficient indeed had a small negative value, made insignificant by a high standard error.

In the earlier analysis, when we considered development-oriented collective action as the dependent variable, we found literacy to be a significant variable, along with political competition and social capital. Literacy is important, thus, for explaining variation in the level of villagers' development activity. It is not an equally salient variable, however, for explaining differences in households' levels of social capital.

PARTICIPATION

Several variables under this heading appear to help account for differences observed among households' levels of social capital. Associated with hypotheses related to, respectively: (a) participation, (b) regard for locally formulated rules, and (c) prior experience with collective action, these variables had consistently significant correlations even in alternative formulations of the model.

A household that had, for instance, engaged with others in the village to do something about a community problem even once within the past 12 months had a 5.27 point lead on the social capital index on average, compared to those who have not engaged even once in this sort of enterprise. Participation in decision-making is supported as well by other results, suggesting that appropriately institutionalized, it can work as a powerful correlate of social capital formation.

Beliefs and attitudes that households have concerning participation associate positively and significantly with their levels of social capital. Households that claimed decisions about village development are better taken in a participatory fashion, rather by village chiefs or government officials acting alone, on average scored up to 2 points higher on the social capital scale.

Information is another variables found to have a statistically significant association with social capital. Adding one more source of information to those already accessed by a household enhances its social capital by 0.8 points on average, all other things remaining constant.

²⁶ There is some correlation between caste and landholding. In alternative formulations of the regression model, we kept one and dropped the other among these two variables. Multicollinearity is mild, however, even for the formulation where both the variables were retained. As measured by the highest level Condition Index, multicollinearity was scaled at 17.7, not very high for a model with 18 variables and 1,500 observations.

The highest levels of social capital arise when beliefs about participation are reinforced by the existence in the village of rules that are clear to follow and that are implemented fairly. Controlling for other attributes and beliefs of households, those which perceive that such rules exist in their village scored 4.85 points higher on the social capital scale on average.

The combined effect of attitudes about participation, rules that facilitate participation, and actual experience of participating in a collective enterprise, add up to approximately 14 points, which amounts to a difference of more than one standard deviation in the household distribution of social capital. Accumulated among sufficient households in a village, social capital in this amount can take the village 10 percentage points higher on our scale of development activity, a substantial achievement.

This draft report presents the main and most interesting findings from our empirical study of social capital, based on evaluating individual and village-level characteristics associated with development performance for conserving watersheds in Rajasthan and making them more productive. Our next step in this study will be to solicit critical comments and suggestions from professional peers and to take these results back to Rajasthan, for discussion with officials and villagers. This will be done both to check and confirm the findings and also to involve them in explicating policy-relevant implications of this study for the creation of development-related social capital.

ANNEX 1. VILLAGE SELECTION AND HOUSEHOLD SAMPLING

Village Selection

Sixty four villages were selected for this investigation, lying within four districts – Ajmer, Bhilwara, Rajsamand and Udaipur – which straddle a contiguous belt running from mid-central to south-central Rajasthan. The selection of these four districts was purposive, not random.

Though watershed development projects are located in each of the 30 districts of the state of Rajasthan, a disproportionately large number of projects in the state are housed within these four districts. Three of the four World Bank-supported Integrated Watershed Development (Plains) Program (IWDP) project areas are located here (the fourth is in Jodhpur), and there are areas within each of the four selected districts which are covered by the World Bank project. Significantly, there is no other contiguous tract in the state that is covered by both types of watershed development projects – the World Bank-supported IWDP as well as the Government of India-supported National Watershed Development Programme for Rainfed Areas (NWDPA).

Another reason for selecting a contiguous belt – rather than taking a random sample of all watershed development projects in the state – is to control for variations on account of different agro-ecological endowments. Rajasthan's is a vastly varied landscape, with arid desert in the west (annual rainfall less than 250 mm) giving way to much more hospitable climates toward its eastern border (rainfall exceeds 1,250 mm in the most easterly districts). By selecting a set of adjoining districts spanning a central range, both geographically and in terms of ecological features, we expect to focus comparison most closely upon variables associated with social relationships and local institutions, the sorts of variables most likely to be related to social capital.

There was also a practical reason responsible for this selection. Rajasthan spans nearly 600 kilometers from north to south and close to 800 from west to east. Rather than risk selecting watershed villages more than 500 kilometers apart from each other, and have the investigators scurrying around from one end of the state to the other, we opted for a more compact block, thereby allowing time for more detailed investigation in each village separately. Local dialects in Rajasthan change perceptibly every 20 kilometers and radically every 200 kilometers, so the logistics of training and dialoguing with field investigators and village respondents rapidly would become unwieldy the more widely spaced out is the sample of villages. In any case, what is being studied here is an understanding of the relationship between social capital and development performance, and not some absolute or representative measures of either variable.

Field Investigators

Language can be a barrier to communication, especially if, as in India, language and idiom are clearly recognized to indicate the class and occupational background of the speaker. In much of north India, including Rajasthan, English is spoken easily and often by the metropolitan elite, hesitantly and self-consciously by the provincial middle classes, and not at all by most villagers. A higher form of literary Hindi is spoken easily and fluently by the provincial elite,

and hesitantly and self-consciously by metropolitans and villagers. Villagers are most comfortable speaking in the local dialect. They have less reason to hide their real feelings or to dissemble when the social and linguistic distance between the inquirer and the respondent is the least.

Two alternative methods were considered. The first is the anthropological method wherein experienced investigators – most likely city dwellers – immerse themselves in a particular village for long periods of time, learning to converse in local dialect, and dispelling the initial mistrust their presence might occasion. Though this method is more rewarding in the long term, deploying 48 professional investigators over long periods of time requires more time and more money than this study could afford.

The second method – which we adopted – consisted of selecting persons who were themselves village residents and then training them to conduct the survey in their own and adjoining villages. The time lag involved in learning the local dialect and earning local acceptability is minimized in this method, though there are risks arising out of (a) improper and deficient training, and (b) identification of the investigator with a particular group or faction, resulting in biased and colored responses being given out to him or her. The first type of risk can be reduced through careful training. We had a eight days long training session, followed by three sets of practice interviews conducted (supervised, then unsupervised) by each of our 16 investigators.

Investigators were selected not on the recommendation of some faction leader or local government official, but because of the previous experience most of them have of implementing some components of the watershed development program, mostly the component related to livestock development. Eight men and eight women comprised our team of 16 investigators, thereby allowing separate investigations among men and women in a society where gender segregation is the norm. One man and one woman investigator together formed a team. They administered the questionnaire in each village, following a list of interviewees given to them and resulting from a sampling procedure.

Second, investigators' work in the field was facilitated by trained supervisors, who visited them often and helped resolve any problems of local identification. For the help provided by them in identifying field investigators, assisting with their training, arranging for field supervision, and providing logistic support, we acknowledge with great appreciation the services rendered by M/s Chitra Management and Consultancy Services, Jaipur, Rajasthan.

Selection of Villages and Respondents

While the four districts were purposefully selected, villages within the district and respondents within each village were selected following a process of multi-stage random sampling.

Village Selection All watershed villages in the four selected districts were classified as High, Middle and Low in terms of development performance. Seven indicators were used to provide this preliminary measure of development performance. Sixteen villages were selected in each district, four each from the High, Middle and Low categories, respectively,

following a process of simple random sampling for selecting villages within each category. Among the four villages within a category, two villages each were selected from the IWDP and the NWDPRRA groups.

Respondent Selection Within each selected village, respondents for the individual questionnaire surveys were selected randomly from the official Voters' List for each village. All adults in each Indian village are enrolled as voters through a house-to-house survey undertaken periodically. This periodic extensive survey is complemented by annual intensive revisions for the sake of complete voter enrollment. Some errors and omissions are, no doubt, still possible, but apart from the voters' lists no other standardized list of households and adults is prepared for any village.

The Voters' List classifies all voters first by households (i.e., individuals living together in the same dwelling), and then gives unique numbers to each adult member (voter) within the household. Since we wished to maximize the spread of households within the sample – to cover the largest number of caste, class and occupational categories within each village – we first selected households following a process of simple random sampling. Since we also wanted to interview an equal number of male and female respondents, a male member was selected at random from odd-numbered households, while a female member was selected at random from even-numbered ones.

The list of all female respondents were given to the woman investigator in the two-person team. Similarly, the male investigator was responsible for all male respondents in the sample. Each investigator was also furnished with a B (backup) list, to draw upon sequentially in the event that persons in the A list had died or migrated from the village.

ANNEX 2. TERMINOLOGY AND CONCEPTUALIZATION OF SOCIAL CAPITAL

I. Structural Forms of Social Capital: RULES, SOCIAL NETWORKS, ROLES, PROCEDURES and PRECEDENTS that *facilitate* mutually beneficial collective action (MBCA) by lowering transaction costs, coordinating efforts, creating expectations, making certain outcomes more probable, providing assurance about how others will act.

Primary Forms: These have cognitive origins in people's subjective realm, but they are relatively objective and observable:

- A. Specific **ROLES**, both formal and informal, and **RULES**, explicit and implicit, that support the four basic functions and activities required for collective action:
- ◆ Decision-Making (planning, evaluation, etc.) [Goal attainment]²⁷
 - ◆ Resource Mobilization and Management [Adaptation]
 - ◆ Communication and Coordination [Integration]
 - ◆ Conflict Resolution [Pattern maintenance]
- B. **SOCIAL RELATIONSHIPS** more generally, broad and specific patterns of exchange and cooperation that involve both material and non-material goods and facilitate MBCA on a regular or on an as-needed basis. These are often described, and can be analyzed, in terms of **NETWORKS**.

Secondary Forms: These are essentially cognitive, but they pertain to objective and observable relationships:

- A. **PROCEDURES:** Agreed and understood processes or routines for carrying out the above activities and functions through roles and rules in ways that make these roles and rules widely understood and accepted.
- B. **PRECEDENTS:** Previous actions and outcomes that establish the validity and value of certain roles and rules. Precedents increase the likelihood that people will act in certain ways and that such action will be accepted and effective.

An example of a structural form of social capital is *sanctions*, which reinforce and regularize agreements and dispositions for collective action. Sanctions can be produced by persons acting in any of the four kinds of roles listed above. They are specified by rules and carried out according to procedures and precedents. They make cooperation more likely because others' behavior is more predictable, and they accordingly make cooperation more widespread and beneficial.

²⁷ These bracketed terms are the designations that Talcott Parsons gave to what he considered to be the four universal and essential functions for any and all social organization. They correspond to the four kinds of roles found necessary for effective irrigation management (Uphoff 1986a: 166), but they appear to be critical for any and all collective action.

II. Cognitive Forms of Social Capital: NORMS, VALUES, ATTITUDES and BELIEFS which create and reinforce positive interdependence of utility functions and which support mutually beneficial collective action (MBCA).

Primary Forms:

A. **Orientations toward OTHERS** – how one thinks about and acts toward others:

1. **TRUST/RECIPROCATION** – MEANS of relating to other persons, e.g.:

- ◆ *Norms* of reciprocation
- ◆ *Values* in being trustworthy
- ◆ *Attitudes* of trust
- ◆ *Beliefs* that others will reciprocate

These cognitive orientations make cooperation and generosity *efficacious*. One can assume that others will act in friendly, reliable way; will keep agreements, but will also act in beneficent way even without explicit agreements. An area where more analysis and evaluation needs to be done concerns "specific" vs. "generalized" norms and behaviors of reciprocity. The first set is more intense while the latter set is broader. Both represent forms of social capital but with different effects.

2. **SOLIDARITY** – ENDS of relating to other persons, e.g.:

- ◆ *Norms* of helping others, of "standing together," of incurring costs for benefit of some larger group, beyond immediate family or kin
- ◆ *Values* of maintaining solidarity among persons within larger group
- ◆ *Attitudes* of benevolence and loyalty toward all those within the larger group
- ◆ *Beliefs* that others will uphold norm of solidarity and be willing to make some sacrifices to help others

These orientations make cooperation and generosity *desirable*. One can assume that others will act in friendly, reliable ways and will be willing to make some sacrifices for the "greater good" of the larger group.

B. **Orientations toward ACTION** – how one should be disposed to act:

1. **COOPERATION** – MEANS of action with other persons, e.g.:

- ◆ *Norms* of cooperation, working together, rather than separately
- ◆ *Values* of being cooperative, working with others for common good
- ◆ *Attitudes* of cooperation, being willing to oblige, accommodate, accept tasks and assignments for common good
- ◆ *Beliefs* that others will similarly be cooperative and that cooperation will be accordingly successful

These cognitive orientations create expectations that others will cooperate and make this action *efficacious*. These predispose people to seek joint solutions to problems rather than assume cooperation will not occur or will not be successful so that individual action is preferred.

2. **GENEROSITY – ENDS** of action toward other persons, e.g.:

- ◆ *Norms* of altruistic behavior, contributing to others' well-being in addition to one's own
- ◆ *Values* of acting generously, recognizing that this (if reciprocate) will be beneficial for one's self, but at the same time taking satisfaction in others' well-being
- ◆ *Attitudes* that being generous is good, natural and beneficial, that generous actions will be good for everyone, including one's self
- ◆ *Beliefs* that others will act generously and will not take advantage of one's own generosity beyond some reasonable limit

These orientations create expectations that "virtue will be rewarded," later if not immediately. These also establish positively *inter*-dependent utility functions, which are conducive to positive-sum satisfactions. As means, TRUST and COOPERATION are interactive/interdependent and mutually reinforcing, much as SOLIDARITY and GENEROSITY are as ends.²⁸

Secondary Forms: There are variety of norms, values, attitudes and beliefs that correspond with and reinforce these primary normative orientations: e.g., honesty, egalitarianism, fairness, participation, democratic governance, and concern for the future (e.g., for the next generation).

No systematic analysis has been done on these as secondary forms of cognitive social capital because they have thus far been treated mostly descriptively in the literature, being lumped together with trust and reciprocity, solidarity, cooperation, and generosity. The latter are, we think, the basic normative orientations that produce mutually beneficial collective action – the "income stream" that comes from social capital assets. The latter, more specific normative orientations are certainly important, but we think they are better understood as being secondary forms of social capital.

²⁸ The relationships and dynamics of solidarity and generosity have been explored in analytical and theoretical ways in *Learning from Gal Oya*, Chapter 12. There is a growing social science literature on "altruism" as a behavioral phenomenon, and there is a long-standing tradition of work on "solidarity" initiated by Durkheim. "Cooperation" and "trust" have gotten increasing attention from various researchers.

ANNEX 3: PROFILE OF SURVEY RESPONDENTS (N = 2,397)

GENDER:	Male:	= 1,178
	Female:	= 1,200
	Missing Values	= 19
AGE:	Mean	= 43.06
	Std. Dev.	= 14.1
HOUSEHOLD SIZE:	Mean	= 5.22
	Mode	= 5
	91% of all households have between 2 and 7 members	
EDUCATION:	No Education	= 1,725
	Primary	= 498
	Secondary	= 66
	High School	= 29
	Undergraduate	= 19
	Graduate	= 10
	Missing Values	= 50
CASTE	Upper Caste	= 804
	Middle Caste	= 896
	Scheduled Caste	= 279
	Scheduled Tribe	= 371
	Missing Values	= 50
PRIMARY OCCUPATION	Agriculturist	= 1,603
	Agric. Laborer	= 363
	Business or	
	Private Service	= 147
	Government Service	= 80
	Jobless	= 158
	Missing Values	= 8

Regular Salary Incomes from Outside Employment

In response to the question, "Does any person in this household have income from a regular salaried job?" 2,115 respondents replied "No."

118 households had one member in a government job, and 51 had placed one member in a private sector job.

AGRICULTURAL LAND HELD BY HOUSEHOLD

Less than 2 bighas ²⁹	=	22.3 percent
less than 5 bighas	=	57.3 percent
Less than 10 bighas	=	78.4 percent
Less than 20 bighas	=	93.6 percent
Less than 40 bighas	=	98.4 percent

FARM ANIMALS OWNED Mean = 8

None	=	10.4 percent
Less than two	=	28.7 percent
Less than five	=	61.2 percent
Less than ten	=	84.0 percent
Less than 20	=	93.3 percent
Less than 40	=	97.2 percent

ASSET OWNERSHIP, CASTE AND EDUCATION

The two variables examined, land owned and animals owned, are positively correlated, which indicates that inequalities in the distribution of these two principal productive assets tend to reinforce each other.³⁰ On the other hand, however, since households with more land or more animals also tend to have more members, there is some equalizing effect in per capita terms.³¹

There is a small positive correlation between caste and land owned, with higher caste members tending on average to own more land do than those of lower caste.³² But there is no observable correlation between caste and animal ownership. Members of scheduled castes tend on average to have more sheep and goat than do members of other castes.³³

No significant correlation exists between education and asset ownership or, surprisingly, between education and caste.³⁴

²⁹ 4 bighas = 1 hectare.

³⁰ The partial correlation coefficient between these two variables (0.1998) is statistically significant at the .0001 level.

³¹ The partial correlations (0.225 and 0.240) are both significant at the 0.001 level.

³² The partial correlation between caste and land owned (0.127) is smaller than one would have expected. Figures reported by respondents for land owned are somewhat suspect. As field investigators mentioned during the Udaipur meeting, people were reluctant to discuss these figures, and there may be some systematically under-reporting of land ownership.

³³ The correlation coefficient of 0.48 between small animals (sheep plus goat) and scheduled caste percent in village population was significant at the 0.0001 level.

³⁴ The partial correlation coefficient between education and caste (0.079) is significant at the 10 percent level of confidence but not at the 1 percent level.

TYPE OF DWELLING

Kaccha (mud)	=	1282	(coded 1)
Pakka (brick or stone masonry)	=	1059	(coded 2)

As expected, type of house is significantly positively correlated with land owned,³⁵ which indicates that people who own more land are also more likely to have better houses – and to have more cattle.

MIGRATION

The families (households) of 2,080 respondents had stayed in the same village for more than 20 years. Only 76 had come into the village less than 10 years ago, indicating fairly stable residential patterns with little in- or out-migration.

RELIGION

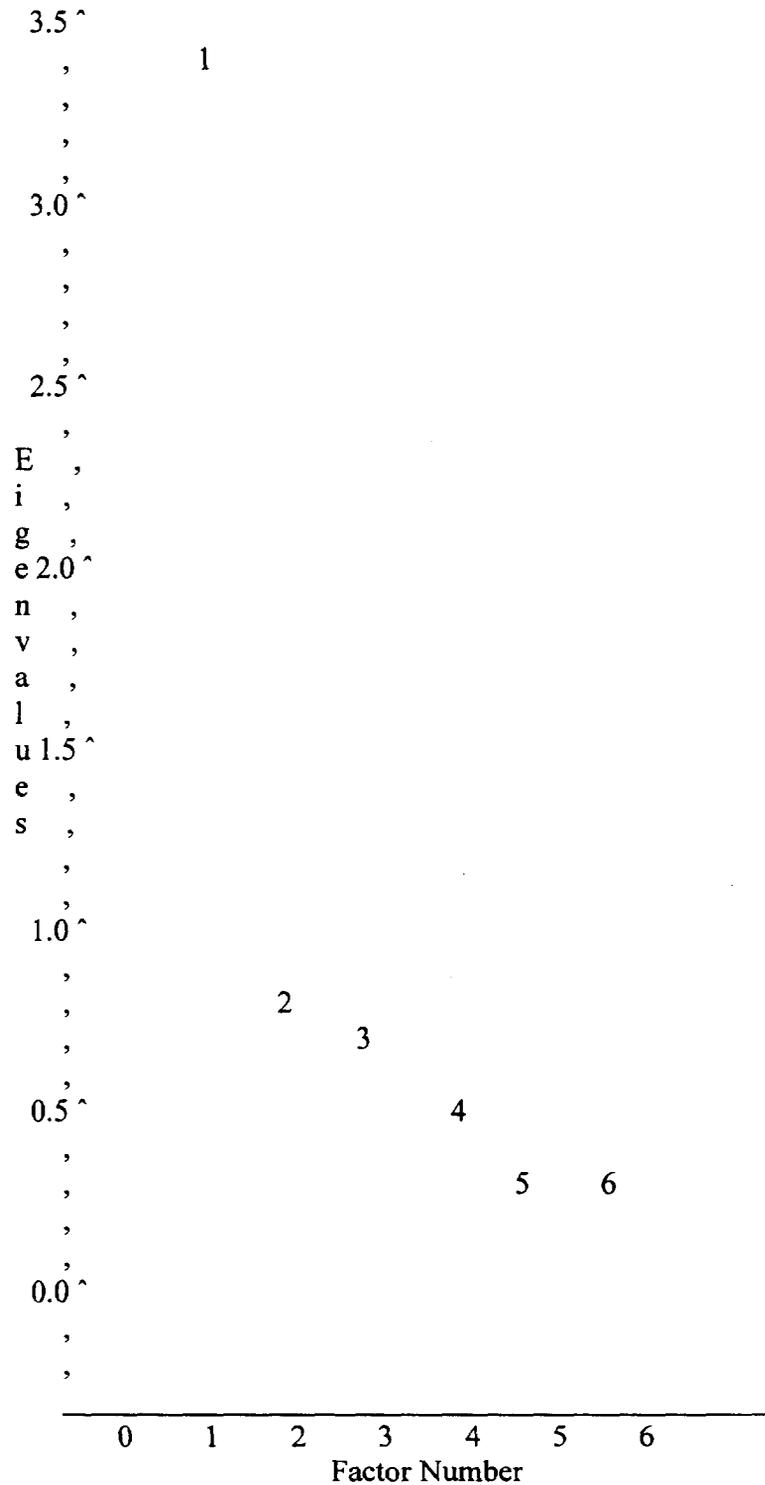
2,309 households considered themselves Hindu, and 45 described themselves as Muslim. No other religious category has more than 10 households identifying themselves with it.

³⁵ The partial correlation coefficient (0.138) is significant at the 0.0001 level.

ANNEX 4. COMMON LAND DEVELOPMENT INDEX

FACTOR ANALYSIS

Scree Plot of Eigenvalues



ANNEX 5. CLDI AND ITS COMPONENTS: CORRELATION ANALYSIS

7 Variables: CLDI WS2 WS3 WS4 WS5 UC5 UC25
 (see Table 1, page 11 for an explanation of these variables)

Simple Statistics

Variable	N	Mean	Std. Dev.	Sum	Minimum	Maximum	Label
CLDI	64	2.1036	1.2266	134.6	0.2000	5.0500	CLDI
WS2	64	2.0625	1.0820	132.0	0	3.0000	WS2
WS3	64	0.9063	0.7500	58.0	0	2.0000	WS3
WS4	64	1.7031	1.0340	109.0	0	5.0000	WS4
WS5	64	0.7813	0.9338	50.0	0	4.0000	WS5
UC5	64	0.7656	0.9214	49.0	0	3.0000	UC5
UC25	64	0.6875	0.7099	44.0	0	2.0000	UC25

Cronbach Coefficient Alpha
 for RAW variables : 0.892851
 for STANDARDIZED variables: 0.891465

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 (N = 64)

	CLDI	WS2	WS3	WS4	WS5	UC5	UC25
CLDI	1.00000 0.0	0.65724 0.0001	0.72419 0.0001	0.79848 0.0001	0.79983 0.0001	0.84555 0.0001	0.59983 0.0001
WS2	0.65724 0.0001	1.00000 0.0	0.18338 0.1469	0.41411 0.0007	0.42221 0.0005	0.44483 0.0002	0.31515 0.0112
WS3	0.72419 0.0001	0.18338 0.1469	1.00000 0.0	0.57757 0.0001	0.51419 0.0001	0.51897 0.0001	0.27204 0.0297
WS4	0.79848 0.0001	0.41411 0.0007	0.57757 0.0001	1.00000 0.0	0.52347 0.0001	0.62555 0.0001	0.52032 0.0001
WS5	0.79983 0.0001	0.42221 0.0005	0.51419 0.0001	0.52347 0.0001	1.00000 0.0	0.71429 0.0001	0.42201 0.0005
UC5	0.84555 0.0001	0.44483 0.0002	0.51897 0.0001	0.62555 0.001	0.71429 0.0001	1.00000 0.0	0.44439 0.0002
UC25	0.59983 0.0001	0.31515 0.0112	0.27204 0.0297	0.52032 0.0001	0.42201 0.0005	0.44439 0.0002	1.00000 0.0

ANNEX 6. EXAMINING ALTERNATIVE HYPOTHESES

Correlation Analysis

Pearson correlation coefficients are reported below. Analyses were also conducted using Spearman rank-order and Kendall's tau-b correlations, but this did not change the significance or relative magnitude of any coefficient.

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0
(Number of Observations =)

	CLDI	DCAIND
MOISTRES	0.06196 0.6267 64	0.06690 0.5994 64
COWUNITS	-0.13562 0.3580 48	-0.15750 0.2850 48
OFFINPUT	0.06667 0.6007 64	0.08099 0.5246 64
DISTMKT	-0.06581 0.6567 64	0.07497 0.6126 64
MECHZN	0.07062 0.5823 63	0.11835 0.3556 63
INFRASTR	0.00360 0.9775 64	0.09824 0.4399 64
EDUCATION FACILITIES	0.17062 0.1777 64	0.23460 0.0620 64
HEALTH FACILITIES	0.05635 0.6583 64	0.07883 0.5358 64

COMMUNICATION FACILITIES	0.04309 0.7353 64	0.14416 0.2558 64
TRANSPORT FACILITIES	-0.10569 0.4059 64	-0.09581 0.4514 64
ELECTRICITY	-0.08164 0.5213 64	0.01622 0.8988 64
LITERACY	0.28158 0.0254 63	0.30883 0.0138 63
LITFEM	0.19481 0.1260 63	0.16617 0.1931 63
HIGHED1	0.06969 0.5843 64	0.12829 0.3124 64
NCASTES	-0.08498 0.5043 64	0.03512 0.7829 64
CASTEDOM	0.28993 0.3201 64	0.11224 0.3772 64
SCSTPERC	-0.07785 0.5409 64	-0.18865 0.1355 64

ANNEX 7. COLLECTIVE ACTION FOR DEVELOPMENT INDEX (DCAI)

1. PEARSON CORRELATION COEFFICIENTS / Prob > |R| under Ho: Rho=0 (N = 64)

	CLDI	COMMPROJ	COLLREP	SERVESAT
CLDI	1.00000 0.0	0.65197 0.0001	0.64505 0.0001	0.63264 0.0001
COMMPROJ	0.65197 0.0001	1.00000 0.0	0.49961 0.0001	0.54805 0.0001
COLLREP	0.64505 0.0001	0.49961 0.0001	1.00000 0.0	0.46764 0.0001
SERVESAT	0.63264 0.0001	0.54805 0.0001	0.46764 0.0001	1.00000 0.0

2. FACTOR ANALYSIS

Variable	N	Mean	Std Dev	Skewness	Minimum	Maximum	Range
CLDI	64	2.10	1.23	0.73	0.20	5.05	4.85
COMMPROJ	64	2.84	1.56	0.45	0.00	6.00	6.00
COLLREP	64	1.09	1.31	1.06	0.00	5.00	5.00
SERVESAT	64	2.32	0.87	0.24	0.75	4.25	3.50

Factor Pattern

FACTOR1

CLDI	0.89481	CLDI
COMMPROJ	0.81833	COMMPROJ
COLLREP	0.78670	COLLREP
SERVESAT	0.79969	SERVESAT

Variance explained by each factor: FACTOR1 2.728750

Final Communality Estimates: Total = 2.728750

CLDI	COMMPROJ	COLLREP	SERVESAT
0.800680	0.669671	0.618896	0.639503

Root Mean Square Off-diagonal Residuals: Over-all = 0.11177836

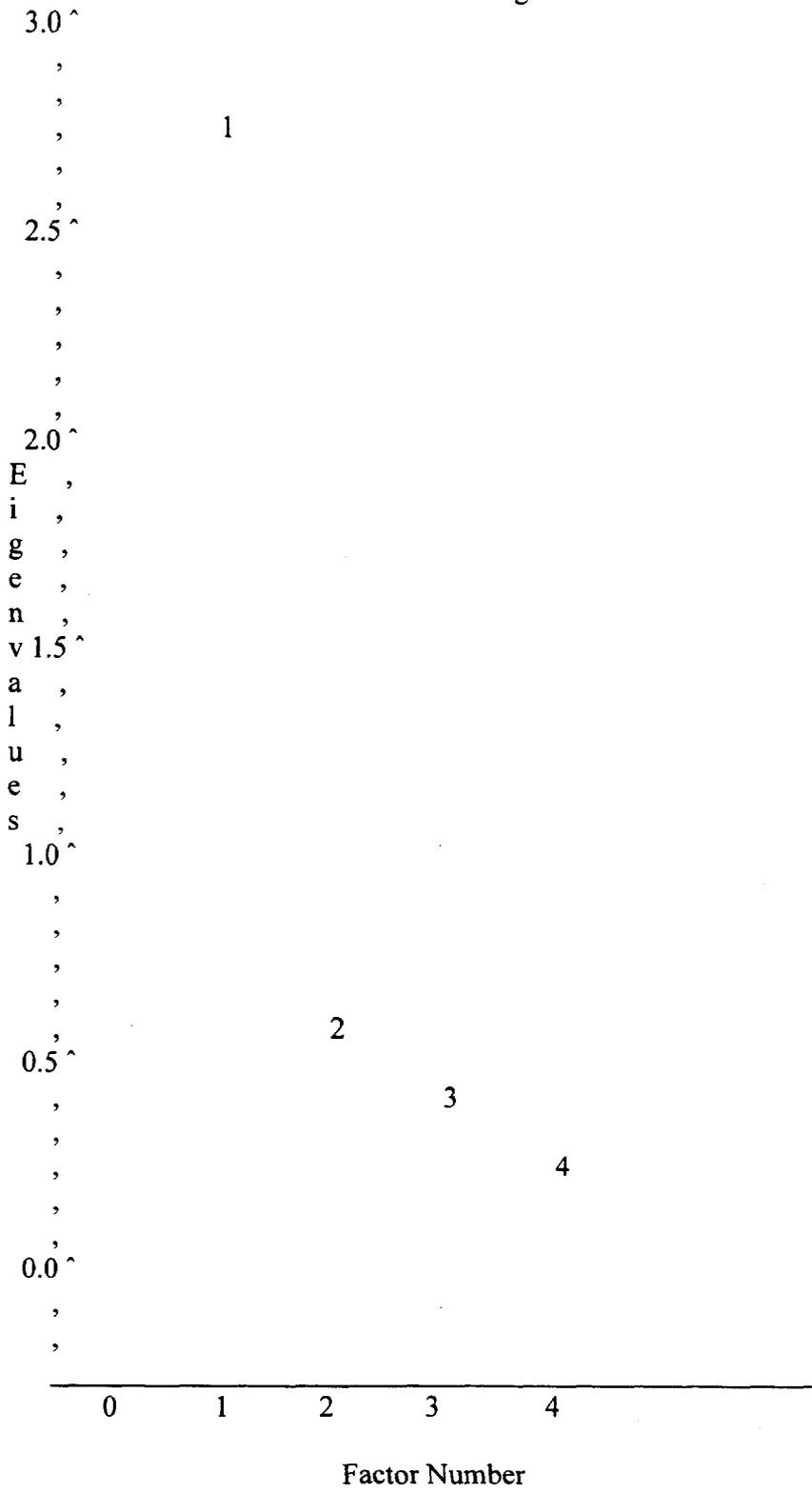
Kaiser's Measure of Sampling Adequacy: Over-all MSA = 0.79479148

CLDI	COMMPROJ	COLLREP	SERVESAT
0.733249	0.815162	0.828580	0.833155

The composite variable **DCAI** is calculated by summing across the four variables, CLDI, COMMPROJ, COLLREP, and SERVESAT after adjusting each of these variable to have a range from 0 to 1, thereby weighting each of them equally.

The scree plot reproduced on the next page has a sharp elbow between factor numbers 1 and 2, indicating that these four indices load highly on a single common factor.

Scree Plot of Eigenvalues



ANNEX 8. SOCIAL CAPITAL INDEX: QUESTIONS AND RESPONSES

If a crop disease were to affect the entire standing crop of this village, then who do you think would come forward to deal with this situation?

- Every person would deal with the problem individually [1]
- Neighbors among themselves [2]
- The dominant political faction [3]
- All village leaders acting together [4]
- The entire village [5]
- Don't know/not sure [8]
- Refused to reply; no answer [9]

Who in this village has historically looked after the common pasture lands?

- No one does anything for protecting these lands [1]
- There are old customs that are followed here [2]
- Our leaders take decisions that we all follow [3]
- A village committee exists which takes these decisions jointly [4]
- We all discuss and jointly decide what is to be done [5]
- Don't know/not sure [8]
- Refused to reply; no answer [9]

Suppose two people in this village had a dispute with each other. Who do you think would resolve this dispute?

- No one [1]
- Some political leaders [2]
- Their neighbors [3]
- Their caste fellows [4]
- The entire village collectively [5]
- Don't know/not sure [8]
- Refused to reply; no answer [9]

Suppose some children of the village tend to stray from the correct path; for example they are disrespectful to elders, they disobey their parents, are mischievous, etc. Who in this village feels it right to correct other people's children?

- No one [1]
- Only close relatives [2]
- Relatives and also neighbors [3]
- Anyone from the village [4]
- Don't know/not sure [8]
- Refused to reply; no answer [9]

Which among the following is the most important reason why people in this village plant and protect grasses and trees (check one)?

- Because fodder and fuelwood are in short supply [1]
- Because this way there is less need to protect our crops from cattle [2]
- Because this is the right thing to do and earns us religious merit [3]
- Because this activity keeps the villagers united [4]
- Don't know/not sure [8]
- Refused to reply; no answer [9]

Suppose a friend of yours in this village faced the following alternatives, which one would he or she prefer most?

- Own and farm 10 bighas of land entirely by themselves [1]
- Own and farm 25 bighas of land jointly with one other person [2]
(each would be entitled to 12.5 bighas)
- Don't know/not sure [8]
- Refused to reply; no answer [9]

ANNEX 9: SOCIAL CAPITAL, TOLERANCE OF DISHONESTY, DIVISIONS, AND POLITICAL COMPETITION

Correlation Analysis

4 'VAR' Variables: SK DISHONES DIVISION POLINDEX

Simple Statistics

Variable	N	Mean	Std. Dev .	Sum
SK	64	56.256067	7.996043	3600.388
TOLDISHON	64	222.728111	34.561924	14255
DIVISION	64	309.305299	55.724644	19796
POLCOMP	64	68.368516	17.404427	4375.585

Simple Statistics

Variable	Minimum	Maximum	Label
SK	33.404558	67.463699	Social capital index
TOLDISHON	136.839080	295.312500	Tolerance for dishonesty
DIVISION	167.708333	416.279070	Divisions and factions
POLCOMP	47.393365	99.880392	Political competition index

Correlation Analysis

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 (N = 64)

	SK	TOLDISHON	DIVISION	POLCOMP
SK Social Capital Index	1.00000 0.0	-0.22590 0.0727	0.11916 0.3483	0.11474 0.3666
TOLDISHON Tolerance for dishonesty	-0.22590 0.0727	1.00000 0.0	0.21032 0.0953	-0.07731 0.5437
DIVISION Divisions and factions	0.11916 0.3483	0.21032 0.0953	1.00000 0.0	0.15144 0.2323
POLCOMP Political competition index	0.11474 0.3666	-0.07731 0.5437	0.15144 0.2323	1.00000 0.0

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