Wells in Western India
Irrigation and Cooperation in an Agricultural Society
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Introduction

The principal purpose of this paper is to describe the social arrangement surrounding access to water from open-surface wells in a rural Indian setting. This description raises certain questions concerning the sociology of cooperation in a traditional agricultural society undergoing rapid economic and technical change. Some of these questions are briefly discussed in the conclusion.

Context

Control over the means of production—land, labor, tools, animals, water and money—both stratifies and connects rural households in the villages of South Asia. It stratifies them because some of these households invariably control more of these resources than others. It connects them because features of the social organization of production place these households in positions of cooperation with one another. Such features include a variety of forms of joint ownership of land and other resources, formal and informal exchange arrangements for tools and for labor between households, crop-sharing arrangements, legal and illegal uses of land as security in loan transactions, tenancy relations, and sharing systems for water resources. Some of these relations have recently been carefully described by Lee Schlesinger for a village in Satara district, Maharashtra (Schlesinger 1981).

I use the term 'cooperation' in this context with some hesitation, for it frequently implies equality between partners and equally cheerful attitudes on both sides. Though this is sometimes the nature of cooperation in situations such as the one I shall describe, more often cooperation is a state of affairs that involves households of different economic capability, and that may not be regarded as especially desirable by some of the parties involved.

This paper uses data collected in 1981-82 from a single village in Maharashtra to consider one form of cooperation, that which is involved in the problem of access to water for agricultural production. By describing the technology, social organization, and political economy of open-surface wells in this village, I hope to cast some light on the very complicated ways in which cooperation is related to the distribution of resources in one kind of agricultural milieu. Villagers do cooperate in other contexts and on other scales. Extended families jointly operate domestic units and sometimes work their plots together. Larger kin units cooperate in bearing the costs and labor needs of large-scale ceremonies, such as those involved in marriages and funerals. Lineages work together to celebrate the festival days of lineage deities. Farmers sometimes have special cooperative arrangements for the sharing of bullocks and related equipment for key agricultural activities. Women form teams that sell their services for specialized agricultural activities, such as the planting of onions. Men
form teams that dig wells by contract. All of the households in the village make some contribution to the festival of the principal village deity, and most households have made some financial contribution to the recent renovation of the shrine of this deity (Fig. 2). Water from wells, therefore, is not the only interest which draws farmers together in cooperative arrangements. But it is a cooperative context of special complexity and importance.

Before I describe the village I worked in, I should point out that open-surface wells constitute an important feature of this agrarian society for several reasons. First, according to the Swaminarayan Report for Maharashtra State for 1975-76, the area under well-irrigated was over 50 percent of the net irrigated land of the state, with surface irrigation being used for less than 40 percent. Further, at least in the mid-70s, well-irrigated land was increasing at twice the rate of land under surface irrigation. Also, between 1974-75 and 1975-76 the number of electric pumps on wells increased by 12.5 percent. Maharashtra is very backward in comparison to other states in terms of the amount of irrigated land. It is further clear that wells play a quantitatively significant role in irrigation in Maharashtra which is probably unique in India. In closely examining the social organization and economic system of well-irrigation in a Maharashtra village we are, therefore, looking at a particular aspect of the transformation of the agrarian landscape in India.

Second, and simply from a descriptive point of view, most anthropological accounts of irrigation systems, to my knowledge, deal with spatially and technologically larger ones, i.e., supra-village systems. Brian Spooner's account of jainti systems in the Iranian plateau is among the very few which deal with systems of a comparably small scale (Spooner 1974).

Third, such wells and access to the water in them constitute the critical link between rural production and the market in agricultural commodities in contemporary Maharashtra. By extension, in the particular village discussed here the sale of agricultural commodities grown on plots watered by these wells is the most important source of cash in two senses: for those who can successfully market these products, this is likely to be their most substantial and predictable source of cash; and this commercialized agriculture is also likely to be the principal source of cash for those men and women who sell their labor to others, either because they are landless or because they have too little land to meet their minimum needs.

Fourth, for technical reasons that will become apparent as I proceed, there is a good reason to believe that the current use of these wells represents a major intensification of commercialized agriculture in this region, with certain historical implications and possibilities. For all these reasons, a careful analysis of the political economy of wells in a village in Maharashtra ought to tell us something of value about the changing relations between the forces of commercialization in agriculture and the local organization of rural production.

The Ethnographic Locus

The village from which I have drawn this data—and to which I have given the pseudonym Vadi—is located about 25 miles southeast of the city of Pune, in Purandar taluk (subdivision), Pune district, Maharashtra State (see Fig. 4). For non-Indians, this places it in western India, about 130 miles inland from the coastal metropolis of Bombay. Its location also places it on a gradient of decreasing rainfall in the Deccan Plateau. Rainfall in Vadi totals probably less than 25 inches in most years, and is sharply seasonal. The peak period of rainfall in normal years is in the months of June, July, August and September, which account for about 75 percent of this total. October and November normally account for about 15 percent, the months from December to March for about 3 percent, and April and May for about 7 percent. These figures are very approximate, for there can be sharp year-to-year fluctuations from this norm. The village is about 25.5 miles from Swad, the taluk headquarters, which is the principal bus link to Pune and to Bombay.

There is a road that goes by the village which is used by the buses of the State Transport system and by the trucks of the transport companies that move vegetables from villages like Vadi to Pune and to Bombay.

The population of Vadi consists of approximately 3000 persons, who are distributed in 183 households. About 30 percent of these households contain families that are 'joint' (ākārm) in one or another sense, while the remaining 70 percent are 'nuclear' (ādharām). The total amount of cultivated land is about 880 acres of which about 260 acres (less than 33 percent) is wet land, i.e., land that has access to water above and beyond rainwater. Mean landholdings are 4.5 acres, with mean dry landholdings being 5.1 acres and mean wet landholdings being 1.4 acres.

Vadi has a very significant set of links with the outside world. Out of the 183 households, 104 have one (and often more) members of the family outside the village, usually earning a living in Bombay or Pune. But this should not give the impression that Vadi is a 'remittance' economy in any simple sense, since many of these wage-earners support dependents in the city, and others, for a variety of reasons, send cash back to the village only in special circumstances. Then it is no surprise that although 104 households have working members outside Vadi, only 33 of these households described cash salaries as their principal means of subsistence (when compared with income from cash crops, sale of family labor, and the products of their own fields).
The caste composition of Vadi is relatively simple. Out of the total households 174 are Maratha, and the rest are distributed among theMahar, Mang, Chambers, Gurav, Lohar, Narsi, and Ramesh castes. When villagers state that this is a “Maratha village,” they are not far wrong. The Maratha households themselves are organized into four numerically dominant lineages (bhāskari) and three numerically minor ones. The families in each lineage share surnames (ādānī), although there is here an ethnographic curiosity that in two of the dominant Maratha lineages share the same ādānī. The families of the other castes are similarly identifiable by shared surnames.

I have already noted that mean landholdings are small. Agriculture, to produce crops for both household consumption as well as for sale, is the principal economic activity of the villages. The principal subsistence crops are sorghum (jowar) and millet (bajrī), and most villages grow at least some of each. In addition, however, there is a very large inventory of other cultivars. Small amounts of wheat and rice are grown. The principal commercial crops are sugarcane, onions, and green peas. Also important, but more for consumption than for sale, are a variety of lentils and pulses, peanuts, many kinds of greens, and small amounts of tomatoes, carrots, figs, fodder grass, and flowers. All the crops are grown principally for sale (and here peas and onions are the most important), as well as the vegetables grown for home consumption, require irrigated land.

There are two major cropping seasons: the khāṛī (or winter) season, when the bulk of the irrigation-dependent, market-oriented farming is done, which runs from November to February, and the hot (unahāri) season from March to May is the most tiring because of the heat and lack of water, but those who do have access to water in this season use it to grow certain vegetables. The hot season is also the season for repair of tools, preparation of the land in anticipation of the June rains, and the celebration of marriage and other village festivities. It is the season of high expenditure and low income for many households.

While the technology of agriculture is largely traditional, its economic framework is no longer so traditional. The bullock and the plough are still the key instruments of agriculture, and the tools used for plowing, sowing, threshing, and harvesting are still largely part of a very ancient material inventory. Yet there have been important changes: The use of fertilizer and of pesticides, particularly for cash crops, has become common, and animal manure is now infrequently used. Agricultural labor is paid for virtually entirely in cash, and there are clearly understood rates of payment for different tasks, seasons, and genders. Vadi is a labor-surplus village, for though there are very few landless households, the number of land-poor households is quite large. Even the intermittent flow of urban remittances is inadequate to sustain the land-poor households, whose women and men must sell their labor in addition to using it to manage their own small holdings. Thus, it is not often that the farmers of Vadi need to hire laborers from other villages.

Vadi is now in a variety of ways deeply monetized. Even the poorest households are deeply tied into the cash nexus and most households, in the opinion of these farmers, would now collapse without a few hundred rupees per month, at the very least (Rs. 500; US $1 then). One major way to improve one’s position in a world dominated by cash transactions is to enter the market in agricultural commodiﬁeds, not only as a laborer (where the prospects for improvements are dismal) but as a producer. This means gaining access, however precariously, to irrigated land. This is where wells enter the picture.
The Place of Wells in Agrarian Culture

Though the concern in this paper is with some sociological and economic problems raised by the use of wells in Vadi, it should be made clear that to the farmers of Vadi, wells are not usually regarded from an aggregate point of view, nor simply as parts of the capital required for agriculture. There are now 74 wells (vadi) in Vadi and most of them are seen as individual entities, with names, histories, and identities. Wells are part of the known landscape of the village, and they serve to demarcate the landscape at the same time as they derive their own distinctiveness from it. Their names sometimes refer to the fields in which they lie, and these field names, like all traditional toponyms, contain the memory of precious owners of the soil, reflect qualities of the soil in the vicinity, or serve as reminders of the lineages controlling that soil, or of particular fruits or crops for which the land associated with the well is known. Not all of the names have folk explanations, but most are associated with shared knowledge of features of the history, landscape, and social framework of the well in question.

Space and time come together in the names of these wells, although not all farmers know all them to be known about these names. What is known is a good deal about who now are the sharers in the well, when it was built, its reputation for being a plentiful source of water (or not). Given the number of wells, and the complexities of the system of sharing in them, such knowledge is not evenly shared and is sometimes out of date. Well-water, like all water, is believed to contain delineated powers, and when new wells are inaugurated, there is a special ritual offering to these deities, in which representations of fertility and sanctity are central. Wells thus form a very important part of the human landscape of Vadi, and it is the willingness of farmers to talk in detail and at length about the wells in which they have shares that has made possible the discussion that follows.

The Technology of Wells

The basic technological structure of the 74 wells currently in use in Vadi probably goes back at least a millennium and consists of a hole dug in the soil to a depth of anywhere from 20 to 60 feet, and with a diameter of anywhere from 15 to 30 feet. The traditional measure for the depth of a well is a paras or porush, indicating the height of an adult male but actually equivalent to about 7 feet. While some wells were probably dug by family or village labor, specialist castes of well-diggers are a well-known part of the historical record in western and southern India. In the past, the inner walls of this hole might be finished with stone and lime, and these would have been a wooden superstructure (Fig. 10). This superstructure would permit the dropping and lifting of a leather water container. The raising and lifting would have been accomplished either by two or four bullocks.

Today, wells have acquired some new features, though they are fundamentally unchanged. Cement has largely replaced lime for the finishing of the interior, steel containers (mot) have replaced the leather water containers, and, in a few cases, rented boring machines have replaced human labor for the actual digging. Most important, animal power is now regarded as obsolete, although about 12 wells still use this form of power. The energy source of choice is electricity, although about 5 wells are powered by oil-engines. This means that there are today about 57 wells that are powered by 3 or 5 h.p. electric motors. Sometimes these modernized wells have varying lengths of pipeline, but often traditional dug channels (pat) are used to take the water from the mouth of the well to the fields (Fig. 12). Most wells physically pre-date the arrival of electricity, and are thus simply electrified traditional open-surface wells. The technology of wells may thus better be called mixed than traditional.

Another aspect of the technology of wells is raised, and that is the technique by which decisions are made about where the well should be located. Farmers tend to rely on the propitiations of specialists called pandhari (water-diviner), who are men and women with other regular occupations but who are known to have a talent for spotting subsurface water. These diviners suggest not only locations for digging but also offer predictions about the depth at which water is likely to be struck and the nature of the soil likely to be encountered. Given the massive investment that new wells represent, farmers tend to consult more than one diviner, sometimes a government geological expert, and finally triangulate these expert suggestions with their own knowledge about the likely location of subsurface veins based on their assessment of the relative productivity of other wells in the vicinity.
The Distribution and Control of Wells

Wells are part of the picture of very small and fragmented holdings in Vadi, but are also indicative of a relatively high proportion (33 percent) of irrigated land to total cultivated land, compared to the figure for the state, which was 11 percent in 1973-74. In Vadi, 142 households share about 280 acres of wet land. Of these households, about 33 percent have wet land holdings of less than 1 acre, about 60 percent have less than 5 acres, and about 80 percent have less than 3 acres. Only 11 of these households have more than 5 irrigated acres each, and 1 of these has 25 acres which is the largest concentration of wet land holdings in Vadi. I present these figures to show that these irrigated holdings are extremely modest, by and large.

Most farmers own several plots (tukhā) of wet land: these holdings are not usually physically contiguous, which means that the farmers are open shareholders (ihṣādi; ʾānākā) in more than one well. Although there are 24 single-owner wells, and 13 two-owner wells, even the farmers involved in these have shares in some of the other wells, which have co-shares ranging in number from 3 to the most involved case, which has 31 co-shares. The scattered picture of individual land holdings is further layered over by a cross-cutting web of shares in wells. Shares in wells usually remain attached to the pieces of land with which they are associated and, in Vadi, to buy or inherit a piece of land is by definition to inherit a share in the well which allows it to be irrigated. Yet shares in wells are not entirely tied to pieces of land for wells can fall into disuse or water from one well (theoretically meant to irrigate a particular plot) can be diverted by the shareholder to another plot not associated with it; or well shares can be dissolved while the pieces of land associated with them may be watered by water from another well to which the shareholder has access.

Nonetheless, as a rule, shares in wells are closely associated with pieces of land, and thus the major way in which current shareholders in wells acquire these holdings is through land inherited from their male parents. This is reflected in the fact that many wells have shareholders who are all male agnates (patrial kinship) from the same named lineage, and sometimes they might be sons of the same father. This picture of patrilineally inherited shares is fairly persistent, so that when one encounters a well which has mixed lineage membership, or in which there is one anomalous surname, it can easily be traced to one of the following three sources: a sale of the land (and the associated well-share) to an outsider by a lineage member in financial difficulty; the acquisition of a piece of lineage land by an outsider because of a loan default in which the land was the security (fīrāq); or, in the few cases where a widowed member of the lineage, whose husband received the land as part of her dowry, and the land has reverted to her after her death.

Turn-Taking and Constraints on Production

Approximately 33 percent of these wells have between 1 and 4 shareholders and thus do not require complex systems for sharing water. But the remaining 60 percent, which have between 5 and 20 shareholders, do require complex time-sharing systems. To understand these systems, it is necessary to have some background concerning the role of wells in agricultural production. Well-watered land is crucial to growing most crops in the winter and summer seasons when the rains are minimal. Very few wells have water through all 12 months, and it is these few 12-month wells (ḥirdāsālā) that allow their beneficiaries to grow sugarcane, which requires ample water throughout the year. The bulk of wells are known as 8-month wells (ṭūsālā; and yield water from approximately mid-June to mid-February. Such 8-month wells permit the growing of cotton and green peas (the two major cash crops), plus a variety of other vegetables and fruits which are grown both for market and for home consumption, as well as small amounts of rice and wheat.

In wells that have more than four or five shareholders, who are working small plots of land and growing the same cash crops (such as onions) at much the same time, there are fairly complex turn-taking (gālī) systems. These systems vary depending on the number of shareholders, the water retention capabilities of the well, especially in the hot weather, the crops being grown by the shareholders, and the amount of land under the well in question. Usually the system is a 12-day or 5-day rotation, and the amount of time (1 day or 2 days or a part of a day) that a particular turn consists of depends on the amount of land that a particular landholder has in his share. It is in the hot season, when the water level drops, and when the cash crops need water in order to yield profits, that these systems come into play. It is also at these times that those farmers who have access to their own wells, or to low-membership wells, have the greatest advantage.

In general, partly because of the fragmented holdings under wells and the problem of low-capital for many of these farmers, few wells involve 100 percent use of the plots that are described as being under them (chahrkūltī). Frequently only a third of the acreage is actually associated with the well and is actually in productive use. This is a sign of the incapacity of shareholders to afford the labor and other costs associated with full use of their well-linked acreage. In most cases, the underutilization of these nominally irrigated plots is a function of these disabilities and not of the limits of the wells alone. Consolidation of holdings is the key to the economics of using these wells optimally, but most farmers have holdings that are far from each other in addition to being small. Wealthier farmers are already seeking to acquire, either by direct purchase or by mortgage-defaults, plots near ones they already own.

14 Make shift protection for an unwired electric well motor.
All farmers in Vadi who lack access to shares in wells would like to acquire such shares. All farmers with shares would like to see these shares electrified. (I speak of electrified shares rather than of electrified wells because there are several cases of wells in which some shareholders have invested in motors which they operate during their turns. The motor is not available to other shareholders who could not afford to participate in the original investment, and who therefore use bullock power during their turns or, in a few cases, rent oil-engines, which are portable.) And all farmers would like to have wells of their own, preferably electrified, without having to cooperate with other farmers in the original investment or in the subsequent turn-taking.

The motorized wells which have multiple shareholders clearly reflect the fact that the costs of electrification (a 3 h.p. motor costs about Rs. 5000 [US$55] and a 5 h.p. motor about Rs. 8000) are beyond the reach of most farmers. Yet, the decision to invest jointly in a new well is even harder than the decision to invest jointly in a new motor for an existing well. The costs of a new well, including digging it, installing a motor, and perhaps installing pipelines, can go from Rs. 20,000 (US$222) to Rs. 40,000. This is a very sizable investment, since the mean annual cash income of most small farmers (from all sources) is unlikely to exceed Rs. 5000. Given the small individual plots, the chances that some of the co-sharers will not be able to afford the inputs to make the optimal use of the irrigated land, and the chances that economic difficulties will make some of them renounce on their share of the bank loan repayments or the electricity bills, it is no surprise that all but one of the new wells dug in the last five years are entrepreneurial ventures by single farmers. There have been joint efforts to electrify existing wells, but there are several wells where plans to electrify have not come to fruition, and others that, though electrified, are underutilized, especially by the poorer shareholders.

Sharing and Conflict
Though current sharing systems in the multi-shareholder wells are quite intricate, they are surprisingly conflict-free. Problems do arise, and these come from a variety of sources: most common is the usurpation of part of another shareholder's turn; using the water from a turn to water land which is not attached to the relevant well but to another one; or the incapacity or refusal of a shareholder to participate in repair costs, electricity costs, or the costs of repaying bank loans. Perhaps the most frequent source of tension is the question of what happens to a turn disrupted by a failure in the electrical supply or by a breakdown in the motor. Most well-sharers have agreed that the fair solution is to allow the turn to resume, rather than to lapse, after the problem is solved. It is not at all obvious, furthermore, that tensions appear to increase with the number of shareholders or the overall intensity of use. There is, however, a definite seasonality to tension around wells, with the hot season being the fragile temporal zone. The largest number of shareholders is associated with a particular lineage, 3 of whom use a certain well, involving a very complex and interrelated system of turns. But this is a very disciplined and well-managed lineage, which, in this as in other matters, is very good at handling internal problems effectively and quickly.

In general, it seems as if the family and lineage built of these groupings has a good deal to do with the low level of conflict occurring in them, not because families and lineages are interpersonal utopias, but because as long as a group of agnates maintains its productive interests jointly, they have a variety of emotional, social, and corporate reasons to resolve conflict rapidly. In these cases, as well as in those that involve nonrelated farmers, the other factor that preempts complete disruption of the system is the shared awareness that a complete breakdown is simply too costly for all concerned, given the short commercial cropping seasons, the high costs of the inputs, and the need to get maximum yields in order not to face significant financial losses. Indeed, in the case of the bulk of the multi-owner wells, the fact that these are small farmers holding on to the commodity market with very small margins for failure makes them less prone to pursue disputes in ways that bigger landlords can afford, in this and other parts of South Asia. Disputes about water, such as Douglas Merrey has reported in the large-scale irrigation systems of Pakistani Punjab (Merrey 1983), might require a larger size of holding, before they become chronic and endemic.

Wells, Commercialization and Cooperation
Looking at the state as a whole, it is clear that irrigation, and the commercialized agriculture it supports, is the basis of a dominant peasant class economy. These rural villages use modern forms of capital (including cash) in a massive way in agriculture, and generate significant profits from the sale of agricultural commodities. The technology of well-irrigation plays an unusually important role in supporting this development in contemporary Mahana. As I have already suggested, further, the electrification of these wells, which is clearly proceeding rapidly, is a new technical means to intensify commodity production in agriculture. Given the small amount of irrigated land in the state, this suggests the rapid formation of a small class of capitalist farmers who consume the labor of other, less wealthy farmers, and reap the bulk of the profits from commercialization. From the village perspective, at least in cases such as Vadi, the picture is more complex, for irrigated land is spread among a very large number of households. Thus, though a few of these families constitute a truly distinct category in terms of their role ownership of wells and the relatively large amounts of land they own (as well as certain other endowments that I have not discussed here), on the whole, irrigated...
plots are part of the precarious struggle to survive and reproduce of a large number of small farming households, who do not form a wealthy class in any obvious way.

For these smaller farmers, cooperation in complex water-sharing systems is apparently a function of both the costs and the rewards of commercialized agriculture based on the availability of electricity. Such cooperation is not regarded as either desirable in itself or as optimal, and most farmers are perfectly clear that they would prefer independent ownership of wells. But cooperation is, for most farmers, the only way to gain some access to the benefits of commercialized agriculture, and is, at the same time, a way to retain some independence from the market for meeting their own consumption requirements in certain vegetables and grains. It must also be stressed, however, that the traditional structures for organizing such cooperation, which are kinscented even if not completely kin-based, are remarkably effective and conflict-free. From the point of view of the actors, such cooperation is largely a result of the disciplined effort of small farmers to gain access to those resources which they hope will permit them to become free (as producers) of those very structures of kinship, inheritance and sharing on which such cooperation is currently based.

Farmers cooperate in the short run so that, if they are fortunate, they may not have to do so in the long run. This orientation to the possibility of autonomy from collective forms of organization may be the single most important result of intensified access to cash incomes, electricity and urban markets.

Acknowledgments

Earlier versions of this paper were presented at the panel on "Rethinking Agricultural Research for South and Southwest Asia," Annual Meetings of Mid-Atlantic Region of the Association for Asian Studies, October 28–30, 1983, Philadelphia, Pa., and at the First International Conference on Maharashtra, University of Toronto, March 18–20, 1984. I am grateful to participants in each of these gatherings for their critical comments and suggestions. For comments on earlier written and oral versions, I am especially grateful to Sandra Barnes, Robert Hunt, Douglas Merrey, Loron Michael, Brian Spooner, and Bernard Wails.

The fieldwork on which this paper is based was conducted in 1981–82 with financial support from the National Science Foundation, the American Institute of Indian Studies, the Joint Committee on South Asia of ACLS/SSRC. Dipak Kumbharkar and Devidas Tarwade assisted in the collection of the data in the field. A grant from the University Research Foundation, University of Pennsylvania, aided in the analysis of some of the data.

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