DISCUSSION PAPER

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Trust as a Factor in Canal Performance: Organizational and Technological Conditions

by

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Summary

The performance of canal Irrigation systems depends, in part, on trust by farmers in the good faith and abilities of irrigation officials. In India, this trust is typically lacking; there is, instead, a 'syndrome of anarchy' under the canals, in which farmers lack the confidence that if they refrain from taking water out of turn they will get water on time, and officials lack confidence that if they work conscientiously to get the water on 'time, farmers will refrain from rule-breaking. To break the syndrome, changes need to be made in the relationship between 0 & M and construction; in the source of the 0 & M budget; and in the geographical scope of the 0 & M organization. The East Asian Irrigation Associations provide an example of the direction in which institutional changes might sensibly be made. Changes In physical design can also help; particularly the punctuation of the hydraulic system at a point within the ken of farmers.

TRUST AS A FACTOR IN CANAL PERFORMANCE: ORGANISATIONAL AND TECHNOLOGICAL CONDITIONS*

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Canal managers, faced with irrigators who steal water or break the structures, typically respond by demanding more powerful deterrents. That response fails, however, because it misses the deeper problem of which the law-breaking is a symptom, and because in any case the law as a mechanical barrier can only be effective when a tiny minority of the population are likely to break it. Most of the observance of rules has to be more voluntary, because the cost of enforcement when large numbers of the population comply involuntarily (through a calculus of evasion and punishment) is likely to be prohibitively high. What then are the conditions in which a group of people will voluntarily subscribe to a rule of restrained access to irrigation water?

My context is surface irrigation systems where public officials operate the higher levels of the distribution network and below a certain point, farmers take over. Here the question becomes: what are the conditions in which <u>trust</u> by farmers in the good faith and abilities of irrigation officials can be sustained?

The Need for Trust in Authority

Whenever water is scarce in relation to demand, there is a rationing problem. Even in those rare canal systems where water is sold in a market (as in the Alicante canals of southern Spain: Maass and Anderson 1978), and where price is thus the principal means of rationing, an organization to administer and sanction the rationing is needed. In the more usual situation where water is not priced volumetrically, the 'load' on the rationing organization is heavier, and increasingly so as water becomes scarcer in relation to demand. More and more farmers will want to take water they are not entitled to.

The situation from the viewpoint of an individual irrigator (or small group or irrigators) can be likened to a Prisoners' Dilemma game. Each Individual has a clear preference ordering of options: the first preference is for everyone else to abide by a rule of restrained access while the individual enjoys unrestrained access — while he 'free rides'; the second preference is for everyone, including himself, to follow the rule; the third preference is for no-one to follow the rule — for everyone to grab what he can; and the worst outcome of all is for everyone else to grab while he follow the rule. Given that this is the order of perferences, the stable outcome (in the absence of careful institution design) is likely to be the third-ranked alternative: unrestrained access. From the more socially desirable second-ranked alternative (restrained access by all), each individual has an incentive to cheat and go for his own first

preference (restrained access by all except him), with the result that the aggregate situation deteriorates to the outcome of the third-ranked preference. In other words, mutual rulebound restraint is not necessarily a stable equilibrium, because from that position each individual can be immediately better off by cheating — provided that he thinks the others will not also immediately cheat. But the third-ranked preference implies that unless water is very abundant, many farmers will get little or unreliable water supply, because their own supply is a function of the unrestrained access of those higher up the distributory. They will in turn struggle to obtain better supplies by stealing water, breaking the gates, breaching the banks, bribing the officials, even murder (Maass and Anderson 1978:2); so compounding the overall problem.

Many theorists of Prisoners' Dilemma have concluded that the socially desirable outcome of restrained access by all can be sustained only by the imposition by an external authority of powerful penalties against rule violation. If so, the conclusion is a council of despair; because in the reality of most Third World countries, legal mechanisms and the authority of government are simply not powerful enough to make a sufficiently plausible threat access myriad micro situations.

But the conclusion is too strong. Prisoners' Dilemma is useful in drawing attention to the point that just because a set of individuals have a joint interest in a certain outcome, that does not mean the outcome will be forthcoming. Beyond this point, however, Prisoners' Dilemma is misleading for the irrigation case. It makes good sense to suppose that in many situations individual irrigators will restrain their water-rule

breaking if they are confident that others will also refrain, and if they are confident that they will still get as much water as they are fairly entitled to (even if not as much as they would like). They will more likely refrain from cheating if they are confident that by doing so they will not be the 'sucker'. Where people are so motivated by an 'I'll restrain if you restrain' calculation, then institutions (such as an Irrigation Department) which convince them that these expectations are justified can promote voluntary compliance with the rules. The reason is that the rational individual will not free ride regardless of what others do, as the Prisoners' Dilemma game assumes. He will calculate the likelihood that his own free riding will encourage others to do so and how much their free riding will reduce the benefits that he gets from going so. It must be remembered that the individual's first preference is to free ride while other do not free ride, so that he continues to get the collective benefit which their restraint produces. If that collective benefit might not be forthcoming because his free riding encourages others to do the same, it may be rational for him to comply with the rule. Free riding remains a possibility, but not an imperative (Runge 1984, Kimber 1982).

This argument is hypothetical. But there is a growing body of experimental evidence — admittedly about contexts rather far from what we are discussing here — which suggests that ideas about 'fairness' are important factors in individuals' choices about whether to free ride, and that the strong version of the free rider hypothesis (that individuals will voluntarily contribute very little of their resources towards the provision of a public good) is very implausible (Runge 1984, Marwell and Ames 1981).

Or consider the converse. Henry Hart identifies a 'syndrome of anarchy' at work under Indian canals, which is, he suggests, a major factor in their under performance (1978). The syndrome of anarchy grows out of and reinforces a basic lack of confidence, of trust in good faith, and both sides of the irrigator/irrigation official divide. The farmers lack the confidence that if they refrain from taking water out of turn (refrain from stealing it, breaking the structures, bribing the officials) they will nonetheless get water on time. The officials for their part lack the confidence that if they do work conscientiously to get the water delivered on time, farmers will refrain from rule-breaking. It is a 'syndrome' in that the behavior of each party to the relationship now tends to confirm the negative expectations held by the other. Each is the other's headache. (The syndrome may operate between individual farmers within a given village, who behave anarchistically towards each other over water matters; or, given the capacity of some villages to organise canal-water distribution within the village (Wade 1985b), it may operate only <u>between</u> village units, each village unit struggling to get more water than it is entitled to against other village units).

Breaking this syndrome has to be done primarily from the <u>government</u> side, by means of a sustained demonstration of the ability to deliver reliable and expected amounts of water if the farmers do not interfere. Our question then is: how can public officials assure farmers that if they restrain their taking of irrigation water, they will get the expected amounts?[2]

Part of the answer is to be found in the physical design of the system, to make the dependence of farmers on irrigation officials less critical, to make it less necessary for farmers to trust their good faith day-by-day. I come back to some of these physical features later. Another part of the answer is to be found in the design of the irrigation management organization.

Organizations and Trust

Political theorists generally stress two elements as preconditions of authority. First, that the person given decision-making power should have some competence which makes such a division of labour sensible; second, that he should evoke trust in his good intentions — that his use of power should be seen not to be predatory and self-interested, but concerned with the welfare of the larger whole of which both he and his subordinates or clients are part.

Compare against these preconditions the situation under Indian canals, as seen from the farmers' perspective. The immediate field staff — those who are responsible for actually opening and shutting gates, checking on minor maintenance, etc. — are recruited from amongst landless labourers and carry little respect within rural society. The officers typically have little prior experience of canal 0 & M — the size of 0 & M divisions compared to other divisions of the Irrigation Department is so small that any one person normally spends most of his career on things other than canal 0 & M, in particular, on construction. (If O&M posts account for only, say, a tenth of the total numbers of professional pests,

and if there is no career specialization, any one individual can expect to spend only about a tenth of his career on O&M work). There is no training available for prospective O&M managers.[3] Their competence in O&M will thus frequently be more striking by its absence than its presence. In practice, of course, farmers will typically not be in a good position to assess competence directly; and as the judgement of competence becomes more difficult, so the trust element becomes more important. Typically the officers have no identification with the area or the farmers they are responsible for; and they typically are rotated in and out of any one posting every 15-20 months or less (Wade 1982b, 1985a). Other than at the bottom field-staff level, there is no stable core of people who are associated with a particular canal. Transport facilities are poor and the distances large; so officers are rarely seen on the canals (Hart 1978: A-126).

Such conditions are almost guaranteed to create a situation in which the legitimacy of the public officials who allocate water is always close to being questioned, whether by their own subordinates within the irrigation agency or by the farmers.

The conditions which keep competence and trust at low levels are themselves the results of three basic structural features of the organization. The first is that canal 0 & M is carried out by an organization whose primary function has been construction. That is why few of the professional staff on a particular canal will have had much prior experience of 0 & M. It is also why they are not especially interested in O&M because the O&M budget will be a tiny part of the overall

Irrigation Department budget, so its allocation and scrutiny will be given little attention; also because professional reputation will be anchored firmly in construction; and they will then tend to behave while doing O&M work in the top-down hierarchical control mode appropriate for construction but inappropriate for O&M. The second important structural feature is the lack of connection between the budget of the Irrigation Department and the collection of water rates. Water rates are normally collected by a separate department; and in those few states where rates are collected by staff attached to the Irrigation Department, the department's budget is still entirely unrelated to what it collects. Lacking a revenue base of its own, it must depend on the government budget. The third feature is the almost complete absence of contact with, let alone coordination between, the Irrigation staff and the staff of other agencies which provide important inputs into irrigation agriculture (so that, for example, irrigation water might be released into the canal at the start of the season in complete ignorance of whether farmers are ready to use it if there have been delays in the disbursements of credit farmers may not have been able to buy the inputs needed to make prompt use of the water). The lines of authority run parallel, from the top of each department in the state capital right down to the lowest rank of field staff; at each level, the staff of each department go their own way.

Compare now the Irrigation Associations (IAs) of Japan, Taiwan, and South Korea (in South Korea they are called Farmland Improvement Association).' All three countries use a basically similar form of organization, which is a watershed-based parastatal. In South Korea and

Taiwan the term 'association' is misleading in that it suggests democratic control by farmers' representatives, whereas in fact there is no such mechanism of accountability (in Taiwan the irrigators' council of each association — which in any case had fairly circumscribed powers — was abolished between 1975 and 1982). However, each parastatal has considerable autonomy within its geographical jurisdiction.

The primary function of each parastatal is canal O&M, not construction. Construction is carried out by a separate, national-level organization which undertakes the design and construction (supervision of construction carried out by private contractors) of all sizable structures in the country. So the staff of each IA do not have their incentives constantly tipped towards construction, nor is their behavior constantly shaped by the control mode appropriate to construction tasks. They are O & M professionals. What is more, they have their own independent revenue base: the IA itself collects water rates from farmers (so much per irrigated hectare), and from this revenue meets (most of) its operating costs for staff salaries, routine maintenance, etc.[5] So the staff have a direct sense of dependence on the prosperity of farmers—in-the—aggregate. Thirdly, South Korea's IAs provide some agricultural extension and land development; indeed, the same people who operate the canals provide the extension (but most of them do not much like having to do both). The ordinary extension service, organized in provincially-based parastatals (one per province, which is much smaller than an Indian state), also provides extension in irrigated areas. In Taiwan, the IAs do not provide extension — that is done by separate Farmers's Associations. The

jurisdictions of the IAs and Farmers's Associations are not congruent; but the key point is that a stable set of officials are engaged in the same small area, some providing O&M, others providing extension, and informal coordination develops between them. In South Korea's IAs, the coordination between the water supply function and the extension function is built into the organization.

In none of the three countries are the IAs involved in input supply or marketing, or in other-than-minor construction.

A higher level (provincial and/or national) agency monitors the performance of each agency against various kinds of financial and physical targets, and lays down general regulations about, for example, salary scales, staffing densities, and ratios of administrative to operational expenses. The East Asian form of Irrigation Association is thus quite different to the Indian pattern of a centralized Irrigation Department (at state level), with a Chief Engineer General at the top of the pyramid in the state capital, and a hierarchy of regional and project offices stretching out beneath him; with the same department attending to construction, investigation, design, and O&M across the entire jurisdiction of the state (which may have a population of 40 million or more).

Organizational structure is only one determinant of how organizations perform; the same structure can be activated in different ways. But one can see, just from the structure, how trust between farmers and irrigation staff and within the irrigation hierarchy itself is easier to maintain in the East Asian type of organization.[6]

Several other features of the East Asian type also help. The staff are locals: they tend to be recruited locally and spend most of their career within it. There is limited movement by irrigation staff from one IA to another. This helps to promote an identification of interests between the staff and farmers. With respect to South Korea's IAs (Wade 1982), the 'patroller', who bicycles around a 100-150 hectare jurisdiction twice a day opening and shutting gates, is nominated each year by the headmen of the villages within his jurisdiction. He must himself be a farmer, with land to irrigate, so that he experiences the problems at first hand. If the headmen are unsatisfied with his performance they nominate someone else. At the top level, the senior employees are mostly promotees. (But in South Korea and Taiwan the senior-most official of each IA is appointed by the government.) In any case, virtually all the senior employees will have spent years on the project scheme before they make it to the senior positions. Moreover, the IA is <u>not</u> a launching pad for a career in the central government. In all these ways, the eyes of the officials are kept firmly on the locality, and an identification between their own welfare and that of the farmers is further encouraged.

This identification is strengthened in still other ways. The contractual nature of the employment relation between the IA and individual staff members is obscured, or replaced by, a sense of common membership in a corporate entity which has objectives that can be shared by all members. A variety of methods are used to build up this corporate sense <u>within the Association itself:</u> such as competitions between the field stations (in

quality of canal maintenance, collection of water charges, volleyball, even the making of the staff of farmyard manure, intended to spur farmers to do the same); such as once-a-week joint exercises sessions for all the staff; or such as weekly planning meetings for all field station chiefs. But most Important of all, all the staff (other than the patrollers) are paid on rising seniority scales, so that pay is not closely tied to the job they do; all the staff expect to have lifetime employment; and the lower ranks in each IA identify more closely with their IA than with lower ranks in other IAs, which helps to avoid the ingrained conflictualism which is found between lower and higher staff in Indian Irrigation Departments and which erodes any sense of common purpose and pride in work.

Staff involvement with farmers is promoted by such devices as a monthly newsletter; and more importantly, by the constant presence of irrigation staff along the canals. This last is a function of a particular method of supervising the 'patrollers', whose responsibilities have already been noted. All staff members, even the (male) clerks, have the responsibility of supervising one patroller, in addition to their other duties. At least once every two or three days they must go to their 'patrollers' beat and make sure that they can see that he's on the job. They are provided the use of a small motorcycle for the purpose. They are expected to, and in any case are inclined to, stop and chat with farmers whom they pass along the canals. The intensity of this sort of local, dyadic contact helps to make up for the paucity of more formal channels of communication between farmers and staff, which is in turn an expression of the authoritarian character of the South Korean political regime (Wade 1983).

So the IA structure is such as to encourage a local identification. Local identification is important because it gives both sides a set of shared experiences. This directly assists a sense of mutual obligation between them; and also provides a basis for a shared set of beliefs according to which the existing order is fair and just, and every betrayal is perverse and unjust – including betrayal of the irrigation agency's rules. This is a much more cost-effective method of avoiding free-rider problems than relying on a calculus of punishment.

At the same time, pressures and incentives bear down on individual staffers, and on the IA in general, to perform. For individual staffers, promotion is decided by means of a complex formula. The formula includes, very importantly, seniority (length of service); but also includes a weighting for performance in the regular training sessions that a national training agency arranges, and for superiors' judgments on such things as diligence, willingness to take responsibility, and loyalty (Wade 1982:112). For the IA as a whole, its performance is monitored from above, within the Ministry of Agriculture, by means of a variety of criteria, such as staffing density, revenue collection, ratio of expenditure on administration and expenditure of maintenance, and so on. In addition, each IA can expect to have a team arrive from the ministry at least once a year, to make an inspection which may last several days and includes not only the financial accounts but also the state of the physical structures. Prizes are awarded to IAs for good performance.

I would not wish to be seen as starry-eyed about the IA form as it works in South Korea. I have elsewhere argued, indeed, that canal

operation in South Korea is not very proficient, for the simple reason that, land being normally more limited than water, good supplies can be got to the crop (which is only rice) without any degree of fine-tuning of supply to demand (1982:26, 58). However, I think it is clear that the IA structure does offer big advantages over the Irrigation Department structure in terms of its capacity to induce O&M officials to do their job conscientiously and to evoke in farmers a counter-trust in authority.

Physical Structures and Trust

The need for trust, and the likelihood of it being forthcoming, is also related to the physical structures. The bigger the size of system, the more difficult it is for individual farmers to understand how the system operates and the constraints under which the canal staff work. The more difficult it is for the farmers to understand, then the more crucial is the trust element (as opposed to the understanding element) in the acceptance of authority. And the more that active act of faith is needed, so the more those given authority must be seen to be using their power in a henevolent, and not in a predatory way, in good faith for the common good and not merely for personal aggrandizement.

Compare now the typical Indian canal (Wade 1982a, 1985). It has a command area of 50,000 or 100,000 hectares or more. It has a single source of water, and no intermediate storage. The water may take a week or more to travel unimpeded from head to tail. From the viewpoint of the farmer, the rest of the system outside his immediate locality is a mystery. He simply has to take the word of the irrigation staff as to what

the overall water supply situation is. He and his village neighbours have no stock of water which they can call their own. Their 'own' water begins at the outlet; but plenty more water may be available in the distributory on the other side of the outlet. They can go at night with a spade, take water against the rules, and leave little trace behind.

Moreover, the design of the typical Indian system itself necessitates that the irrigators must have a high degree of trust in the irrigation officials if they are to refrain from grabbing. The typical Indian aystem is <u>not</u> the kind found in the Northwest (Punjab and Haryana), with its ungated outlets and rotational delivery rule in the main system (Malhotra 1982, Reidinger 1974). The typical design uses (more or less) continuous flow in the main system and <u>gated</u> outlets, with few cross-regulators. Here water levels in the main system vary greatly, and to maintain constant discharges through the outlets it is essential that an irrigation official run around raising and lowering his gates; but the raising or lowering of one gate will typically set up changes in upstream levels, requiring further gate changes there. In theory, then, the system contains a <u>high</u> level of water control capacity, despite the lack of cross-regulators. In practice, of course, the irrigation staff rarely show the required devotion to duty and technical skills needed to carry out the required routines, and the unadjusted gates discharge fluctuating amounts. But farmers usually want constant, not fluctuating discharges and take whatever defensive action is needed to smooth out the fluctuations --

perhaps by adjusting the gates themselves in line with their local interest. The failures of the irrigation staff force the farmers to compensate, but in ways which make the situation worse overall (Wade 1982b).

Compare the East Asian canals. They are typically much smaller in size (few canal systems in South Korea command over 10,000 hectares, while Taiwan has a few of more than 50,000 hectares but less than 100,000 hectares). The bigger ones are generally linked agglomerations of smaller subsystems, each with their own water supply but capable of feeding into one or more of the other networks. So it is less likely that the whole area will run short of water at any one time, and lags in the adjustment of supply to demand are shorter than where water can be brought from only one source. The South Korean canals (I am not sure how the Japanese and Taiwanese compare on this score) also require, like the typical Indian canals, frequent adjustment of gates to maintain a constant discharge. But because the systems are smaller, the lags in the adjustment for supply to demand shorter, and because the wider political structure makes dor a more disciplined administration at field level, this particular design requirement does not have the trust-eroding consequences that it has in India.

So the design of the Indian canals requires that the farmers have more trust in public officials than is needed in East Asia; while in Indian conditions that trust is more difficult to create and sustain.

Implications

Large-scale systems are a given in Indian conditions. But within that constraint, performance might be improved by changes in both the organizational and physical design. The guiding principle of these changes should be to both reduce the need for farmers to trust the staff and to increase the likelihood that the needed trust will be forthcoming. Changes which meet this criterion have a chance of breaking the damaging 'syndrome of anarchy'.

The basic way to reduce the need for trust is to reduce the farmers' dependence on the allocation decisions of officials. For this, two conditions are necessary: first, an 'inventory' of water, so as to buffer fluctuations in water supply and water demand; second, a clear hand-over point where the officials' jurisdiction ends and the farmers' jurisdiction begins. One design feature which seems promising from this pointof view is the break-point reservoir. The break-point reservoir does not have to be between the outlet and the farmers' fields; it could be at a higher level of the system, serving more than one outlet or village. The important point is that it be at a low enough level for water to be able to reach all the fields within a few hours; secondly, for farmers to see the stock of water which is 'theirs'; and thirdly, that they have a large (legitimate) hand in how it is allocated. However, the break-point reservoir also has major drawbacks: water losses are often very high (efficiency very low); lane acquisition commonly is difficult and costly;

siltation may be high; there are health hazards; and the storage capacity – and so the ability to buffer – is typically small. It is interesting that in Taiwan, the same Japanese engineers who put break-point reservoirs into the Taoyuan system during the colonial period did not put them into most of the other systems on the island, partly because the flatter slopes of most of the other systems made break-point reservoirs much more extensive. In practice, more use of within-canal storage can substitute for a break-point reservoir in terms of the 'inventory' condition; though within-canal storage does not provide for such a clear hand-over point between officials' and farmers' jurisdictions.

So there are trade-offs. One wants to aim at a physical design which will help an organizational distinction between the task of water conveyance, which is properly the concern of experts in hydraulics, and that of irrigation, which should be the concern primarily of agricultural experts. The design should permit the water supply agency to deliver plugs of water according to simple, transparent rules.

Simple operating procedures help to make the system more transparent; the more transparent the system and its operating principles, the more easily farmers' can judge the competence of the irrigation staff and so, by hypothesis, the less needed Is trust in their good faith for the legitimacy of their allocation decisions to be respected.[7]

But also, the simpler and more transparent the operating procedures the easier it is for the officials to be competent at performing them, and so the more farmers will acknowledge their legitimacy. This competence-legitimacy causation can then be reinforced by the more powerful trust-

legitimacy causation if the irrigation agency is structured in the IA rather than Irrigation Department form. For where the water supply agency is structured along IA lines, it is rather more likely that the behavior of staff will be trustworthy, because of their (a) O&M orientation, (b) sense of dependence on farmers' prosperity, (c) local identification, supplemented by (d) the sorts of promotion incentives and (e) monitoring pressures I described earlier.

Of course, it is easier to introduce more inventory capacity and simpler operating procedures than it is to switch from a centralized Irrigation Department to an IA form. To a degree, the break-point reservoir could be a substitute for that more difficult organizational change, since the centralized Irrigation Department could continue to run the main system, as now, but only down as far as the break-point. If the break-point came relatively high up the system, one could imagine an IA, covering the whole command area or major portions of it, taking over responsibility for water allocation from the break-point reservoirs down to small outlets; or if the break-point came lower, farmers might do it themselves in less formally organized ways.

But even without going as far as the widespread use of break-point reservoirs and an IA form, valuable but less far-reaching changes in the same direction could be and, in a few places in India, are being made. In the state of Maharashtra, for example, responsibility for the operation and maintenance of tertiary distributories has been taken from the Irrigation Department and given to new project-specific Command Area Development Agencies, which combine a staff of irrigation engineers with agricultural

specialists. But the Command Area Development Agency is still vulnerable to one of the main problems, which is rapid transfer of officials in and out of post, with trust-eroding consequences.

Another experiment in India which is promising in terms of the argument made here involves the sale of bulk amounts of water to a tertiary distributory — to all the farmers under that distributory as a unit. The farmers themselves then organize the distribution of water and the collection of the fee. This Gujerat experience deserves particular study, because it seems to provide a method of getting many of the benefits of the break-point reservoir but without the costs (in land removed from production, for example). It must be noted, however, that the area of the tertiary is only about 400 acres, and the crop is sugar-cane — a high-value, low-risk crop. Extension of the idea to bigger units and other crops may be more difficult.

Similarly, the type of canal design used in France and Morocco — which combines hydro-mechanical automatic gates plus constant discharge modules — looks promising from a trust perspective, primarily because it greatly reduces the dependence of farmers on the irrigation staff and greatly simplifies what the irrigation staff have to do. But there are other problems with this technology, especially its cost, dependence on reliable supply at the head, rigorous design and construction standards, etc.[8] Again, there are trade-offs.

Conclusion

I have taken the question of how to stop farmers from stealing or bribing more water than they are entitled to under some general rule of

water delivery — back to the question of how to enhance the legitimacy of the authority of irrigation staff. Holding things like the degree of water scarcity constant, legitimacy depends on farmers' judgement of how competent the staff are and on how much they trust their good intentions. Given that competence is often difficult to judge (especially when the system is big and the farmers' knowledge of it is confined to the locality), trust becomes the crucial factor. If the 'syndrome of anarchy' under the canals is to be reduced, farmers must be confident that if they restrain their own individual (or small group) access to water, they will still get enough water; or at least that if they don't get enough water, there are good reasons, beyond the control of the staff, and the shortage is being shared out 'fairly'. I have then suggested that the amount of trust or confidence needed can be reduced by features of the physical design — such as punctuating the hydraulic system at some point within the ken of farmers; and secondly, that features of the organizational structure can make it more likely that trust-evoking behavior by the irrigation staff will be <u>forthcoming</u>. I have emphasized the importance of separating the O & M organization from the construction organization; of providing the O&M organization with a revenue base, such that there is some link between what is collected in water rates and what the organization can spend; and of shaping the O&M organization into a geographically circumscribed parastatal.

What I have not talked about is management techniques — specific techniques for monitoring and controlling the performance of irrigation staff. Management techniques, I suggest, are an important but auxiliary

issue, which can too easily occlude the more basic issues addressed here. Or, in the words of a noted Indian irrigation specialist,

> 'Management is based on the premise that things can be done better, which in turn means that one wants better performance. In a socio-political situation where what Is legitimate Is what one can get away with, can there be any concern about public system performance. And if there is no desire to manage, what can management techniques do? "In the land of nudists, what can a washerman do?"' (Sundar 1984:22).

Notes

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1. The same question can be asked for other common property resources, such as grazing and trees.
2. Irrigation engineers in India, talking about how they try to manage water allocation, commonly stress the need to create trust: 'You have to build up affection', explained one. Another remarked that 'Water management is 25% water and 75% soothing'. The India side of my remarks in this paper is based on detailed field work carried out between 1976 and 1982, which included lengthy periods of residence in a canal command area, as well as trips to several others.
3. Only in the 1980s has this surprising state of affairs begun to change, and then because of pressure from foreign aid donors (Sundar 1984:22).
4. My statement on South Korea are based on three months of field research on irrigation organization in 1979 (Wade 1982); for Taiwan, on short visits in 1979 and 1983 and on (Moore 1983). The East Asian form is similar to that used in Italy (Wade 1979).

5. The South Korea IA I studied in detail covered about 80% of its recurrent costs by Water charges (1982:42).

6. In the interests of brevity I fudge the distinction between trust in relations between farmers and the agency, and trust between hierarchical levels of the agency.

7. The argument for simplicity of operating procedures means that the demand to which water supply is to be adjusted has to be considered at a relatively high level of aggregation, rather than at the level of the individual needs of each person or micro-location served by the system. One reason is limited information-processing capability of most bureaucracies (and the unreliability of computer technology in most rural Third World conditions). This applies even without the second reason, which greatly reinforces the point. Where high margins of discretionary control over water allocation are available to irrigation officials and where water is scarce, corruption is likely; which may reach the point where irrigation officials have an incentive to act so as to reduce farmers' confidence in the reliability of water supply, because this enhances the protection money the officials are able to extract from particular groups of farmers in return for increasing their confidence about their own supplies (Wade 1982b).

8. But cost comparison between this type of technology and the mora conventional type are exceedingly difficult to make. The gates and modules are said to be about twice as expensive as conventional ones; but if, as I have heard said, this adds only another 5-10 percent to total cost, compared to the costs of the same canal with conventional technology, this might be offset by the extra benefits of more reliable water supply.

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