

DRAFT FOR COMMENTS

Appraising and Improving Canal Irrigation

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APPRAISING AND IMPROVING CANAL IRRIGATION

Thrust

The thrust of this paper is that improving canal irrigation presents a wider range of choices of interventions and sequences than is likely to be recognised from the standpoint of any one discipline or profession; that identifying optimal interventions and sequences for any one canal system requires an open-ended and open-minded multi-disciplinary appraisal; and that techniques of rapid appraisal may be cost-effective, if they can be integrated and developed for the purposes of canal irrigation.

Definitions

In this paper:

- appraisal means finding out about
- canal irrigation refers to gravity canal systems typically over 500 ha, and typically administered through some centralised bureaucracy
- the objectives of irrigation are taken to be production (and the productivity of water where it is scarce), equity (especially for tailenders), environmental stability (avoiding waterlogging, salinity, erosion, flooding, etc.), and low costs
- main system includes reservoirs and river diversions, and main system canals, distributaries and minor channels down to the outlets

Potential

The potential for achieving these objectives on existing canal irrigation systems in India appears so vast that it is difficult to grasp. Much time could be spent on arguing what the figures should be. One working hypothesis (Seckler 1981: 8-9) is that about one quarter of the canal systems, measured in terms of potential irrigable land, operate at about 70 per cent of capacity utilization.⁽¹⁾ These are concentrated in North-

(1) Seckler (1981: 8) defines capacity utilization as "the amount of effectively irrigated land which can be obtained from existing supplies of water at the headgates of irrigation systems, with good management of the water through the farm level, and with economically justifiable improvements in physical distribution facilities.

west India. The remaining 75 per cent of the systems operate at about 25 per cent of capacity. Given a created potential of the order of 30 million hectares, the scope for achieving production goals through raising capacity utilisation especially on systems outside Northwest India seems very large. Whatever the figures should be, there is no disagreement about the importance of the opportunity. Moreover, evidence is accumulating that the opportunity can be grasped. Action research conducted on the Mahanadi River and Hasdeo Bango Projects in Madhya Pradesh has found steep gradients of declining yields from head to tail of the system (Chadha 1980; WAPCOS 1980), and points towards a possible doubling of the productivity of irrigation water through quite simple interventions. On a much larger scale, a package of a sequence of changes including warabandi introduced on the Pochampad Project in Andhra Pradesh is reported to have achieved more than a doubling of production (Hassan 1981). The equity implications - more water, more reliably, to the tails - need no elaboration, nor do the environmental ones, with waterlogging and salinity as growing problems. The search is on for low cost methods of achieving these objectives. This search raises two questions which this paper seeks to explore: first, the range of possible interventions, and second how to appraise canal irrigation systems in order to identify, system by system, what mix and sequence of those interventions will be most cost-effective.

Limitations of Diagnosis and Prescriptions

In some respects the past methods of appraising canal irrigation systems have been both quick and effective. Engineers and agricultural scientists have been able to bring to bear a wealth of experience and insight. The team of two, an engineer and an agricultural scientist, who reviewed 24 existing projects in India is an example (CWC 197). They visited each project for a few days only, and produced a report which lists in considerable detail the deficiencies found. This was an impressive achievement, and their diagnoses will help subsequent appraisals.

Past appraisals may, however, have been subject to three constraints:

(i) a problem orientation. Problem-solving can be a most useful activity, but it is not necessarily the most cost-effective. Not all problems are worth solving. It may simply not be worth trying to get water to a distant tail, or to get the design discharge flowing in a main canal, or to reduce seepage losses by lining distributaries.

It depends on costs, benefits, and alternatives. The alternatives may often include some which involve not the solving of problems as much as the exploitation of opportunities. To identify opportunities sometimes requires a different way of thinking to identifying problems. A problem orientation starts with limitations. An opportunity orientation starts with resources. Starting with the resources available on an irrigation system may lead logically to examining the distribution of those resources, notably water, which leads to questions of main system management and distribution below the outlet. Using resources to enhance production and equity also encourages a search for ways in which all irrigators^{can} gain from redistribution of water. A quite different agenda of questions is raised, and a different repertoire of possible ways forward.

It is not a question of either a problem-orientation or an opportunity-orientation, but of a balanced mix. The recurrent danger is that problems will obscure opportunities.

(ii) Professional orientations. Each discipline and profession has its own proper concerns and agenda. Visiting the same project at the same time, a systems engineer, an agricultural engineer, a soils scientist, a crop agronomist, an agricultural economist, and a sociologist, will all see and ask about different things and will neither see nor know to ask about others. A sociologist may know nothing about cross regulators, an engineer may not know about soil-plant-water relationships, an agronomist may not know about labour availability and relations, and a soils scientist may not know about market prices and crop profitability. To the extent that they are at least aware of these other dimensions they may be professionally more effective. But in general, they quite properly rely on other disciplines to examine the questions outside their own professional range, to identify problems (and hopefully opportunities), and to propose solutions and ways forward.

The combination of problem and professional orientations can be illustrated as follows. The listing is far from complete, but enough to make the point:

Professionals	Problem orientation indicates	Problem solution reflex	Opportunity-orientation indicates
Administrators	"Lack of coordination"	New organisational structure	Improve procedures and performance in existing organisation
Agricultural economists	Agricultural prices and marketing and labour constraints risk	Improve marketing and prices, and raise wages	Evolve new more profitable cropping systems, also smoothing labour demand
Agricultural engineers	Poor levelling lack of field channels	Comprehensive development below outlet	More replicable low input solutions with farmer participation
Agricultural extensionist	Farmers' ignorance of water management	Communicate with and 'educate' farmers	Enable farmers to organise to improve onfield deliveries of water (e.g. waraband etc.)
Agronomists	Water supply is too much, too little, or untimely	Supply exact plant requirements	Adapt crops, varieties, rotations, and timings to the available water supply
Economists	Waste of water underutilisation of potential low returns on capital	Water pricing further investment	Seek other ways to make water more productive
Engineers	Inadequate physical works, inadequate maintenance waterlogging	Construct better works, more resources for maintenance construct drains	Change water distribution on the main system
Political scientists	Inequitable distribution of water on the system	Change power structure Represent tailenders	Seek ways to redistribute water so that all gain
Sociologists/social anthropologists	Inequity and conflict over water below the outlet	Conflict resolution in the community	Bigger share of water to the disadvantaged at time when water supply improves

This is not to say that the reflex solutions to problems are necessarily wrong; it is to say that there is a tendency, profession by profession, to advocate and seek problem-correcting interventions which are variously costly, difficult, slow to implement, unlikely to occur, and dependent on external resources and on action, sacrifice or loss on the part of others. In contrast, most of the actions indicated under the opportunity-orientation are less costly, less difficult, quicker to implement, and more likely to occur, require less external resources, and involve the professionals concerned more directly.

Understanding this very last point matters in multi-disciplinary collaboration. Every discipline has a tendency to solve its problems in ways which require action by other disciplines. Problems are exported. The agronomist determines plant water requirements and then hands over his findings to the engineer, expecting him to deliver the exact amount of water at the right time. The agricultural engineer puts in field channels and hands over to the extensionist the problem of organisation for maintenance. Economists recommend water pricing and hand over to engineers the problem of how to measure water and to administrators the problem of how to collect the dues. Engineers construct the works and then pass over to the extensionists and sociologists the residual problem of participation by the people. For their part, extensionists and sociologists identify and organise community demands and requirements for water, and pass the problem of that demand over to the engineer. As for political economists perhaps they sit on the side lines and tell everyone else what they should do.

(iii) all-at-once. The third constraint is a tendency for rapid disciplinary appraisals to suggest a list of actions required, but not to establish their sequence, mix and location. One consequence can be the implementation of some measures without others which are necessary for their success (field channels without organisation for maintenance, cross regulators without managerial controls to use them, warabandi without a reliable supply of water, and so on). The choice of where to start to implement changes also affects the chances of success. The dangers of "all-at-once" are either none at all, because too much is required, or failure and disillusion because preconditions have not been met and complementarities not exploited.

The Range of Choice for Interventions

There is an admirable human tendency to simplify, and it is often true that simple is sophisticated. But when faced with a complex system which demands the competences and insights of many disciplines, it is tempting to simplify too soon. One simplification is to identify one solution or package of measures, and then apply this across the board, regardless of local conditions. If an expert, or a team, or a committee has a strongly preconceived idea of what should be done before they examine a system in detail, they may fall into two sets of errors: the first is failing to identify preconditions for the success of the measures they recommend; the second is failing to see that alternative measures should be considered. Some of these other measures in some combinations and sequences, may be more cost-effective than the favoured solution, or may be very cost-effective as part of a sequence together with the favoured solution.

This can be described in terms of what actions to start with in seeking to improve a system. Without being comprehensive, eleven points of entry can be suggested. These are taken in alphabetic order. They are:

- (i) action research
- (ii) administrative practice and the law
- (iii) administrative structure
- (iv) bio-physical problems
- (v) farmers' organisations
- (vi) farming systems
- (vii) main system water distribution
- (viii) main system works and maintenance
- (ix) management science and monitoring
- (x) resource opportunity
- (xi) works at and below the outlet

(i) action research. With this approach (Bottrall 1980; Lenton 1980), promising experiments are devised, conducted, monitored and evaluated, and developed as they proceed, with a view to replication. The research typically takes place in one homogenous area, although in principle action research can be undertaken with the main system management of an entire canal system. Such action research has been undertaken with subsystem canal management in two places in the Philippines (Valera and Wickham 1976; Early 1980), with field channel and on-farm development in Pakistan (), with warabandi in Pochampad in Andhra Pradesh (Ali Ali and Hassan Singh), and with minor channels and

rotation below the outlet on the Mahanadi River Project in Madhya Pradesh (Chadha 1980, WAPCOS 1980). It is currently taking place in different forms with community irrigation in the Philippines (Korten , de los Reyes), and on the Gal Oya Project in Sri Lanka, in each case with an emphasis on farmers' organisation. Action research merges with pilot projects, but is distinguished by a high level of monitoring and usually by a research team separate from an action team.

(ii) Administrative practice and the law. Here the point of entry is a change in administrative practice, or in the law, or in both. The change may be seen as a precondition for other changes, and as a catalyst for them. Examples are abolishing water rates which act as a disincentive for efficient water use, and so arranging them that there is an incentive for lightly irrigated crops (Kathpalia 1980:41). Another example could be the abolition of the demand system on the Mahi-Kadana system in Gujarat, if underirrigation is linked with the requirement that cultivators have to indent for water. Without this demand system, a more practical system for allocating water on the basis of rights established with warabandi might then be feasible. Yet another example could be tightening of discipline against water poachers through changing the law to permit summary trials of offenders, and an administrative change to introduce touring magistrates during the periods of most poaching, and to permit quick hearings.

(iii) administrative structure. The point of entry here is the creation of a new organisation or new organisation structure, usually to achieve "better coordination". The intention is that a new authority will be able to bring different departments closer together, and require better performance of them. This is a common prescription of consultants and civil servants. It is popular because it creates jobs and may provide opportunities for promotion, but it is resented and resisted by those who are candidates for being coordinated. The Command Area Development Authorities in India are a well documented example ().

(iv) a bio-physical problem. The start here is with a technical bio-physical problem such as waterlogging and salinity, or black soils irrigation in kharif. Finding and testing a solution to the problem would be the first stage, to be followed by establishing the conditions, such as a fine-pointed water supply from the main system, conjunctive use of groundwater in the dry season, change in cropping pattern, farmer organisation, and so on, for implementing the solution.

(v) farmers' organisation. With this approach, the starting point is the community and farmers' organisation. The process of evolution of community organisation and management below the outlet is a central theme. A positive value is set on self-management by groups, and on their ability to secure and manage their water supply.

To secure their water supplies on canal systems, they must be able to assert their rights as against other communities, and to make effective demands on the bureaucracy which controls water distribution. One supporting argument is that if tailender outlet groups are mobilised and articulate, they will be able to press for their fair share of water. Unless they are organised, topenders will continue to take more than their share, at the cost of the tails. Unless this political reality is faced, the bureaucracy will continue to allow topenders more water than they should receive.

To manage their water supply, communities or groups have to allocate water between their members and need means for resolving conflicts. The warabandi system practised in North India, and being adapted and adopted in other parts of India is an example to which priority is being given (K. K. Singh 1980).

Examples of farmers' organisation include community organisation of irrigation committees, funds and staff on a canal in South India (Wade 197), a water cooperative in Maharashtra, and pipe committees on Pochampad (Ali 197 , Singh), and elsewhere the Water Users Associations of Taiwan and in the Philippines an experiment in management procedures to enable farmers to make demands and complaints (Honadle 1978). (The evolution and effectiveness of these different examples varies widely.)

(vi) farming system. The starting point in this case is the farming system of the irrigation family. The argument is that the farm family is the production unit and the main beneficiary from irrigation, and therefore the logical place to begin. Analysis of the farming system, and its constraints, including cropping patterns, labour profiles, costs, risks, inputs, cultivation practices, yields, storage, marketing, income, and so on - leads to the identification of feasible improvements and their irrigation requirements. Changes in farming practices (from single-cropping to double-cropping, or changing the crop mix, or intercropping, or adopting shorter or longer-duration varieties, etc.) are tested on research stations, demonstration plots, and with farmers. Irrigation management is then modified to supply the water required, phased in with the adoption of the new practices.

Examples include the growing of a second, rabi, crop, where only a kharif crop was grown before (as with a gram which uses residual moisture and only one or two short waterings), or a shift from one paddy crop to two irrigated dry crops, as in (Wade 197).

An opportunity for this approach could be the analysis of the farming system of topenders to identify ways in which they could receive less water (thus releasing water for the tail) but at the same time gain, and feel that they were gaining (Chambers 1980b: 28-31). The identification of such a changed farming system would precede the reallocation of water. It is not known how commonly such changes are preceded by experiment and analysis of feasibility at the farm level.

(vii) Main System Water Distribution. The point of entry here is the distribution of water on the main system. The argument is that an adequate and reliable supply of water to the outlets is a precondition, often not met, for many other improvements in performance. The start has, therefore, to be made by examining the distribution of water and then by making changes, especially through timing, rotations, and control, to provide more appropriate and reliable water supplies to outlets. This can usually be done, even if not ideally, without new or renovated structures, even though those may be desirable in the longer term. A downstream control system (Kathpalia 1980:40) is needed, with information about water requirements passed upwards to the controlling authorities. Priority for main system management has been argued in several places, and accumulating evidence suggests the benefits can be very high (Valera and Wickham 1976; Levine and Wickham 1977:3-4; Early 1980; Wade and Chambers 1980). Those who advocate starting with main system distribution argue that on some, perhaps many, systems such changes could be introduced without delay with high benefits in both production and equity, and negligible additional costs. One straightforward measure on these lines, adopted by the Government of Andhra Pradesh for kharif 1980, has been to issue a Government Order requiring that rotational irrigation be practised (GOAP 1980).⁽¹⁾

(viii) main system works and maintenance. The case here is that major works and/or maintenance present the starting point. It is first essential to maximise the supply of water, minimise losses, and maintain the supply and delivery system in good condition.

(1) An evaluation of the effects of this order could help in assessing the feasibility and value of this sort of approach.

Until this is assured, other efforts will be ineffective or short-lived. Major works may be needed to increase the total water available (through new dams, storage or diversions), for balancing purposes, for canal regulation, for canal lining, and for drainage. Once these measures are completed, and good maintenance is assured, other measures can then follow.

There are many examples of major works undertaken after canal systems have begun to operate, and of the case made out for better maintenance. Canal lining is one common type.

(ix) Management science and monitoring. In this analysis the point of entry is seen as the management⁽¹⁾ system. In David Seckler's view, for example, "the major reasons for the poor performance of public sector systems is the lack of feedback regarding system performance, the outputs". He argues that canal irrigation in India is "administered", with feedback on inputs, rather than "managed", with attention to outputs such as capacity utilization (Seckler 1981:13). The implication of this diagnosis could be that the first intervention should be to introduce monitoring of outputs (area irrigated, yields, etc.), and their use in management. Once information of this sort was being fed back to managers, then management by objectives, and a better improved, and more effective management could follow.

(x) Resource opportunity. The starting point here is with lateral thinking. Opportunities are sought not in the central elements of the irrigation system but on its fringes. Slack, or potentially slack, resources are sought. To varying degrees there are implications, however, for how the irrigation system is managed.

Examples include:

- the conjunctive use of ground and surface water
- fish farming in tanks or canals
- the use of silt to improve light and porous soils and to help groundwater recharge, while at the same time desilting canals and tanks

(1) The word "management" can lead to confusion. Three senses can be distinguished: the management of natural resources such as water, meaning how they are controlled and used; the management of people, both within bureaucracies and members of the public; and the management of information and controls, usually with a cybernetic idiom, which is the primary sense in which Seckler uses it. These three meanings often overlap in common usage, and lead to misunderstandings between people with different disciplinary and professional backgrounds.

- the cultivation of tank beds as the water draws down
- the elimination of small tanks on larger systems, and the conversion of their beds to irrigation⁽¹⁾
- fertiliser farming on tanks, for example with blue-green algae
- growing trees or fodder bushes on banks and bunds
- the conversion of swampy areas to fish or frog farming, or growing reeds for basket work etc.

The argument would be that other changes were difficult or would take time, whereas these might generate earlier and easier benefits which would establish preconditions (a complementary water source, another source of income and food, relief of population pressure through settlement on tank beds, etc.) for other developments.

(xi) works at and below the outlet. Development works at and below the outlet is here seen as a point of entry, and often as a precondition for other improvements. Unless field channels can convey water from the outlet towards the fields, on-farm water control will be difficult. Unless fields are so shaped as to permit even water applications, irrigation efficiencies will be low and yields will suffer. In particular, lack of field channels, and field to field irrigation which goes with it locks farmers into water tolerant crops, notably paddy, whereas controls and field channels enable farmers to regulate the amount and timing of water their fields receive, so that they can grow more water-sparing crops.

Works below the outlet can be installed without farmer organisation. An example is the action research conducted by WAPCOS (Water and Power Consultancy Services, New Delhi) in kharif 1979 on the Mahanadi and Hasdeo Bango Projects in Madhya Pradesh, where they constructed channels to sub-outlets and rotated water between them (WAPCOS 1980; Chadha 1980). More commonly, such development works are a preliminary to farmer organisation and water rotation, especially with warabandi in those parts of India where it is not already practised (K.K. Singh ed., 1980). Another well-documented example which followed this approach is the Mona Project in Pakistan (

).

(1) In this as other examples, many questions arise as to costs and benefits, and in my view it is likely that this measure would usually only be justified when a main system was so well established that it would be clearly of net benefit to irrigators.

Choice, Mix and Sequence

The reader may be irritated by the cursory and incomplete nature of this list. No mention has been made of agricultural extension, agricultural marketing and prices, communications on canals, credit, improving the lot of women and other disadvantaged groups, land consolidation, land reform, or the supply of inputs such as fertiliser, pesticides and seeds. But the list is long enough to make the point:

that in improving canal irrigation performance there are many alternative points of departure. There is a wide choice of what to do and where to start. Any one of the eleven measures can be undertaken independently, and benefits may follow from it. All, however, would benefit from one or more of the others. They are thus synergistic: in the right combinations they generate benefits which are greater than the sum of their individual benefits. Some are even necessary preconditions for deriving substantial benefits from others.

In clarifying one's own view of priorities, it is useful to rank these eleven measures. Two sheets are provided for this purpose at the end of the paper. The reader who is introspective and reflective about his or her own attitudes and views, may wish to complete the sheet before continuing.

This exercise can raise rather acutely three sets of questions:

- (i) what determines one's choice of priorities and sequences?
Is this professional training, interests, and predispositions?
Do we, for example, find the following pattern?

<u>Type of measure preferred</u>	<u>Who by</u>
action research	researchers and research-funding organisations .
administrative practice and law	administrators
administrative structure	administrators
a bio-physical problem	soils scientists, agronomists, agricultural engineers
farmers' organisation	extensionists, sociologists
farming systems	agricultural economists
main system water distribution	political economists
main system works and maintenance	irrigation engineers .
management science and monitoring	management scientists
resource opportunity	geographers, unusual economist
works at or below the outlet	agricultural engineers

To the extent that these relationships hold, they support the case for a wide representation of disciplines and professions in appraisal teams which are identifying what to do.

- (ii) what sequences are optimal? Identifying optimal sequences is less easy than it might appear at first sight because

a. some measures are strongly interdependent, or preconditions for others. One of the prerequisites for identifying the best measures to start with **and** the best sequences, is an understanding of interdependence. One example is warabandi as being introduced on some Indian canal irrigation. Three conditions are considered essential:

- field channels to enable each field to be irrigated independently
- measurement of flows at the outlet
- ability of the main system to deliver a required volume of water at predetermined times

To these may be added farmer organisation. One has here a package of interdependent conditions. One implication is that warabandi, or any similar set of changes, has to be introduced in as a package with its own internal sequence.

b. some measures are quick-acting, others longer-term

There may be a case for a quick-acting intervention such as rotation of main system water distribution, while in parallel pursuing longer-term changes such as farming system analysis, canal lining, or warabandi.

c. the sequence of locations may be significant.

It may be a nice decision whether to start by, say, trying to issue less water at the head, or by generating more effective demand for water from the tail, or both simultaneously. The sequence is likely to influence the nature and success or otherwise of the outcome, especially depending on the degree of perceived conflict of interest generated between different groups of irrigators.

d. optimal sequences may vary by location

Waterlogging may be a problem in the head reaches, while water shortage and unreliability may be a problem in the tail. The sequence in the head reaches may be farming systems analysis to identify profitable alternative and more water-sparing cropping patterns, combined with main system water distribution to reduce water issues, while in the tail reaches the sequence may be farmer organisation to secure and manage the water supply combined with works at or below the outlet. The administrative reflex of standard treatment may be especially inappropriate in improving canal irrigation. It may often be optimal to devise a sequence of mutually supporting changes which differ by location.

(iii) how special is each irrigation system and each part of it?

One difficulty in completing the priorities chart in the appendix is the knowledge that "Ultimately each canal system has developed a unique pattern of its own" (Patel 1980:7); and indeed that each combination of water supplies, and each branch canal, distributary, minor, subminor,

field channel, field, farming system, farmers' organisation, combination of soils, slopes, hydrological conditions, and so on, is also unique. The major differences between North Indian and South Indian canal irrigation are well-known at a high level of generality; but there are also major differences between systems even within the same state. Nor are these merely physical. Legal and administrative practice, irrigation bureaucracy, and roles, conventions about water allocations, social organisation, and agricultural and economic conditions also differ. It is questionable whether any one formula can be universally applied. If an approach such as warabandi is disseminated into quite widely differing conditions, then it will be important, case by case, to analyse the local situation, to see whether there are more cost-effective alternatives, to ensure necessary preconditions, and to work out practical sequences.

If.....then.....

To the extent that it is true that

- benefits from potential improvements are large
- the choice of interventions is wide
- appraisers identify measures connected with their own disciplines and professions, and
- the optimal mix and sequence of measures depends on the characteristics of each system and of its parts,

then a practical question follows:

how can appraisal of existing canal systems be organised to identify optimal mixes and sequences of measures for the early realisation of potential?

The Rationale for Rapid Appraisal⁽¹⁾

One reflex, faced with the wide range of choices for interventions, mixes and sequences, and the need to tailor them for each system and even for different parts of systems, is to call for large-scale, multi-disciplinary monitoring and research over a period of years. Only when much more is understood about the complex problems and linkages, about seasonal variations, about problem soils and problem farmers alike, will it be possible to see what best to do.

This, at least on its own, is unlikely to be a cost-effective approach. There have already been too many instances of rural studies generating mounds of indigestible data which cannot be processed, or which even if processed are useless. There is indeed a case for identifying key items of information which should be collected continuously in order to improve future decisions. But meanwhile time is passing, and when potential benefits are high, so are the costs of time lost. What is required is an assessment of the trade-offs between amount, accuracy, relevance, timeliness and actual use of information. The concept of optimal ignorance applies here: the importance of knowing what it is not necessary to know and of realising degrees of accuracy which it is not necessary to achieve. The long-and-dirty (large amounts of precise information which are late and not used) contrasts with the quick-and-clean (smaller amounts of less accurate information available quickly and actually used).

In summary, the case for trying to devise and improve quick-and-clean approaches for the appraisal of existing canal irrigation systems rests on the following points:

- a. the huge potential for benefits, especially increased production, ^{and} improved equity. Delays therefore have very high costs, in delaying future streams of benefits.
- b. the possibility of realising some benefits quickly. This applies especially to main system water distribution.⁽²⁾

(1) See also Belshaw 1979, Chambers 1980:1-5, Pacey forthcoming, Carruthers and Chambers (forthcoming 1981) and Ellman (forthcoming 1981) and the papers of the Workshop (26-27 October 1978) and Conference (4-7 December 1979) on Rapid Rural Appraisal held at the Institute of Development Studies, University of Sussex, Brighton.

(2) Note the writer's bias slipping in. The argument, in skeletal form, is presented in Chambers 1980b.

- c. the way decisions are taken on the basis of rapid appraisals anyway, including decisions about what long-term data to collect. Moreover, the more senior people are, the more rapid their appraisals are likely to be, and the more decisions and changes are likely to flow from them; all the more important, therefore, are the means whereby they acquire their quick knowledge.
- d. irreversible commitments to lines of action tend to occur early in decision processes about irrigation projects (see for example Carruthers 1979)
- e. the greater ease of mobilising a multi-disciplinary team of competent appraisers for a short period, than recruiting them for more lengthy work
- f. comprehensiveness and flexibility. A rapid appraisal team can be organised to cover a wide range of concerns without an institutional commitment to certain solutions

Dangers of rapid appraisal

If rapid appraisals are to be worthwhile, several traps have to be avoided. It is all too easy to be rapid and wrong. Some of the main dangers are:

- the biases of rural poverty unperceived (Chambers 1980a), including visits and meetings with these tendencies:
 - headreach not tail
 - large farmer not small
 - farmers not labourers
 - men not women
 - senior staff not junior
 - staff not farmers
- premature exclusion of choices because of time pressure. Options have to be identified, developed and assessed, with care to avoid premature closure. One big danger is never considering the options for disciplines not represented among the appraisers.
- neglecting existing information.
- coming with preconceived solutions

- failing to cover gaps between disciplines (the practical politics of redistribution of water; the management of irrigation staff; system management seen in terms of management science, etc.)
- failing to learn from farmers. In both practical and moral terms, their involvement, knowledge and experience are crucial. To plan changes to an irrigation system and cropping systems without extended consultation with farmers is, to say the least, a heroic simplification.

Basic Questions and Team Composition

There is a hen-and-egg problem over the questions to be addressed in a rapid appraisal and the composition of the team. In practice, the team may be determined by the organisations and individuals who are available. It is probably rare for a balanced range of disciplines to be represented. There are some signs of traditions: in India, appraisal teams of engineers and agronomists; in parts of the Philippines, persons with a strong orientation to farmer organisation. Since each project is unique, so may the appropriate mix and balance of disciplines vary by project. One of the virtues of rapid appraisal is the opportunity to include a wider rather than narrower range of professions at quite low cost. To say in advance that a particular discipline is not needed is to beg some of the questions the rapid appraisal is designed to answer.

Given this, the following composition can be suggested:

system engineering and hydrology
agricultural engineering
agronomy and soils
agricultural economics
sociology and political economy
administration and law
management science⁽¹⁾

There is scope for much profitable discussion about this list. It could be longer or shorter. Subjects can be combined or split. The point is that a priori to eliminate any of the above risks missing some key component to a solution.

(1) Tentative. I am not sure that management science, in Seckler's (1981) sense, is useful at the early appraisal stage.

The basic questions to be addressed can be listed in different ways. Bottrall (197) has produced a comprehensive and useful checklist. But not everything needs to be known. The key to successful rapid appraisal is to move quickly and surely to the main problems, opportunities and measures. For this each discipline or profession may need its own mental algorithm, and experienced people already have these in their minds.

The most obvious approach is to follow the top-down logic of a physical system centred on water. This starts with the irrigation water source (how much, how variable, when available) and follows it through the system (distributed with what losses in what quantities, when, where, and with what variability and reliability), into the root zone, the plant and the farming systems, and then continues to the household economy. The next stage is then to examine alternative methods of storage, distribution and farming system.

There are also other approaches.⁽¹⁾ That of practical political economy might, for example, start by asking if there are ways in which water can be redistributed so that all will gain. Implementing such methods will be more straightforward and feasible than approaches where some individuals or groups, such as farmers in the head reaches, have to lose. If however some groups do have to lose, this line of reasoning leads to political engineering. This can mean representing the interests of those currently at a disadvantage, often tailenders, so that they can assure their rights and make it rational for those who have to lose to accept their loss.

It is, indeed, possible to start the analysis and questions from the standpoint of any of the disciplines or points of entry. If they conflict, solutions to the conflicts have to be found; if they do not conflict, and green lights of feasibility flash for all the disciplines and actors, the solution is likely to be practicable.

Sources of Information, Insight and Ideas

It is surprisingly easy to overlook sources of information and insight. The following is a provisional list:

-
- (1) Another worth studying is that used for rapid appraisals of communal irrigation systems in the Philippines (Romana de los Reyes, n.d.) This has the following headings for information to be collected: System identification; water supply; water rights; physical aspects; history and assistance received; ownership of lands; organisation: non-association managed; organization: association-managed; opinions on assistance needed; water distribution; conflict; fees; maintenance; community data.

1. Irrigators and other local residents.
2. Irrigation staff.
3. Staff of other government departments.
4. Reports of previous teams, surveys, appraisals, evaluations, and special studies.
5. Annual and other routine reports of departments.
6. Data from agricultural and/or soil and water management research stations.
7. Up-to-date information about crop varieties available or likely soon to be released.
8. Maps of the system and subsystems, preferably annotated (irrigation system, soils, topography, cropping patterns, etc.)
9. Charts and tables with time series data of water storage, flows, distribution etc.
10. Aerial inspection (Abel and Stocking 1979) or, second best, a view from a hill.
11. Aerial photographs.
12. Remote sensing and Landsat imagery (see e.g. Heller and Johnson 1979)
13. Historical documents referring to water rights and customs.
14. Manuals and circulars concerning water distribution routines and practices
15. Descriptions and files concerning crises of water shortage and how they were tackled.
16. Staff of non-government organisations working in the area.

It is not always easy to obtain or tap such sources quickly. How to do so cost-effectively, given a short period, leads us to the next questions.

Appraisal Activities and Sequence

An appraisal is only one of a series of preceding and subsequent activities. The way it is set up will depend on what has gone before and what will follow. There is a danger that it will be seen as a high-powered group of outsiders (senior government staff, researchers etc.) who descend on a project, tell everyone what to do, and then leave. If the objective is to identify and initiate a sequence of change (whether through fact-finding research, action research, or direct interventions) it is vital that the staff managing and working on the project be full participants, contributing their experience and ideas and influencing the proposals which emerge.

The outline which follows indicates some possibilities.

(i) Selection

If a series of appraisals is planned, the selection of the projects to be appraised is important. Criteria might include the potential there appears to be for improved irrigation performance. Thus if North Indian canal systems are operating closer to their potentials, the benefits from appraisals might at this stage be higher from other parts of India where the gap between performance and potential is wider.

(ii) Preparation

Before the appraisal proper, the following are proposed:

- preliminary visit by one or two outsiders (i.e. people who are not directly engaged in managing the irrigation system or working on it)
- meetings with staff to discuss the appraisal
- request to staff to complete questionnaires⁽¹⁾
- find a place to work (big room, blackboards, accessible at night)

(1) For this idea I am indebted to the team (Wayne Clyma, T.K. Jayaraman, Max Lowdermilk and Barry Nelson) which recently conducted a five-week course of professional development for engineers, economists, agricultural scientists and others at Anand. The questionnaires they issued to Irrigation Department staff provoked some thoughtful, detailed and very useful replies, and encouraged constructive thought based on experience about possible improvements.

- arrange vehicles, part-time small aeroplane etc.
- identify (a few) local participants (from government departments, perhaps a voluntary agency, etc)
- request maps, reports etc. to be centralised
- recruit whatever outsiders needed

(iii) the appraisal

Two weeks may be allowed. The usual rapid appraisal seems to take 2-4 days. This is too short for adequate discussions with farmers, for identifying, trying out, discussing, modifying and rejecting ideas, and for assessing mixes, sequences and the locations for them.

The two weeks could follow many different patterns. There should be no rigid routine. Adaptability and the ability to pursue leads are important. With that qualification, one possible outline sequence is:

1. Briefing and discussion with staff
2. First field visit
3. First flights over area
4. Tentative list of priority questions -
5. Field visits

One promising approach is Peter Hildebrand's technique, evolved in Guatemala, of joint visits by pairs from different disciplines, changing members of the pairs day by day (P. Hildebrand forthcoming 1981). Many variants on this technique are possible. Evening debriefings and discussions follow.

In the field, adaptations of Collinson's (forthcoming 1981) and Ellman's (forthcoming 1981) guided interview technique could be used for rapid understanding of the farming system.

Some field visits might be along disciplinary lines, with disciplinary concerns, and others cross-disciplinary. Within limits it is import

for an agronomist or agricultural economist to understand the potential and limitations of the water distribution system, and for an engineer to understand the farming system and household economics. In particular, visits should be checked to ensure that the less obvious aspects (farming system, labour shortages, farmers' and others/problems and views, the management of water on the main system) are covered

6. Evening activities To alternate between team discussions, and open-ended discussions with groups of farmers. (The latter must be emphasised, as for reasons of convenience and exhaustion it is liable to fall by the wayside). A good deal of open-ended brainstorming is indicated, avoiding premature closure on solutions.

By the end of the first week the aim would be for all team members to have a sound appreciation of the farming and irrigation systems, and their seasonal operation, problems and opportunities, together with a list of options for interventions. At the end of this first week, a tentative plan with alternatives would have been drafted. As in Hildebrand's work, this would focus thinking, and identify unanswered questions.

The second week would then be taken up with testing, rejecting and modifying proposals. The tendency of busy people will be to consider the second week dispensable. This should be resisted. The second week is precisely when the less obvious snags and the less obvious opportunities are likely to come to light. In particular, during the second week, better information may come from junior staff and from farmers. A second week is also important for assessing the feasibility of alternative water distribution and cropping systems, and of exploring the economic implications for households.

The final output would be a sequenced plan developed and thought through jointly by the project staff, the visiting outsiders, and farmers. This plan would be likely to include some immediate action, and some pilot or experimental elements. It would set directions and priorities, but it would not be a rigid blueprint. There would be allowance for learning and adjustments in the course of implementation.

Conclusion

The success or otherwise of such rapid appraisals will depend on the open-mindedness and experience of those who take part. They will be unlikely to succeed well if participants take a narrow view of their responsibilities. Each participant should be free to take an interest in the field of each other participant while recognising and learning from his or her special competence. Specialisation is of course necessary; but so is breadth of understanding to see the linkages and gaps between the disciplines.

The method of rapid appraisal is itself a subject for R and D. To gain experience with appraisals, and to develop methods should not present too serious difficulties. Those who take part in them will learn as they go. It will be important for them to record what they do and what they learn and to share their experience. Sometimes the activities of appraisal can seem so obvious that they are not worth writing down. But what seems obvious to one may not be obvious to another. Only if the methods and experience of rapid appraisals are treated as a serious subject and recorded, analysed and criticised, will their potential value be fully realised.

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Appendix

Priorities for Measures for Improving Canal Irrigation

You may wish to make these entries for canal irrigation generally, or for a particular project with which you are familiar:

	The best measure to start with	The best sequence	The measures from which most benefits will come
action research			
administrative practice and law			
administrative structure			
a bio-physical problem			
farmers' organisation			
farming systems			
main system water distribution			
main system works and maintenance			
management science and monitoring			
resource opportunity			
works at and below the outlet			

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