Enabling environments, financing mechanisms and equitable access to irrigation

Environnements favorables, mécanismes de financement et accès équitable à l'irrigation

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Abstract

Irrigation development in Africa, in the past 30 or 40 years, has been done primarily by governments, with or without the financial and technical contributions of foreign donors. In many cases new installations have been oriented towards welfare objectives. In recent times several countries have been introducing policies of management transfer, under which farmers must usually make increased financial contributions towards the running costs of the irrigation schemes which serve them. The paper considers what constraints may prevent further increases of private finance beyond this modest beginning (including the possible input of private capital) and what changes in the institutional environment may help to reduce these constraints. Enabling conditions are reviewed under five categories: profitability, rights to land and water, sources of finance, intra-community relationships, and residual supports by government. The ultimate objective should be self-supporting irrigation systems with a sound economic base, but the existing situation is in some respects far from that. Particular attention needs to be given to the long-term security of such investments, through measures such as systems of documented land and water rights, laws governing the nature and procedures of organisations of irrigators, and facilitation of market development for higher-value crops.

Résumé

Le développement de l'irrigation en Afrique dans les 30 ou 40 dernières années a été surtout l'œuvre des gouvernements, avec ou sans l'assistance financière et technique de bailleurs de fonds étrangers. Dans beaucoup de cas, la mise en place des infrastructures neuves a été motivée par des objectifs sociaux. Plus récemment, beaucoup de pays ont commencé à introduire des politiques de transfert de gestion où les agriculteurs sont appelés à assumer plus de responsabilités financières dans le fonctionnement de leur aménagement. Cet article met en évidence des contraintes qui risquent d'empêcher une participation financière plus importante de la part du secteur privé (y compris l'injection des capitaux privés) et propose des changements au cadre institutionnel qui aideraient à surmonter ces contraintes. Ces facteurs sont de cinq ordres : la profitabilité, des droits d'accès à l'eau et à la terre, des sources de financement, des relations intra-communautaires, et le soutien résiduel de l'Etat. Bien que l'objectif global reste la mise en place d'aménagements hydro-agricoles autogérés à base économique solide, la situation existante est loin de là. Une attention particulière doit être prêtée à la sécurisation des investissements à travers des mesures tels l'enregistrement et la documentation relatifs aux droits d'accès à la terre et à l'eau, des lois précisant la nature et les procédures des organisations d'agriculteurs, et le développement de marchés pour des cultures à haute valeur.

1. Introduction

The goal of increasing the participation of the private sector in African irrigated agriculture seems to be good. Government-sponsored irrigation systems have often had mediocre results, and many governments lack the resources of money and skills required for efficient state management of these systems. But the introduction of a greater level of private-sector involvement depends very much on the behaviour of the government irrigation agencies.

More than a decade ago, Moris (1987: 100) commented on the "privileged" status of irrigation as a subject for government investment in Africa. By "privileged," he said he meant

preferred investments, chosen because they are thought to answer some pressing policy problem. When accorded privileged status, technologies are more likely to be adopted by reference to the seriousness of the problem than on the basis of their own likely performance under realistic field conditions... In Africa irrigation is often seen as the universal answer to drought, and thereby escapes detailed justification and local adaptation.

According to this view, there was the risk of over-investment in creating too many irrigation systems; their designs were often brought in, with little or no change, from donor countries with different needs; and there was little attention to cost.

In the 1970s and 1980s, perceptions of the urgency of food needs and drought relief were accentuated by recent memories of the suffering caused by droughts in the Sahel, Ethiopia and elsewhere. Events of that kind may have led to a perception of irrigation as something intrinsically good and desirable: "privileged," in Moris's view. But much more recently, Schiffler (2001) has expressed quite similar concerns about the impacts of irrigation development, at a global scale:

... using actual food prices instead of the food price projections made in the past, many of the past investments in irrigation would not have been economically viable. Indeed, over-investment in irrigation may have contributed to accelerate the decline in real food prices, thus making it harder for small-scale farmers in developing countries to break out of poverty. Publicly-funded large-scale irrigation projects have beyond any doubt improved the living conditions of millions of farmers in developing countries. However, by reducing food prices they may well have had a negative impact on many more farmers in rainfed agriculture and in privately-funded small-scale irrigation schemes.

Neither of these is telling us that irrigation is an inappropriate technology. What they say is that there have been injudicious investments, and the installation of systems whose basic economics are in some cases dubious or non-viable, and that government-assisted schemes may actually reduce or prevent private activity, by lowering prices. It may be that governments and donors have installed, with irrigation development, a production capacity that is in excess of effective demand for its outputs.

Similar accusations, of increasing the poverty of those who are not fortunate enough to obtain a place in the government irrigation systems, were made in India during its great irrigation expansions 25 - 30 years ago. One implication is that governments, after giving some farmers the advantage of occupying new irrigation systems, should not then give those people further gifts in the form of continued free services of management, operation and maintenance by government.

On a more optimistic note, Moris (1987: 113) observed that:

The main exceptions come from the areas of Africa where large-scale commercial producers have evolved their own irrigation systems, usually to protect export crops like coffee, tea or tobacco. In Zimbabwe, Swaziland and Kenya, there are producers who inherited or purchased highly efficient and cost-effective irrigation systems, a demand-led outgrowth of large-scale commercial farming in a hazardous environment. The contrast between demand-led and bureaucratically imposed irrigation performance is striking.

In the 14 years since he wrote this, the tendency towards "bureaucratically imposed" irrigation has reduced in Africa. A theme in the present paper is that we should encourage further movement in the "demand-led" direction. We live, however, with some legacies of the past, including the residual consequences of past decisions, and the persistence of some attitudes of bureaucratic dominance.

It should be emphasised that the "demand" we are speaking of here is demand for the products of irrigated agriculture, not demand for irrigation facilities themselves. There is evidence that the desire to have irrigation, or the desire to have a plot of land within an irrigation system, is high. Among the most striking cases are the irrigation co-operatives along the Niger River in Niger. The annual fee payment required from users is typically equivalent to nearly 200 US\$/ha/year (PMI-Niger 1998: 117) at official exchange rate, and much more than that (around 800 US\$/ha/y) at purchasing power parity rate. These rates are extremely high by global developing-country standards; yet all plots are taken up, and there are waiting lists for access to plots at many of these systems. But perhaps this simply reflects the fact that, if the government is sponsoring irrigation development, those who remain outside of such systems will be at a great disadvantage. This type of demand for irrigation **service** does not guarantee in any way that there are consumers ready to pay the true economic cost of irrigation **products**.

In investigating how to stimulate greater private-sector involvement in irrigation, we shall look at three levels of involvement, which are progressively more difficult to achieve:

- how to encourage private people (usually, existing users of irrigation systems) to take over responsibility for operation, maintenance, and management of existing governmentbuilt irrigation systems;
- b how to encourage private investments of capital in the creation of new irrigation systems, and in the expansion of existing irrigation systems, or the up-grading of their facilities and technologies;
- c how to encourage new entrants into the business of irrigated agriculture; in other words, to reach a situation where irrigated agriculture not only can survive on its own financing, but can become sufficiently successful to attract new people who are willing to contribute fresh money and effort to it; this could be in the construction or utilisation of facilities, or in provision of support services.

We shall try to identify institutional and financial arrangements that will make these results more likely; and we shall try to see whether additional institutional safeguards may be needed, to prevent the possible increases of inequity that can sometimes result from ill-planned increases of individual economic freedom.

2. Utilising existing government irrigation systems

The policy of irrigation management transfer, under which government agencies increase the roles of farmers' organisations in operation, maintenance, management decisions, and funding of recurrent costs, has been in existence in various countries since about 1975. It began in South America and the Philippines. African examples began more recently. Vermillion (1996, 1997) identified eight African countries then operating irrigation management transfer policies: Madagascar, Mauritania, Niger, Senegal, Somalia, Sudan, Tanzania, and Zimbabwe, to which Burkina Faso and perhaps some others should be added.

Irrigation management transfer, generally, does not bring in the external private sector to any significant extent. It is only a rather small step away from full government control of irrigation management. In the most common models, farmers on the irrigation systems are asked to form organisations, usually adopting some standardised constitution proposed by the government agency. These organisations then become responsible for the kind of local-level tasks listed in the previous paragraph.

Reviewing 29 studies of such transfers from around the world, Vermillion found that ownership of the irrigation facilities was vested in the farmers, after the transfer, in only three cases, of which one (in Senegal) was in Africa. The irrigated areas involved in that one African case were the smallest in all of these studies.

The outcomes of irrigation management transfer programmes have been very variable. It is difficult to claim that it has been, overall, a successful policy. A part of the difficulty of assessment lies in the obscurity, and diversity, of objectives. Possible objectives may be (Abernethy 1998: 18):

- To reduce public expenditures.
- To improve irrigation performance and generate surplus production.
- To enhance sustainability of irrigation facilities.
- To conserve water resources and reduce resource consumption.

Of these, only the second is clearly an objective of the system's users. They may be also interested in the third, but that probably depends on whether they can perceive themselves as the new owners of the system and its facilities. Since, in 90 percent of transfer programmes, the facilities still belong to the government agency, the users will assume that sustainability and renewal costs are the government's problem, not theirs.

The other objectives noted in the list above are essentially objectives of the government or of the society in general. It is not certain that the farmers will feel motivated towards those objectives.

The hope of improved agricultural production seems to be the main factor that could motivate farmers to want irrigation management transfer. Is it achieved? The evidence is mixed and uncertain. Most studies have been of the "before and after" type, so production would perhaps have been improving anyway. The extent of output improvements that have been noted in the literature does not seem (in general) significantly above the normal growth that happens through other influences such as crop improvements.

The organisations set up (under government promotion schemes) to be the recipients of irrigation management transfers are often of a kind that would be thought peculiar and unsatisfactory, if they existed, for example, in the world of business. Membership is often "inclusive": that means, the promoting agency, or the standard constitution, may simply announce that all people farming land within the boundaries of the irrigation scheme are members automatically. For example, the standard constitution of such organisations in Niger (PMI-Niger 1998) says, under the heading "Admission as a member of the co-operative":

Article 4: Each head of a household, to which a landholding in irrigation system XXX has been allocated, has the right to join as a member of the co-operative, and undertakes to respect the clauses of the present constitution.

The member must then sign a personal contract with the organisation, which legitimises his or her continued use of the landholding, and regulates various aspects of agricultural behaviour, and inputs of work and fees.

The more usual concept of an organisation, in other kinds of activity, involves a collection of individuals who join together in order to achieve some shared objective that could not be achieved by individual efforts. It is clear that the sort of inclusive arrangement commonly used in irrigation management transfers is significantly different from this. The person in the Nigérien collective has made no personal commitment to any joint objectives. "Joining" the organisation is simply a requirement (imposed by government) for protecting a personal interest, the right to continue receiving water and cultivating the land-holding. In some such cases, the "members" scarcely know that the organisation exists. Field interviews may show that individual farmers feel a sense of alienation from the organisation.

There is usually not a special law enacted to define the operations of organisations that are set up to receive irrigation management transfers. In the case just mentioned, Niger, they were established under a law on rural co-operatives. Other countries have used other existing legal arrangements. The absence of a law specific to irrigation organisations may explain some of the problems we encounter.

Some of the problems and disappointments of irrigation management transfers may be attributed to inadequate attention to establishing suitable enabling environments, of which the legal deficiency just noted above, is an example. Vermillion (1994) set out a short list of prerequisites for success, which he identified from the more frequent recommendations of researchers. These were:

- a clearly recognised and sustainable water right;
- appropriate infrastructure relative to local management capacities;
- clear designation of responsibility and authority for essential management functions;
- effective accountability and incentive mechanisms;
- adequate resources (financial, human) for sustainable irrigation management.

This list includes aspects of national policy as well as of local arrangements. The list can be further expanded and refined (Abernethy 2001) thus:

Preconditions of national policy

Essential	A law defining the status, governance, scope, and financing of irrigators' organistions Political will and consistency in applying the transfer policy
Desirable	A clear and secure system of water rights Laws and procedures that will be applied in case of bankruptcy or other organisational failure

Local preconditions

Essential	Clear definition of ownership and responsibilities Clear rules of membership
	Consultation with all affected famers to define their objectives; and assistance to them in drawing up a constitution that reflects some combination of government's and members' goals
	Skill training in aspects of management, especially communication and record- keeping Adequate initial capital
Desirable	A secure water right for the irrigation system (In larger systems where the government will continue to operate main-system facilities) A clear contract or level-of-service declaration Appropriate infrastructure that the famers can operate and maintain with minimal

3. Capital investment

need for external skills

As we have seen, irrigation management transfer is a small step towards private-sector involvement. Only existing users of the facilities normally are concerned. Ownership of facilities and water rights is not normally part of the transfer, except in some rather small schemes. Government roles usually remain quite large. The transferred functions are usually lower-level operations and maintenance. The financial inputs expected from the organisations' members are small: they vary widely, but the range of US\$10–50 per hectare, per year would probably cover the majority of cases. Membership is often automatic, rather than the result of personal desire to pursue joint objectives.

Financially, irrigation management transfer is (in most cases) essentially about bringing private funds, from existing irrigation users, to meet all or part of the operational and maintenance costs of irrigation systems. It does not usually address capital investment. In cases where the recipients of a transfer are required to make a contribution to capital, as in the Philippines or Niger, these are generally rather nominal contributions, quite far from meeting the true costs of installing such systems. Where irrigation users' organisations are required to contribute to capital costs, these contributions may be spread over periods such as 25 years, without interest or inflation effects; so these are conditions very much softer than the conditions that would face a genuine private investor.

When we contemplate the possibility of bringing private capital investment into irrigation, we soon see that this is a much more complex objective for public policy to achieve. We can consider three main modes in which it may happen:

- extension of existing government-built irrigation systems;
- private installation of new irrigation systems;
- small single-owner or small-group installations.

Extension of existing government systems could, in principle, be done either by the existing users, or by some external new group. Neither of these seems to happen much. This may seem quite strange, since there are many cases where an initial government scheme has not been extended to its full potential (in terms of the available water and land resources). Usually this is because of funding constraints on the government's side. Why are the users of such systems not motivated to invest labour and money in expanding their systems to fulfil their potential?

There can be several explanations, as conditions vary. A very likely explanation is that the organisations being set up under irrigation management transfer programmes are not appropriate for this kind of challenge. Extension of an existing irrigation system by its own users requires mobilisation of a substantial effort among them. Constraints that make that unlikely seem to include:

- Allocation of inputs and benefits.
 - > How will the personal or household contributions of labour and money be determined?
 - > Who will get the benefits of using the extended land?

The organisations set up under irrigation management transfer generally treat all members as more or less the same. New rules are required for a joint effort such as an expansion. Some members may see no benefit for themselves in an expansion. The ordinary rules about contributions to the organisations usually make these compulsory, and somehow uniform (most commonly, a uniform rate per hectare cultivated); but undertaking some new joint effort probably requires a different basis with voluntary and variable inputs. People will be quite willing to work for expansion of the system, if they believe that they themselves will be able to use the new land; but they will need some other incentive if they believe that others will use it.

- Ownership.
 - If the government owns the system and its water rights, why should the users improve it?
 - > Who will own the new facilities and their water?
 - The water available for existing users will obviously be reduced if the system is extended: what will be their compensating benefit?

The literature of farmer-managed irrigation systems has many examples of autonomous expansions, resulting in more efficient use of the available land and water. In such cases, the members of an existing farmer-managed system have perceived that they could get a direct benefit to themselves by expanding the system to accommodate new users. The benefit may be a payment, such as an "entrance fee," or a labour contribution, such as help with annual maintenance of a common intake or conveyance canal. If the organisation receives such inputs, the future contributions of money or labour by the existing users will be reduced, and the prospect of this reduction makes them willing to let some of their water be used by the new partners.

The existing users of a government-built system, on the other hand, may feel that it is in their personal interest to oppose, not promote, its extension. They consider the water in the supplying reservoir to be "theirs," in the sense that they are angered if the government agency starts to build structures that would enable some other group of potential users to obtain a share. But it is not theirs in the sense of a right, in which they might voluntarily decide to sell a share.

Sri Lanka has begun experimenting with an organisational model, in government systems, that goes beyond the conventional irrigation management transfer models. There are two types of farmer organisation within the same irrigation system. One is of the inclusive, statutory type, which includes all farmers. This is responsible for the routine tasks of operation and maintenance. The other is a "Farmers' company." This is a voluntary organisation, with a shareholder structure. Joining the company is a matter of personal choice as is the number of shares taken.

The idea is that the inclusive organisation is responsible for tasks that must be performed to keep the system functioning, whereas the shareholding organisation can undertake other kinds of activities, such as seeking new markets, making production contracts, experimenting with new crops, arranging credit lines for members, and so on. It may be possible for a model of this kind to lead ultimately to resource accumulation, and so to investment by the existing users in expansion of their own system, but that remains to be seen.

Direct private investment in creation of new irrigation systems faces a different set of constraints. These constraints relate mainly to financial factors: markets, profits, and sources of capital. Historically, in the colonial period, African countries had substantial amounts of private irrigation. It was generally established for growing high-value crops, not basic foods, and these were mainly intended for export since home markets were too thin to support this kind of activity. Cotton, sugar, tobacco, and other crops were the main examples, and some of these continue to sustain private enterprises. All of these require substantial ancillary facilities for post-harvest processing, and are, therefore, suitable mainly for companies, which can afford to install these, with a reasonable assurance of market access and continuity. Many of these companies are foreign, or began with foreign origins.

Single-owner, or small-group, indigenous enterprises on the other hand have shown high levels of activity in many countries, especially in peri-urban environments around cities. Such enterprises benefit from two modern trends: the growth of the urban populations directly increases their potential markets, and the increased standards of living of middle-class city-dwellers lead to some changes and diversification of food preferences, including usually greater consumption of fruits and vegetables.

These small-scale peri-urban enterprises correspond best to the "demand-led" development that Moris (1987) praised.

Studies of small government-built irrigation systems, in both Burkina Faso and Niger (PMI-Burkina Faso 1997; PMI-Niger 1998) showed that both crop choices and overall performance were related to market access: nearness to the capital city, and linkage by good roads. More remote systems are likely to grow only basic cereals, primarily for local consumption; systems near the city are likely to grow more vegetables for sale. Small-scale investors, installing a well or a river-bank pump, are driven by the same market logic.

The role of exporting in these smaller enterprises is problematic. Home markets for fruits and vegetables are growing, but perhaps not very fast, and prices are not high, so exporting seems an attractive alternative. But it is hard for a small group in Africa to establish a satisfactory relationship with a distant contract customer in Europe (for example). There are many risks and possibilities of disputes over such matters as quality, delivery dates, packaging and so on. The evolution of satisfactory export marketing, therefore, seems to depend on the evolution of intermediary local firms, which can carry those risks. This evolution is taking place at varying rates in different countries.

4. New entrants

There are probably many new entrants, at the small local level, appearing in the peri-urban environments all the time, especially where ground-water access is relatively easy or where there is a perennial river that can be accessed. The policy question is, should that process be stimulated by governments, and if so, how? Going beyond that, there is the question of how urban investors (including potential investors of earnings from foreign employment) may be attracted to the irrigated agriculture sector.

These new entrants could have a variety of roles. They may come in simply to provide credit to the producers. They may become agriculture producers themselves. They may come as service-providers.

The tools that governments have for helping in these matters are few, and there are strong arguments for saying that it may be better to do as little as possible, leaving the process to be as far as possible demand-led. The record of the impacts of subsidies, such as pump subsidies and fertiliser subsidies, is not good. We noted earlier Schiffler's comment on the prolonged decline of cereal prices, which may have been caused at least in part by over-investment in irrigation facilities. It will not be useful to those small investors who are already in vegetable-growing enterprises, if governments start to subsidies further entrants sufficiently to cause long-term price falls in those products too.

One of the main things that governments can do is to improve security of tenure for small irrigators, in regard to both land and water rights. The lack of land title documents is often cited as a major constraint inhibiting commercial banks from lending to small farmers and in several countries, it is an obstacle to engaging new private investors too. In some countries, especially in West Africa, traditional and hereditary rights over the allocation and use of land are exercised by local chiefs, who may use this position of power in order to control, or at least to extract profit from, potential new investors. Negotiations in these circumstances can be long and frustrating for the investor.

Water rights for small farmers are not likely to be documented, in many countries, for a rather long time; but it is a valuable policy objective to aim for, even in the long term. A company that decides to invest in irrigated agriculture without having any documented right to its water source will always be to some extent insecure, and will, therefore, seek higher rates of profit.

Many private irrigation farmers in Africa operate on a very small-scale. Formation into organisations can make their operations more efficient in aspects such as marketing, transport and purchase of inputs. Malaysia has experimented with arrangements such as "group farming" (where farmers co-ordinate their field activities but remain separate as land-owners) and "mini-estates" (where

farmers form a share-based company which becomes the land-owner). Government agencies can develop programmes to assist the formation of such larger and stronger units, by training and advice and perhaps assistance with market contacts for export crops.

Private-sector organisations which provide specific contract services to irrigation farmers, but do not engage in agriculture themselves, have been appearing in various countries. These include (in Bangladesh) landless pump-operating groups who take a loan to install a well and a pump, and contract to supply water to neighbouring farmers, and (in China) maintenance companies. Arrangements of this kind allow some economies: for example, a maintenance contractor can invest in equipment which it may then apply to numerous different irrigation systems. Arrangements of this kind are likely to be profitable mainly in countries where the areas to be served are substantial and lie not too far apart. In countries where those conditions do not exist, we may find (for example) teams of young men who offer, for payment, to contract with irrigators' organisations to perform low-level manual maintenance of canals and drains.

5. Components of the enabling environment

After the above rapid overview of some possible private-sector development paths, and some constraints, we shall now try to identify the elements of an enabling environment that may increase the private-sector role. Five groups of enabling conditions will be considered:

- profitability;
- rights;
- sources of finance;
- intra-community relationships;
- technical and organisational support.

5.1 Profitability

The first and most essential requirement for developing any unsubsidised private-sector activity is that it should be profitable. Unfortunately, the mass of literature and research on irrigation management over the past decade or two has given very little attention to profitability. The new IWMI 5-year strategy scarcely refers to it. Irrigation is still perceived quite commonly as a welfare activity rather than as an economically self-sustaining activity. The conditions under which irrigated agriculture is profitable, and how its profitability compares with other possible uses of capital in rural environments of developing countries, are matters that have been inadequately explored.

We have to consider the competitiveness of private irrigated agriculture at two distinct levels:

- Can private-sector producers bring crops to market at prices that are the same as, or lower than, those required by producers on government irrigation systems?
- Are the potential profits from irrigated agriculture sufficient, in comparison with other investment opportunities, to attract private capital?

It seems clear that, as in other sectors, it must be difficult for private irrigated agriculture to be directly competitive with state-financed systems. The users of state-financed systems rarely if ever pay the full costs of their systems, inclusive of capital. The high amounts of new irrigation capacity that have come into existence in the past 30 years have been linked with a long-term decline of prices. So it seems reasonable to say that private-sector irrigated agriculture is not likely to be competitive if it uses the same kind of crop patterns that are usual in the state-supported systems.

Kaboré, Tahirou and Lowenberg-DeBoer (1994) investigated the opportunity cost of private capital in the Sahel, looking at the returns that were obtained from small-scale rural enterprises like fishing, retail trade, and so on. They found varied results, but the general indication was that capital was so scarce that returns of the order of 50 percent per year were obtainable. This kind of information indicates the likely competitive difficulty of attracting capital into irrigated agriculture.

We have noted already the problem of long-term decline of prices for basic cereal crops. The implication is that, for commercial success of private investments in irrigation, it seems that it will be necessary to focus on higher-value crops in the peri-urban areas, and on export crops, in order to generate sufficiently attractive returns to capital.

There are areas where the state can facilitate these kinds of developments. Efficient and accessible market facilities in the city peripheries are essential, and if markets are connected to the rural areas by good roads they will help to expand the peri-urban ring. Official systems of quality control and labelling can help exporters, who also may need help in establishing delivery chains and cold storage facilities.

What are the prospects of bringing in private-sector organisations in contractor modes, as suppliers of support services rather than for crop production? The likely profitability of this seems to depend on the local density of irrigation systems. It is obviously easier to promote this kind of development in countries like China or Bangladesh, where population densities and numbers of irrigation systems are high, than in places where they are few and relatively far apart. Such development, therefore, would be more likely to happen in the North African countries or Madagascar than in most of sub-Saharan Africa.

5.2 Secure rights

Investment depends largely on security; on feeling secure about the future. Clear, transparent and secure systems of land tenure and water rights are a primary need. Without these, investment is much less likely, and the rate of return demanded by an investor will be much higher.

Construction of new facilities particularly needs secure rights to land and water. Investments of that kind may well take a decade or more to recover their initial outlay, so the investor probably will want documented rights for a time period of that order at least.

One of the principal benefits of a system of secure, documented water rights would be that it would encourage investment in water-saving technologies. A limited quantity of water can be used (for example) to irrigate a larger area of tree crops, by installing micro-jet sprinklers. That kind of fixed capital investment is less likely if the water supply is uncertain, or if it is undefined.

The existence of a sophisticated system of documented water rights in Chile has resulted in that country having substantial investments in micro-irrigation, of export crops such as grapes, with consequent enhancement of water productivity and extension of irrigable area.

Security is also needed in regard to the management of irrigation systems. Management decision-making must be done in ways that give the system's users confidence that its performance will be reliable, delivering timely and adequate water, equitably distributed among participants. This is probably a reason against private expansion of existing government irrigation systems: in many countries, the management of government systems has been weak and inflexible, so a private investor would prefer to be sure of having control of operational management.

In several Asian countries, such as India or Thailand, we see clear evidence of the problems of erratic water-delivery performance in government surface-irrigation systems. Farmers have invested heavily in equipping themselves with wells and pumps (even if they are in areas nominally provided with canal water), because they know by experience that the delivery of canal water is unreliable. That may perhaps be tolerable while they are growing rice, but when they move to higher-value crops, especially certain vegetables, whose water schedules may need to be frequent and more carefully observed, they invest in pumps so that they can control irrigation timing.

To some extent that behaviour can be addressed by requiring government management organisations to issue level-of-service declarations, accompanied by some statements of compensation that will be payable to system users if the terms of the declaration are not fulfilled. This type of accountability alters the relationship between service-providers and service-users, and increases the users' confidence as well as the service-providers' performance.

5.3 Sources of finance

The users of irrigation systems are usually not affluent people. Therefore the development of unsubsidised farming activities, and in particular the promotion of private investment to create new irrigation facilities, depend on access to external financial resources. Banks and other types of investors have roles to play in this. In some countries family members working abroad, or in urban areas, may be significant sources of small-scale capital.

The risks to such potential lenders may be quite large at present, which will obviously affect both their willingness to provide capital to irrigation development, and the rates of return they will seek.

The risks can be reduced by various adjustments in the institutional environment. There tends to be a focus on the roles of commercial banks, such as improving their accessibility in the rural areas. These aspects are certainly important, but in the present time, when urbanisation and foreign employment are both increasing fast, it may be equally important to look for ways of encouraging investment of these urban and overseas savings. This means that returns should be as secure and as competitive as the available alternatives. To achieve this is difficult at present, but the improvements in security of rights and in marketing facilities mentioned above would be steps in this direction.

In the past, official control of unrealistic rates of currency exchange was a major obstacle to repatriation and investment of foreign earnings. That problem has reduced in recent times, but has not entirely disappeared.

Innovative lending practices, such as those pioneered by the Grameen Bank in Bangladesh and now spreading in other Asian countries, including use of community groups to guarantee personal repayments, rather than demanding collateral, also may be useful, but these refer more to the level of seasonal crop investments rather than creation of new facilities.

5.4 Intra-community relationships

Profitable farming may involve a shift away from staple cereal crops towards, for example, vegetables or fruits, or other niche crops such as flowers and ornamental plants. This in turn may mean changes in production relationships, in which a farmer or farming group become entrepreneurs and employers of local labour for post-harvest tasks such as grading, processing, packaging, and so on.

Farmers in cereal-growing irrigation systems are essentially rather equal. There is hiring of labour, and use of exchange labour, at harvest and planting times especially. But the extent of temporarily employed labour may increase considerably when the crop changes to fruits and vegetables.

There are risks that these changes may reinforce existing inequities, or introduce fresh sources of inequity, for example by being undertaken by people who are already in some way privileged.

The enabling environment, therefore, should include strengthening of measures that address inequity, such as increased transparency of management, dispute resolution procedures, and ways of giving voice to landless participants.

5.5 Technical and organisational support systems

Even if private activity flourishes, there are likely to be residual roles that have to be filled or at least monitored by government organisations. These may include technological advice or extension, ensuring the availability and certifying the quality of input supplies, general overseeing of irrigation system administration, and intervention in certain circumstances such as corrupt behaviour.

The kind of private irrigation enterprises that we can expect to see will in general not be large, and will probably suffer from scarcity of financial resources in the foreseeable future. Governments which want to promote evolution along this path will probably have to provide these private enterprises with advice and assistance in finding and connecting to markets, especially for those that aim at export products. Quality certification systems may be a part of this. Most of the other technical supports that would be required are already in existence, but some may need to be strengthened. These include research farms that can conduct trials of new varieties, seed certification systems, and extension services. In some countries, especially those where the total irrigated areas are small, extension services are not well skilled in irrigation issues, and there may be training needs for staff in those.

The experience of privatisation in other fields of public services has shown that it may bring benefits, but it also entails risks. There are especially risks of inequity, corruption, and reinforcement of privileges, and risks of weakening field activities due to inadequate commercial performance. The institutional environment may, therefore, need to be strengthened (if the goal is a widespread increase of private activity) by introducing some new type of regulating organisation. Such a regulating body would have the duty of monitoring the organisational behaviour of irrigation systems through procedures of reports or inspections, and would also have powers for responding to failures or abuses.

In future, if the scope of conventional government irrigation agencies reduces, we may see the evolution of a new type of government agency. This would be regulatory rather than executive, and headed by an official called perhaps Inspector or Registrar of Irrigation Organisations, whose function will be to ensure compliance with some set of rules of organisational and financial behaviour. An arrangement of this kind is normal in regard to commercial companies, and will need to be considered if the scale of private-sector activity increases significantly.

6. Inequity of access

At present, a sharp increase of private-sector irrigation investment may not seem very likely, but if it should happen there will be concerns about inequity which should be addressed. We have grown accustomed to seeing procedures of choosing new settlers in government-sponsored irrigation systems; sometimes these procedures of settler selection are obscure, and there are possibilities of favouritism and other sources of inequity. However these issues have not been of a scale that has hitherto caused too much complaint. The potential for inequity in a private-sector system could be much greater. The granting of water rights, for example, is a central requirement for strengthening the private sector; but it also carries dangers, as there will doubtless be people who end up without such rights.

It is not possible to generalise this kind of question. Countries have to find policies that are consistent with their own political and social systems. But it seems that, especially in the drier countries, there will be a need to ensure that water rights are not captured by restricted groups, leaving others disadvantaged, with conceivably no right of access to water.

The best institutional way to guard against this possibility seems to be through forming riverbasin organisations, which would act as the source of documented water rights, and would include some form of stakeholder forum or stakeholder council, probably in an advisory rather than executive role.

7. Summary and conclusions

Irrigation construction in Africa over the past 30 years has been dominated by investments made by governments and foreign donors. To some extent, the provision of irrigation was seen as inherently good. A consequence of this attitude has been that schemes were in many cases built without being subjected to strong economic scrutiny.

Globally, there has been over-investment in irrigation, resulting in a production capacity that exceeds effective demand, at least for the basic cereal crops. This has contributed to prolonged weakness of prices for those crops, which further reduces the economic viability of irrigation schemes.

Private funding may be brought into irrigated agriculture in several ways, especially:

- funding of recurrent costs of operation, maintenance and management, especially by existing users of irrigation systems;
- providing capital to extend existing irrigation systems;

- constructing new irrigation facilities;
- investing in higher technologies, especially water-saving technologies, in existing irrigation systems;
- supplying support services, such as marketing or contracted maintenance.

There are severe constraints facing each of these options, and reasons why they have been slow to happen.

Increase of private-sector roles, in an economic sector that has been dominated by government, can lead to serious problems of corruption, and inequitable access to resources. Governments which aim to privatise irrigation activities, in whole or in part, should first ensure that there are institutional mechanisms in place to prevent these outcomes.

The actions that governments could take, to encourage private-sector financial inputs, while guarding against inequity, include:

- Establish a clear and secure system of documented water rights.
- Establish river-basin organisations with stakeholder councils, which will have among their duties the supervision of water-rights allocations.
- Enact a law defining the status, governance, scope, and financing of irrigators' organisations. If the number of such organisations is significant, there should be a small regulating agency to oversee their compliance with certain standards of organisational and financial behaviour.
- Establish laws and procedures that will be applied in case of bankruptcy or other organisational failure.
- In government-built irrigation systems, establish clear definition of ownership and responsibilities, especially in regard to the physical facilities and water rights.
- In larger existing systems where the government will continue to operate main-system facilities, establish a clear contract or level-of-service declaration, with rules about compensation to users in case of failure to deliver the specified level of irrigation service.
- Promote the establishment of good physical facilities for marketing, especially in the periphery of large cities; such facilities include good transport links and cold storages, and may be provided where possible through private investment.
- Ensure that small organisations of irrigators have an accessible source of advice in relation to export markets.
- Provide skill training for users' organisations in government irrigation systems, in aspects of management, especially communication and record-keeping.

Bibliography

- Abernethy, C. L. 1998. Institutional reform and co-operation in irrigated agriculture: an overview. In: Abernethy and Heim. (eds). Institutional reform and co-operation in irrigated agriculture, with special reference to Lao PDR and Vietnam, pp. 12 25, DSE/ZEL, Feldafing / Zschortau, Germany.
- **Abernethy, C. L. 2001.** Managing irrigation systems in preparation for management transfer. International Commission for Irrigation and Drainage, 19th European Regional Conference, Brno, Czech Republic.
- Kaboré, D.; A. Tahirou; and J. Lowenberg-DeBoer. 1994. The opportunity cost of capital in the Sahel: case study results in Niger and Burkina Faso. Staff paper series, Department of Agricultural Economics, Purdue University, USA.
- Moris, J. 1987. Irrigation as a privileged solution in African development. Development Policy Review, v 5, pp. 99 123.
- Projet Management de l'Irrigation au Burkina Faso. 1997. Analyse-diagnostique et performances de cinq périmètres irriguées autour de barrages au Burkina Faso. International Irrigation Management Institute, Ouagadougou.
- Projet Management de l'Irrigation au Niger. 1998. Rapport final de synthèse. International Irrigation Management Institute, Niamey.
- Schiffler, M. 2001. Global water and food scarcity: are the gloomy predictions right? Agriculture and Rural Development, v 35, no. 5, pp. 4 7.
- **Vermillion, D. L. 1994.** Irrigation management turnover: the shift from agency to local control. *Quarterly Journal of International Agriculture, no. 4.*
- Vermillion, D. L. (ed.), 1996. The privatisation and self-management of irrigation. Final report submitted by International Irrigation Management Institute, Colombo, to Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).
- Vermillion, D. L. 1997. Impacts of irrigation management transfer: a review of the evidence. *Research Report 11. International Irrigation Management Institute, Colombo, Sri Lanka.*