

## **Impact of irrigation management transfer on the performance of irrigation systems: A review of selected experiences from Asia and Latin America**

### ***Impact du transfert de gestion de l'irrigation sur les performances des périmètres irrigués: Quelques expériences tirées de l'Asie et de l'Amérique latine***

Madar Samad

#### **Abstract**

The paper reviews evidence about the impacts of management transfers from specific irrigation systems in six countries: Sri Lanka, India, Indonesia, Nepal, Mexico and Colombia. The comparisons are in some cases based on serial data (before and after transfer) and in some cases on parallel data (with and without transfer). Results are compared in regard to changes in: government expenditure; farmers' expenditure; quality of irrigation services; standards of physical maintenance; crop yields; and crop intensities. The findings are generally mixed and the evidence for improvement in any of these parameters is not strong. The evidence for reduction of government expenditure may be the most persuasive item. In conclusion, the author argues that, while the findings should not be seen as denying the potential value of irrigation management transfer as a policy, they show that better monitoring of outcomes is needed in such programmes, and better analysis of factors that may contribute to success. It is also stressed that there is a need for more research on appropriate institutional adjustments to accompany the implementation of such programmes.

#### **Résumé**

*Cet article examine l'impact du transfert de gestion de quelques périmètres irrigués dans six pays: le Sri Lanka, l'Inde, l'Indonésie, le Népal, le Mexique et la Colombie. Dans certains cas on compare les situations avant et après le transfert, alors que dans d'autres il s'agit des comparaisons avec et sans transfert. Les changements intervenus dans des domaines suivants servent de base de comparaison: les dépenses de l'Etat, les dépenses des exploitants, la qualité des services d'irrigation, le niveau de maintenance des infrastructures physiques, les rendements, les intensités culturales. Les résultats sont généralement mixtes et aucun de ces paramètres n'affiche une amélioration significative; la réduction des dépenses gouvernementales est peut-être l'élément le plus persuasif. En conclusion, l'auteur souligne que ces résultats ne doivent pas être interprétés comme une mise en accusation de la politique de transfert de gestion de l'irrigation mais plutôt comme un appel en faveur d'un meilleur suivi et évaluation des résultats des programmes de transfert. Une meilleure analyse des facteurs contribuant à la réussite du processus de transfert est également nécessaire. Le besoin de davantage de recherche pour mieux cerner les ajustements institutionnels devant accompagner la mise en œuvre de tels programmes est également souligné.*

#### **1. Introduction**

During the last two decades, countries with sizeable irrigation sectors have been transferring the management of irrigation systems from government agencies to water user associations or other local non-governmental organisations. The programme is being implemented under a variety of labels: management transfer, turnover, self-management, participatory irrigation management and so on. A common objective of the various programmes is to curtail the role of government agencies in irrigation management and give farmers more control and responsibility for managing irrigation systems. In most instances, governments pursue management transfer programmes to reduce their recurrent expenditures on irrigation, enhance agricultural productivity levels and stabilise deteriorating irrigation systems (Vermillion 1997).

A question often asked is whether the irrigation schemes that were transferred to farmer management performing better than under state agency management? Although there is extensive literature on irrigation management transfer, no clear analytical paradigm has yet emerged. The writings are a disparate collection of definitions and methodologies from which it is difficult to deduce general

conclusions or policy implications. Many analysts show a bias in favour of transfer programmes, apparently on philosophical grounds. With a few exceptions most reports that attempt to address this question are qualitative and hard to validate. It is important that impacts of management reforms are carefully analysed and understood, not only to set the record straight, but more crucially because of the significance of such analyses for policy decisions pertaining to the irrigation sector.

This paper synthesises the most significant evidence about the impacts of management transfer programmes. The analysis is based primarily on the findings of case studies conducted by the International Water Management Institute in Sri Lanka, Indonesia, Nepal, Maharashtra State in India, Mexico and Colombia. The paper also draws on evidence about impacts of management transfer on irrigation performance from other case-studies carried out in the region.

The paper begins with an overview of government policy on irrigation management transfer (IMT) in the selected countries. This is followed by an analysis of the impact of the management reforms on the irrigation performance in terms of impact on government's recurrent expenditures for irrigation, the quality of the irrigation service and agricultural productivity levels.

## 2. An overview of irrigation management transfer policies

In most of Asia management transfer entails only a partial devolution of responsibilities. Governments tend to retain some control over operation and maintenance (O&M) plans and continue to contribute to the financing of O&M. In most cases governments also remain committed for future rehabilitation and modernisation of the transferred schemes. Most transfer units are sub-sections of irrigation systems that are managed by farmer organisations while the main system continues to be managed by a government agency. Typically, post-transfer management organisations tend to be water user associations (WUA). The scope of responsibilities transferred to the WUAs and the institutional elements under which transfers have been launched have varied among countries. In Sri Lanka, Nepal and Indonesia the management of all smaller schemes was transferred to WUAs.<sup>1</sup> Larger schemes are usually under joint management with WUAs in charge of sub-sections of schemes (distributary and field canals) and government agencies continuing to manage headworks and the main canal system. With some exceptions (e.g., tubewells in Bangladesh and Pakistan, and pumps in Laos) turnover does not confer ownership of the irrigation infrastructure and other assets to WUAs. In almost all countries in the region where transfer programmes are underway, neither the post-transfer management entities nor individual farmers have clear water rights (Vermillion 1997).

The formation of WUAs is central to IMT programmes throughout the region. In Indonesia, following the transfer three types of WUAs have been developed:

- a single organisation whose members and jurisdictions fall entirely within a single village area;
- a federated organisation responsible for a scheme with its service areas located in more than one village. The federation is composed of WUAs representing each village in the service area;
- WUAs in irrigation schemes which serve multiple villages but have not been federated. Under this arrangement, representatives of WUAs of each village co-ordinate with each other to manage O&M (Frederiksen and Vissia 1998).

In most cases WUAs are legal entities and are essentially single-purpose organisations concerned mainly with O&M of the irrigation facilities. They are vested with the authority to formulate O&M plans and budget, and to set water fees, and have the right to contract and raise funds (Vermillion et al 2000). The government retains responsibility for major repairs and emergency maintenance in the transferred scheme. The ownership of the irrigation facilities rests with the government. Water rights are also vested with the government. Legal provision exists for licensing water use but it is not applied to irrigation. Farmers are said to have first rights to water based upon historical use.

---

<sup>1</sup>Small systems in Sri Lanka are those with a command area of less than 80 ha. In Indonesia, schemes smaller than 500 ha were earmarked for management transfer. In Nepal it involved schemes that were less than 500 ha in the hills and 2000 ha in the plains (*terai*). In Indonesia, the new reform policy proclaimed in 1999 covered all schemes. However, not all structures would necessarily be transferred. Major headworks may be retained under government management, secondary canals were to be transferred to farmer management (Bruns 1999).

In Nepal, the government retains ownership of the irrigation facilities, but vests the right to use the facilities to WUAs as part of the Memorandum of Understanding (MOU) on transfer (Frederiksen and Vissia 1998). The ownership of surface and ground water is also vested with the government. The MOU does not contain statements about water rights. The new Irrigation Policy adopted in 1996 provides detailed guidelines for irrigation services fees and authorises WUAs registered with the government to collect fees to cover the cost of O&M of facilities for which they are responsible. In the jointly managed schemes, the rates are determined jointly by Department of Irrigation (DOI) and the WUA. In these systems the total fees collected are shared by the DOI and WUA in proportion to the facilities for which they are responsible. It is envisaged that in the schemes under the Irrigation Management Transfer Programme (IMTP) the irrigation service fee would cover the full O&M costs.<sup>2</sup>

In Sri Lanka, the main function of the WUAs or farmer organisations (FOs) as usually referred to, is to deal with irrigation matters, but statutory provisions permit FOs the right to formulate and implement agricultural programmes for their area, market farm produce and distribute production inputs. When legally registered, FOs have the authority under the Irrigation Ordinance to formulate rules on maintenance, conservation, and management of irrigation infrastructure under their jurisdiction, to devise procedures for distributing water within the area under their command, and to impose and levy fees to recover the O&M costs (IIMI/HKARTI 1997). The ownership of the irrigation facilities remains with the government. However, a policy statement issued by the government in 1988 states that it would enact legislation to transfer the ownership of the irrigation network to FOs when they are found ready to take on that responsibility. To date there has been no such transfer of ownership of irrigation facilities.

In Sri Lanka, all water bodies except those which are entirely within the boundaries of private property are considered as public water resources. Legislation exists for issuing permits for water use but it is not strictly enforced. Water use for irrigation is exempted from the permit provisions. In 1984, the government introduced a cost recovery programme for O&M in the larger irrigation schemes through the imposition of irrigation service fees. Even in the initial years only about 50 percent of the targeted amount was recovered. Due to questions about the legality and also political pressure, the cost recovery programme was abandoned 4 years later. Although FOs are expected to incur the full costs of their O&M responsibilities, in many cases, the government continues to subsidise O&M by financing maintenance contracts let to FOs. However, FOs often mobilise additional labour and other resources for maintenance from their membership.

In India, irrigation management transfer is being implemented under the broader framework of participatory irrigation management. As irrigation is constitutionally a responsibility of the states, not the central government, there are considerable variations in the institutional framework relating to participatory irrigation management between the various states. These range from cosmetic changes in Haryana where farmer involvement is only below the outlet, to more comprehensive efforts in Maharashtra and Gujarat where WUAs are vested with the responsibility of managing minor canal commands of 500 ha.<sup>3</sup> The most far-reaching irrigation management reform programme is being implemented in Andhra Pradesh where the Andhra Pradesh Farmers Management of Irrigation System Act of 1997 provides for the formation of WUAs in all surface irrigation systems in the state. The WUAs are vested, *inter alia*, with the responsibility of operation and maintenance of the irrigation system, water distribution, conflict resolution, and collection of water fees. The WUAs are also authorised to mobilise funds through bank loans, levy fees and generate revenue by engaging in commercial activities (Raymond Peter 2000a). The most significant feature of the Act is that officials of the Irrigation Department are made accountable to the WUAs.<sup>4</sup>

---

<sup>2</sup> In reality this is not the case. In the smaller schemes (e.g. *Khageri and Panchakanya*) irrigation fee contributions amounted to only about 25 percent of the O&M cost in 1995/96. In the larger schemes the share was less than 5 percent (Nepal Management Transfer-Brief, 1998, duplicated).

<sup>3</sup> Detailed accounts of IMT policies in the different states of India are given in Brewer et al. (1999a) and Raju et al. (2000).

<sup>4</sup> An authoritative account of the irrigation management reforms in Andhra Pradesh and key provisions of the supporting legislation, the Andhra Pradesh Farmers' Management of Irrigation System Act, 1997, is given in Raymond Peter, 2000a and 2000b.

IMT in Mexico is generally considered as one of the most ambitious and successful reform programmes in the world in terms of the area affected and the speed of its implementation. It was a part of a broader effort at macro-economic adjustments and institutional reforms. The programme was launched in 1989. By December 1996, almost 2.92 million hectares had been transferred to 372 WUAs representing 90 percent of the area served by the 80 irrigation districts in the country (Kloezen et al. 1997). The Mexican programme is built around the creation of irrigation modules operated by WUAs. Modules cover a specified service area based on hydraulic, social and economic considerations (Johnson III 1997). The main objective of the programme was to reduce public expenditure on irrigation O&M while promoting greater user participation in the management of irrigation districts. The programme also provided assistance, such as on-farm development initiatives, to enhance farm-level productivity and water conservation. A further objective was to restore economic growth by using a system of pricing water, based on international prices, marginal costs, or scarcity value (Kloezen et al. 1997).

The irrigation management transfer programme in Colombia adopted in 1990 involved only a partial devolution of management to water users. The government maintained considerable advisory influence over the districts for several years, exercising some control over O&M plans and budgets, and resisting district attempts to release large numbers of staff. With The Land Development Law adopted in 1993, this control has been relaxed considerably as districts gained almost complete control over management. However, powers devolved do not include a formal water right or ownership of irrigation scheme infrastructure. Also, the government has not made it clear whose responsibility it will be, and under what terms and conditions, to finance possible future costs of rehabilitation (Vermillion and Garcés-Restrepo 1998).

### **3. Impacts of Irrigation Management Transfer**

This section synthesises available evidence about the performance of irrigation schemes that have benefited from irrigation management transfer. The analysis is based primarily on case studies conducted by IWMI about the impacts of management transfer on performance of irrigation schemes in Sri Lanka, Indonesia, Nepal, India Mexico and Colombia.<sup>5</sup> Performance is measured from several perspectives: the costs to government and to farmers of operating and maintaining irrigation systems, the quality of the irrigation service, and agricultural productivity. The main aim of the analysis is to determine whether there have been noticeable changes in performance of the schemes after management transfer.

#### **3.1 Financial impacts**

Financial impacts were assessed in terms of government's recurrent expenditures for irrigation and the cost of irrigation to farmers.

##### **3.1.1 Impact on government expenditure**

One of the main reasons governments promote transfer programmes is to reduce the financial burden of irrigation management (Vermillion 1997). It was expected that, following transfer, the farming community would take on the responsibility to finance fully, or to share, the cost of operating and maintaining irrigation systems. This proposition was tested in all four countries selected for the study.

In Sri Lanka government expenditures on O&M were analysed for 50 schemes over a 10- year period – 5 years before transfer and 5 years after. The schemes selected were categorised into four groups:

- a. schemes that were rehabilitated and transferred (with IMT)
- b. schemes that were transferred (with IMT) but not rehabilitated

---

<sup>5</sup> Details of the respective case studies are given in: Samad and Vermillion, 1999 (Sri Lanka); Vermillion et al. 2000 (Indonesia); Brewer et al. 1999b (India); Samad et al. 1999 (Nepal); Kloezen et al. 1997 (Mexico), and Vermillion and Garcés-Restrepo, 1998 (Colombia).

- c. schemes that were rehabilitated but not transferred (without IMT)
- d. schemes without either of the two interventions (without rehabilitation, without IMT)

A piecewise linear regression model was fitted to analyse trends in government expenditure over two time periods: before IMT (1985-90) and after IMT (1991-95).<sup>6</sup> The aim was to determine whether the O&M expenditures incurred by government showed a particular linear trend from 1985 up to 1990, the year of transfer, but a different trend thereafter.

The results indicate that there has been a statistically significant decline in government's recurrent costs for irrigation during the pre-IMT period (1985-90) across all categories of schemes, irrespective of whether IMT programmes were introduced or not. There was no change in the declining trend in the post-IMT period (1991-95). The results do not fully support the contention that IMT leads to a reduction in government expenditure for O&M.

In India, data collected from selected minor canals in two schemes (Mula and Bhima) in Maharashtra showed that there was no reduction in government expenditure on operations and maintenance in the transferred minor canals. In one location (Mula) the average annual amount spent by government during the period 1987/88 to 1995/96 is higher in the transferred minor canal than in the non-transferred canal. This was due to repair costs incurred by government in accordance with the transfer agreement (Brewer et al. 1999b).

In Nepal, empirical evidence from West Gandak shows that there was a reduction in the government budget allocation for O&M after transfer. Similar observations were made in the case of the Bhairawa Lumbini Groundwater schemes, which were transferred to WUAs (Samad et al. 1999).

In Mexico, results of IWMI's field studies in the Alto Rio Lerma Irrigation District (ARLID) showed that IMT resulted in the increase in financial self-sufficiency from around 50 percent in the years preceding transfer to around 120 percent in the post-transfer years. This is mainly due to the ability of the WUAs to achieve fee collection rates of over 100 percent. Moreover, all modules at ARLID hired highly professional administrative staff and used good computer software to handle daily financial administration. This resulted in improving the financial transparency of the WUAs (Kloezen et al. 1997).

In Colombia, research results in two sample districts showed that the government achieved its objectives of significant reduction of government expenditures for irrigation management (Vermillion and Garcés-Restrepo 1998).

### 3.1.2 Cost of irrigation to farmers

In Sri Lanka, irrigation water has traditionally been supplied free to farmers. Attempts made by government in the past to levy a fee from farmers were largely unsuccessful. The "costs" of irrigation to farmers are primarily the contribution of voluntary labour for canal maintenance, and in some instances payments made in kind to persons (*Yaya Palaka*) employed by the agency to oversee the distribution of irrigation water. With the introduction of participatory management the government expected farmer organisations to recover the cost of O&M from farmers. In a survey carried out in two schemes (Nachchaduwa and Hakwatuna Oya) farmers were asked to compare irrigation costs after transfer with costs of irrigation before transfer.

Three kinds of irrigation costs were assessed: cash payments, payments made in kind, and the number of person days of family labour contributed for canal maintenance. About 90 percent of farmers in both schemes claimed that there was no cash fee on irrigation before transfer. After the transfer of O&M functions to FOs, some organisations charged a modest fee for canal maintenance. The survey results showed that only a minority of farmers paid the maintenance fee. In both schemes, the irrigation cost to farmers is primarily unpaid family labour contributions for canal maintenance, and payments in kind to the person employed by the FO to distribute water. In both locations well-defined procedures for cost recovery have not yet been established. Data from the two schemes do not provide sufficient evidence to suggest an increase in the cost of irrigation to farmers following the introduction of participatory management.

<sup>6</sup>The regression model used and the details of the methodology are given in Samad and Vermillion (1999).

In the two Maharashtra schemes studied, farmers pay to the government (both before and after transfer) crop-area water rates, which are fixed by the state, and some additional fees. Therefore, these irrigation costs to farmers are not attributed to IMT. Data indicate that the cash cost of irrigation has increased. But, as water fees are collected by WUAs, the indications are that transaction costs associated with the payment of water fees have decreased, and thereby reduced the actual cost of irrigation to farmers (Brewer et al. 1999b).<sup>7</sup> More recent evidence from Andhra Pradesh indicate that with the introduction of irrigation management reforms there has been a three-fold increase in water charges (Raymond Peter 2000a).<sup>8</sup> This was done to augment the financial resources of the WUAs. In addition, farmers are liable to pay fees levied by the WUA (Raymond Peter 2000a). Thus there has been an increase in the cost of irrigation to farmers after IMT. But field studies carried out in the state suggest that there is not much resistance from farmers to paying higher water charges, as long as they have a dependable water supply (Jairath 1999). Moreover, even with the enhanced water rate the cost of irrigation water amounts to only 5 percent of the cost of production.

In the small-scale irrigation systems in Indonesia, water charges paid to the village or water users' associations are normally paid in kind (paddy) rather than in cash. Samples of farmers from the selected schemes were interviewed about their perception of changes in the costs related to irrigation before and after turnover. The percentage of farmers reporting no change in the amount of water fees paid in kind varied from 38 percent to 85 percent. In two schemes (Planditan and Cipanumbangan) 35 percent and 60 percent, respectively, reported an increase in the fee after turnover. Generally, farmers did not express concern about the reported increases or decreases being worrisome or too dramatic.

In the West Gandak scheme in Nepal, irrigation cash costs to farmers are higher in the transferred minors than that in the non-transferred minor. Unpaid labour contribution in IMT sites, on average, is not different than that in the non-IMT sites. In the groundwater schemes, pumping charges for irrigation in the IMT schemes are higher than those in the non-IMT schemes. Unpaid labour contribution in IMT schemes is lower than that in non-IMT schemes because the data in non-IMT sites include the labour contributed in rehabilitation works.

In Mexico, IMT has not resulted in an increase in the cost of water to farmers. Although the cost of irrigation to farmers remains low after transfer, WUAs find it very difficult to convince farmers that irrigation fees should be increased to keep up with inflation. Furthermore, none of the modules created a contingency fund for future emergencies or basic repairs. In Colombia, transfer resulted in variable effects on the cost of irrigation to farmers. In one district, where the total cost of irrigation was relatively high (due to two-stage pumping), at transfer, farmers exerted pressure on their new board to contain costs.

### **3.2      *Quality of irrigation service***

A key assumption of irrigation management transfer programmes is that, as farmers have a vested interest in the irrigation service, involving them directly in irrigation management would lead to improvements in the quality of the service. This section examines whether the introduction of participatory irrigation management resulted in an improvement in the quality of irrigation service. Changes in the quality of irrigation service were assessed in terms of farmers' perceptions of adequacy, timeliness and fairness of water distribution, and the incidence of irrigation-related conflicts among farmers before and after transfer.

A survey carried out in two schemes in Sri Lanka showed that a majority of farmers in both schemes claimed that water supply in both the wet and dry seasons was adequate before and after transfer. In one scheme (Nachchaduwa) about one-third of the farmers in the head-reach and about 25 percent of those in the middle and tail-end areas reported that water supply had worsened after transfer. Farmers attributed the worsening of water supply to the poor quality of work done during rehabilitation, prior to management transfer. The responses of a majority of farmers in both schemes

---

<sup>7</sup>Transaction costs are costs such as travel costs and the time involved in visiting the agency office to make the payment.

<sup>8</sup>The Government of Andhra Pradesh transfers 90 percent of the revenue from water charges to WUAs (Raymond Peter 2000a).



were similar with regard to the timeliness of water supply, fairness of distribution and the frequency of conflicts over water distribution, namely, that these had not changed significantly after transfer. What was negative or positive before remained so afterwards.

In the Mula and Bhima schemes in Maharashtra, IMT has been beneficial for water distribution. Although field data indicated that there was no difference between transferred and non-transferred minor canals, in terms of the amount of water delivered per hectare, farmers in the canals transferred to WUAs clearly believed that water distribution had improved following transfer and that they had better access to water when needed; whereas, a majority of farmers in the non-transferred minors were dissatisfied with the irrigation service (Brewer et al. 1999b). The differences in farmer perceptions between the transferred and non-transferred canals clearly indicate that the adequacy, reliability and fairness of water distribution have improved after transfer.

In Nepal, in both the surface irrigation systems and the groundwater schemes, farmers reported that the adequacy and timeliness of irrigation water was better in transferred minors. In both locations a higher proportion of farmers in the transferred minors reported that water distribution is much fairer now than before. Farmers in the transferred minors face less difficulty to get assistance of WUAs.

The responses of farmers in the Indonesian study sites gave a mixed picture of the impact of IMT on the quality of irrigation service. In three schemes a majority of farmers interviewed reported no change in water adequacy after turnover, some farmers saying it was adequate both before and after turnover, and others claiming it was inadequate before and afterwards. In one scheme (Kaliduren) the majority of farmers reported an improvement in water adequacy after turnover. Farmer perceptions about the fairness of water distribution were more positive. A majority in all four systems perceived that water distribution was either fair before and after turnover or was unfair before turnover but had become fair afterwards. In all four systems, between 60 percent and 80 percent of farmers interviewed perceived that the frequency of water-related disputes among farmers in the system had decreased after turnover. Only a very small number of farmers in any of the systems reported a worse situation after turnover. Regarding timeliness of water deliveries, the majority of farmers reported no change. In one scheme (Kaliduren) 55 percent of farmers reported an improvement in the timeliness of water delivery after turnover. Another 40 percent reported satisfactory timeliness before and after turnover.

The results from the Mexican case studies showed that there has been very little impact on water management and use as a result of irrigation management transfer in ARLID. This is because the water allocation and irrigation scheduling practices have not changed since the WUAs took over these tasks from the agency (Kloezen et al. 1997). Similarly the results from the Colombian schemes showed that management transfer by itself did not bring about any clear and significant changes in the quality of irrigation operations (Vermillion and Garcés-Restrepo 1998).

### *3.2.1 Maintenance of irrigation facilities*

The outcomes of maintenance investment after transfer were assessed by detailed field inspection of the full length of main canals, a sample of distributary canals in each scheme, and all structures along these canal reaches. Field inspections were carried out in the two schemes in Sri Lanka, in the selected minors in the two Indian schemes, and in the four systems selected for study in Indonesia. In Nepal the impact of IMT on maintenance was assessed in terms of farmer perceptions of the conditions of canals before and after transfer.

Field inspections in the two schemes (Nachchaduwa and Hakwatuna Oya) in Sri Lanka where IMT programmes had been implemented showed that only 5 percent of all structures in both locations were dysfunctional. In both schemes more than 60 percent of the dysfunctional structures at the distributary level had been dysfunctional for less than one year. In one scheme 72 percent had been in that state for less than 2 years; in the other location this was 94 percent. There were no indications of significant long-term deferral of maintenance by farmer's organisations in Hakwatuna Oya. However, in Nachchaduwa, 5 of the 18 dysfunctional structures (28%) had been dysfunctional for 3 to 4 years. Farmer perceptions of the quality of maintenance are more negative in Nachchaduwa than in Hakwatuna Oya. In Nachchaduwa nearly 60 percent of all farmers interviewed felt that the functional condition of the canal system was worse after management transfer. This implies extensive farmer

dissatisfaction with the rehabilitation, which was done without farmer participation.<sup>9</sup> In Hakwatuna Oya farmers were more evenly split in their views about whether the functional condition of canal infrastructure was better or worse after management transfer.

In the two Indian sites the physical condition of the transferred canals was better than that of the non-transferred canals. The non-transferred canals were found to have more defects than the transferred canals. This is attributed to the fact that the maintenance needs are identified by the farmers who use the canals daily, and also because WUAs handle only one canal they are able to put in more management attention (Brewer et al. 1999b).

In the West Gandak scheme in Nepal, field inspections revealed that the transferred minors were better maintained than the non-transferred canals. Similarly the condition of structures and pumps in the transferred tube wells systems were better than the non-transferred systems.

Evidence from the Indonesian sites indicates that after turnover farmers have not begun to invest in the long-term maintenance of the irrigation systems. The conventional pattern of farmers deferring some maintenance costs until the government might return with external assistance for rehabilitation has apparently not been overcome by turnover. Water user association leaders interviewed in all four systems reported to researchers that they expected that the government would return within 5 years time to finance another rehabilitation of their system.

In Mexico, one of the most positive impacts of the IMT programme in ARLID has been the considerable improvement in maintenance services, especially at lower system levels. This is attributed to a better match between actual expenditures and farmers' perceived needs, especially in the field of maintenance since the implementation of IMT (Kloezen et al. 1997). The results from the Colombian case studies show that, with some exceptions, the transferred schemes' maintenance standards are satisfactory and the schemes appear to be physically sustainable.

### **3.3      *Agricultural productivity***

The relationship between IMT and agricultural productivity levels is less direct than the other performance measures considered earlier. But the ultimate test of any intervention in the irrigation sector is that it should lead to improvements in agricultural production. It can be argued that, with the implementation of IMT, the shift of primary responsibility for water distribution to WUAs leads to improvements in the quality of the irrigation service, and results in improved cropping intensities, while encouraging farmers to use more inputs due to greater confidence in the irrigation service, which in turn would lead to higher yields.

#### **3.3.1    *Crop yields***

In Sri Lanka, the trend in paddy yields in 50 schemes over a 10-year period 1985-95: 5 years before and 5 years after were analysed using a regression equation with paddy yield per hectare as the dependent variable. The analysis was done separately for rehabilitated and un-rehabilitated schemes, with and without IMT.

The results indicate that, in the pre-IMT period, paddy yields in the rehabilitated schemes, irrespective of whether they have been transferred or not, showed a declining trend. In the post-IMT period, there is a statistically significant upward shift in paddy yields in the group showing the effects of both rehabilitation and management transfer. There were no significant changes in trend in the schemes that had been rehabilitated but not transferred, or those that had been transferred but not rehabilitated. In the post-IMT period, paddy yields in the group without either form of intervention show a statistically significant declining trend when compared to the pre-IMT period. The conclusion that emerges from the analysis is that there has been a significant improvement in yield in the schemes that have undergone both management transfer and rehabilitation. Paddy yields in schemes with only one type of intervention, and those with neither of the two forms of intervention show a significant declining trend.

---

<sup>9</sup> Construction activities under the rehabilitation programme were carried out by private contractors. Farmers claimed that the contractors were inadequately supervised by agency personnel.



Evidence from the Indian case study relating to improvements in agricultural productivity is mixed. Results show that farmers in the transferred minor canal (Minor 7) in the Mula scheme had realised improved crop yields. They had also increased the irrigated area and also shifted to higher value crops (sugar cane). Whereas in the non-transferred minor canal (Minor 6) there has been a decrease in the irrigated area and no significant changes in yields or cropping pattern. In the Bhima scheme, there was no significant difference in crop yields between the transferred and non-transferred minors.

The evidence from the Nepali study sites is also mixed. Yields of wheat and paddy in the transferred Palhi minor have been increasing over the last 3 years and sugarcane is not grown at all. There are no significant differences in aggregate yields of major crops in transferred and non-transferred minors. In the Indonesian schemes too there was no difference in the trend in paddy yield between transferred and non-transferred schemes.

In Mexico, yields of major winter crops (wheat and barley) had been increasing before IMT and that continued in the post-transfer period. The increasing trend was attributed not merely to IMT *per se* but to a combination of other macro-economic policy reforms, especially the price policies that were introduced in the 1980s. In Colombian study sites there were no appreciable change in yields of major crops following transfer.

### 3.3.2 *Cropping intensities*<sup>10</sup>

Regression analysis of the trends in cropping intensities in the 4 groups of irrigation schemes in Sri Lanka indicates that there are no significant differences in the trends in cropping intensities in any of the four groups of schemes in the periods before and after transfer.

In the Indian schemes cropping intensity in the transferred minor canal in the Mula command had shown an increase whereas it had declined in the non-transferred minor canal. In the second location (Bhima) there were no changes in the cropping patterns in either the transferred or non-transferred minors.

Field studies conducted in two schemes (Cinangka II and Cipanumbangan) in Indonesia showed that there was no significant difference in cropping intensity before and after IMT (Vermillion et al, 2000). Similarly in West Gandak in Nepal, which had been brought under joint farmer-agency management in the 1990s, cropping intensity had been static from 1992–1996 the period for which data are available (Samad et al. 1999).

In Colombia only one scheme (RUT) had significant improvement in cropping intensity at the time of transfer and afterwards. The cropping intensity rose from 110 percent to 160–170 percent after transfer. In the other schemes there was a slight downward trend in the post-transfer period.

## 4. Conclusions

For the last two decades IMT has been a major policy in most Asian countries. Although there is a vast literature on the subject, no clear paradigm has yet emerged about the impacts of the efforts made to date. This paper is an attempt to obtain insight into the impacts of IMT on the performance of irrigation schemes.

The analysis suggests that there is not enough unequivocal evidence regarding the extent of change. The main change has been a gradual decline in government financing of O&M of irrigation systems. In some cases (e.g., Sri Lanka), there was a decline in the trend in government's recurrent expenditure on irrigation before IMT and the same trend continued after transfer. There are also indications that, at present, WUAs are making only a modest contribution towards maintenance. This raises concerns about the long-term sustainability of the irrigation systems in the absence of adequate investments to ensure that the systems remain functional.

<sup>10</sup>Cropping intensity here is defined as the ratio of the actual area cultivated under irrigation and the irrigable area that was considered to be the design area.

There is no discernible evidence of the impacts of IMT on system operations and agriculture production. Evidence relating to agricultural productivity is mixed. The Sri Lankan study suggests that significant effects on agricultural productivity levels can be observed only where both management transfer and rehabilitation occur. But a paucity of data limits our ability to make a compelling analysis and generalise about IMT impacts. In Mexico and Colombia, management transfer prompted a number of managerial changes aimed at improving management efficiency and staff accountability in the districts. Transfer resulted in a significant shift in the burden of cost from the government to farmers, which has generally been accepted by farmers. But transfer has not had substantial impacts on the performance of operations and maintenance, or on the agricultural and economic productivity of irrigated land or water – neither improving negative performance nor causing detriment where performance is positive.

The evidence from Mexico and Colombia suggests that it may be relatively easier for governments in richer countries with a more prosperous agricultural sector to implement IMT programmes. Farmers in these countries are able to bear the additional costs of financing irrigation services and are able to put in place institutional arrangements that are more effective than government management systems. Turkey is another recent example of this category of countries.

There is a clear need for comprehensive and long-term monitoring of the impacts within the framework of IMT, requiring collaborative effort involving the direct stakeholders, governments, international financing institutions, and local and international research organisations. More systematic research methods need to be applied with enough commonality to permit conclusions about impacts and to specify policy and institutional conditions under which IMT programmes could be expected to succeed or not.

There are signs that IMT has lost the momentum of the early 1980s. One of the primary reasons, as identified by Easter (2001) in a recent article, is the high transaction cost of implementing an IMT programme on an extensive scale. The more recent success stories are those, which were financially supported by international donor agencies. Where external support is absent the progress of implementing IMT has slowed.

This should not discount IMT as an appropriate institutional intervention for improving the performance of irrigation schemes. At the same time one should not be evangelical about the merits of reform, but rather find ways to implement IMT programmes in a more cost-effective way. Research is also required to develop appropriate institutional arrangements which are compatible with socio-economic contexts, foster inter-sectoral linkages, safeguard the interests of disadvantaged groups and provide effective accountability and incentives for management.

## Bibliography

- Brewer, J.; S. Kolavalli; A. H. Kalro; G. Naik; S. Ramnarayan; K. V. Raju; and R. Sakthivadivel. 1999a.** Irrigation management transfer in India: Policies, processes and performance. *Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.*
- Brewer, J.; M. Samad; R. Sakthivadivel; G. Naik; and A.H. Kalro. 1999b.** Maharashtra IMT Impact Assessment Study. *Unpublished Project Report. International Irrigation Management Institute, Colombo, Sri Lanka.*
- Easter, W. K. 2001.** Asia's irrigation management in transition. *Review of Agricultural Economics*, v. 22, no. 2.
- Frederiksen, H. D.; and R. J. Vissia. 1998.** Considerations in formulating the transfer of services in the water sector. *International Water Management Institute, Colombo, Sri Lanka.*
- IIMI (International Irrigation Management Institute); and (HKARTI) Hector Kobbekaduwa Agrarian Research and Training Institute. 1997.** Monitoring and evaluation of the participatory irrigation management policy. *Final Report to Ministry of Irrigation, Power and Energy, Sri Lanka, and Asian Development Bank, Contract TA1705 SRI. International Irrigation Management Institute, Colombo, Sri Lanka.*

- Jairath, J. 1999.** Participatory irrigation management in Andhra Pradesh: Contradictions of supply side approach. *Unpublished document circulated at the International Researchers' Conference on Participatory Irrigation Management, 11-14 December, Hyderabad, Andhra Pradesh, India.*
- Johnson III, S. H.; 1997.** Irrigation management transfer in Mexico: A strategy to achieve irrigation district sustainability. *Research Report 16. International Water Management Institute, Colombo, Sri Lanka.*
- Kloezen, W. H.; C. Garcés-Restrepo; and S. H. Johnson III. 1997.** Impact assessment of irrigation management transfer in the Alto Rio Lerma Irrigation District, Mexico. *Research Report 16, International Irrigation Management Institute, Colombo, Sri Lanka.*
- Raju, K. V.; Ruth Meinzen-Dick; and Ashok Gulati. 2000.** Policy trends in participatory irrigation management in India. *In: Participatory Irrigation Management Paradigm for the 21<sup>st</sup> Century (Vol.1), eds. L. K. Joshi and Rakesh Hooja. Rawat Publications, New Delhi.*
- Raymond, P.J. 2000a.** Management of irrigation systems by farmers in Andhra Pradesh. *In: Participatory Irrigation Management Paradigm for the 21<sup>st</sup> Century (Vol. 2), eds. L. K. Joshi and Rakesh Hooja. Rawat Publications, New Delhi.*
- Raymond, P.J. 2000b.** Salient features of Andhra Pradesh Farmers' Management of Irrigation Systems Act 1997. *In: Participatory Irrigation Management Paradigm for the 21<sup>st</sup> Century (Vol. 2), eds. L. K. Joshi and Rakesh Hooja. Rawat Publications, New Delhi.*
- Samad, M.; and Douglas L. Vermillion. 1999.** Assessment of the impact of participatory irrigation management in Sri Lanka: Partial reforms, partial benefits. *Research Report 34. International Water Management Institute, Colombo, Sri Lanka.*
- Samad, M.; K. C. Prasad; A. Tuladhar; D. Paul; and R. L. Shilpakar. 1999.** Impact assessment of irrigation management transfer in selected irrigation systems of Nepal. *Final Report, Research and Technology Development Branch, Irrigation Management Division, Department of Irrigation, His Majesty's Government of Nepal, and International Water Management Institute.*
- Vermillion, D. L.; M. Samad; S. Pusposutardjo; S. S. Arif; and S. Rochdyanto, 2000.** An assessment of the small-scale irrigation management turnover programme in Indonesia. *Research Report 38. International Water Management Institute, Colombo, Sri Lanka.*
- Vermillion, D. L.; and C. Garcés-Restrepo. 1998.** Impacts of Colombia's current irrigation management transfer programme. *Research Report 25. International Water Management Institute, Colombo, Sri Lanka.*
- Vermillion, D.L. 1997.** Impacts of irrigation management transfer: A review of evidence. *Research Report 11. International Irrigation Management Institute, Colombo, Sri Lanka.*