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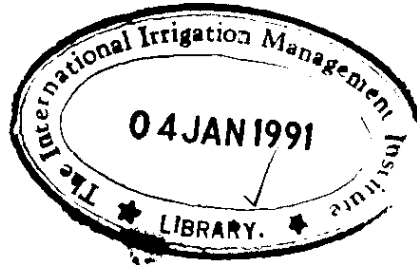
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**Design Issues in
Farmer-Managed Irrigation Systems**

Design Issues in Farmer-Managed Irrigation Systems

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Farmer-Managed Irrigation Systems in the Tras-Os-Montes Region of Portugal

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IN PORTUGAL, THE national agricultural irrigation policy has almost exclusively been concerned with new, large-scale schemes, usually biased towards big landowners. Until the mid-70s schemes were essentially concentrated in the south, where often there was no tradition of irrigation. Hydraulics engineering-oriented state agencies aimed at the irrigation of vast areas,^{††} and the respective systems were to be loosely managed by state-imposed water users' associations. These were led by government technicians and big landowners. The schemes frequently did not work as planned: potential and actual irrigated area did not coincide, crops planned to be irrigated were substituted for others demanding more water and not mitigating seasonal employment, on-farm investments were not made, water fees were not paid, and tenancy and sharecropping arrangements increased.

The efforts of the Tras-os-Montes Rural Development Project (TRDP) to rehabilitate farmer-managed irrigation systems obviously diverged from that policy, and it has surely been a pioneering case at the national level. This paper is a short overview of the contribution of the TRDP for supporting farmer-managed irrigation systems. It draws on the work of the evaluation unit of the project.

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^{††} A 1938 plan set 106,000 ha as the area to be irrigated. The target of the 1961 Alentejo Irrigation Plan amounted to 173,000 ha of which 161,700 ha would comprise big schemes. The remainder was divided among 73 smaller systems. For more on the Portuguese irrigation policy until the mid-70s, see Baptista 1984:95-285.

FARMER-MANAGED IRRIGATION IN THE TRAS-OS-MONTES REGION OF PORTUGAL

A 1979/80 water resources inventory carried out by the Regional Directorate of the Ministry of Agriculture (RDMA) for the Tras-os-Montes Rural Development Project revealed that a large number of streams exist all over the area: excluding the hot climate central area, 1,038 farmer-managed irrigation systems were surveyed, serving an estimated area of 40,800 hectares (ha). The schemes are small (the irrigated area per scheme varies between 3 and 82 ha), being concentrated in the mountainous areas and the high valleys. In summer they show very reduced discharges or even no discharge at all. In some cases the schedule of water distribution in summer is documented. The allocation of night irrigation for permanent natural pastures appears to be a common trait, vegetables being watered during the day. A traditional farming practice is winter irrigation (Goncalves 1985).

THE TRAS-OS-MONTES RURAL DEVELOPMENT PROJECT: ASSISTANCE TO FARMER-MANAGED SYSTEMS

Concept and Guidelines for the Project

It was estimated that the farmer-managed irrigation systems in the region would irrigate nearly 12,500 ha, the costs of improvement being nearly US\$187/ha. Rehabilitation would consist of reconstruction or repair of diversion weirs, lining earth canals with cement, and structures and offtakes equipped with steel slide gates. Ultimately, water losses during storage and transport would be reduced.

The designers accepted that direct water users' participation in the implementation of the rehabilitation works was important. The explicit rationale was twofold: reduction of implementation costs and local finance for subsequent operation and maintenance. Knowledgeable technicians, however, argued that rehabilitation of regional farmer-managed irrigation systems would not be viable without irrigators' direct contributions. Moreover, this action would help lower eventual conflicts among water users and increase the extensionists' reputation and power to advise on water-management issues and production techniques.

The Regional Directorate of the Ministry of Agriculture is responsible for the selection and design of rehabilitation projects and supervision of their implementation but any specific farmer-managed irrigation system can be rehabilitated only if two-thirds or more of the water users are willing to do so and subscribe to the respective protocol. An irrigators' council should call together and organize a task force and act as a link between the Regional Directorate and the water users. The works should take place at off-peaks without disrupting winter and summer irrigation. The irrigators' council should also look after subsequent operation and maintenance.

It was also established that water rights existing at the beginning of the rehabilitation would not be questioned. Another basic rule states that rehabilitation work should not alter the configuration of the scheme. Thus, only minor, approved changes of direction of the canals are possible and the number of traditional offgates, even if apparently excessive, should be unchanged. Similarly, if the irrigation system is a multipurpose one, due regard should be paid to other functions besides irrigation. For example, the operation of water mills, water reservoirs for animals, or washing tanks should not be disrupted.

The total costs of skilled labor, construction materials, and transportation used in rehabilitation are completely met by public funds. The irrigators' share which should represent a minimum of 20 percent of rehabilitation costs (CCRN 1982) consists of supply of unskilled labor and storage, and transport of materials from the village to the sites along the canals. Producers are responsible for earth canals, drains, and land leveling on their own plots.

The selection of systems for the project was based mostly on technical factors (access paths, length of the main canal, size of weirs, water flows, irrigated area, soils, and size of village population) which were biased towards quick implementation. Factors such as farmers' expressed wishes for rehabilitation schemes or water-management conflicts or even local integration of rehabilitated systems with other project inputs were not considered.

The gap between planned and real targets increased from 1983 until 1987. In December 1987, 61 schemes were rehabilitated, 69 units being the deviation. Six months after the planned completion date, that is, in December 1988, the final target (150 units) had not been reached. At this time, the practically rehabilitated irrigation systems totalled 114. Between March 1983 and December 1986, on average, nine months were spent in rehabilitating a scheme. In brief, implementation has been relatively slow, especially the take-off.

The pace of implementation and final success of the rehabilitation of farmer-managed irrigation systems depend on attitudes and behavior of numerous internal and external agents, and multiple local and institutional factors. Rocky ground, steep slopes, and limited space, as well as low temperatures and frosts make rehabilitation work difficult. Labor contributions are hard to get from an ageing and scarce village population or may represent a burden for those who have to guarantee the share of emigrated relatives, particularly when there are no wage workers around. To pool labor among part-time farmers and tenants related to absent landowners may also be hard. Other factors such as the cooperation to facilitate transportation, the ability of local leaders to obtain the active support and coordination of the water users, and local sociopolitical relationships within the community may serve to either help or hinder progress.

The Regional Directorate has reported the lack of timely funds, equipment, and skilled staff as institutional bottlenecks. Other probable ones are obviously the organization and administration of the implementing agency itself.

Positive Effects and Limitations of the Project

In general, water users vividly agree that the Tras-os-Montes Rural Development Project's intervention to rehabilitate farmer-managed irrigation systems produced multiple, definitely appreciated benefits at both the farm unit level and the village level. At the farm level summer-

water scarcity has been visibly reduced, and this has allowed more flexible water-management practices, increased independence from bigger water users (with whom water would be exchanged for labor or 'favors'), reduced expenses concerning complementary lift irrigation, and lessened physical effort and hardship, particularly with night irrigation. In fact, the time needed to divert water and the labor required for maintenance of reservoirs and canals was greatly reduced. In some cases, a few unirrigated plots became watered or permanent natural pastures could be irrigated at an unscheduled time. In an exceptional case, the number of village water users increased. Last, but not least, two specific studies indicate that increased yields and profits can be expected in rehabilitated schemes.

At the village level also the rehabilitation fostered positive effects. In several cases it required the opening or improvement of local paths or roads, complementary drainage, and construction of physical structures such as washing tanks and reservoirs. For a limited number of villagers the rehabilitation works offered an off-farm remuneration, albeit temporarily. It seems very plausible that the rehabilitation projects also contributed both to the lowering of social conflicts related to water management and to the positive reputation of the Regional Directorate.

Of course, there are also several points to be considered, of which the following need to be stressed: water users' direct participation in planning of rehabilitation of farmer-managed systems, data collection, capacity for water collection and storage, and formation of dynamic groups of irrigators. The Tras-os-Montes project staff did not pay sufficient attention to the first point. As a consequence, some interventions happened just because the people did not want to lose the opportunity for financial assistance, but they did have more urgent "felt needs." Out of 53 rehabilitated irrigation systems 8 have reduced canals and this disrupted the winter irrigation, reducing the yields of permanent natural pastures. In some cases the plots changed to cereal production.

Farmers' viewpoints were not considered. In these cases rehabilitation has meant retrogression instead of progress. Data collection about the systems also did not receive much care. For example, there are no "hard" data on the reduction of water losses through rehabilitation. The achieved reductions certainly represent a step forward as to the *status quo ante*, but are apparently insufficient for a more intensive cropping and steady output. To reach this aim the capacity for water collection and storage would have to be increased. Finally, rehabilitation of the farmer-managed systems could have been perceived as a good opportunity to empower groups of water users, regardless of their informality.

In conclusion, the State experience with assistance for rehabilitation of farmer-managed irrigation systems in the Tras-os-Montes region produced generally positive results. Next, the recommendations resulting from the evaluation need to be considered and adapted in order to facilitate greater success and increase the number of small-scale systems that can be included in the project.

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