Irrigation has been vital to agricultural gains in the last half century. But demand for food continues to rise as the world’s population increases and economic progress allows more people to eat better. Demand for irrigation grows apace with the demand for food.

But in recent years the pace of irrigation development has slowed—expansion of irrigated fields has not kept up with population growth. Governments have been investing less in irrigation infrastructure, and less water is available, as competing demands from cities and industry reduce the water supply. To avoid a severe gap between supply and demand, advanced irrigation techniques and technology must replace inefficient water management practices. With guidance and support from the World Bank, public-private partnerships (PPPs) could improve the way water is used.

Expansion and new challenges

In the last 40 years, as nutrition has improved, demand for food in developing countries rose some 300 percent—much faster than the population. Food production in the developing world has almost kept pace, rising some 250 percent during the same period. But new challenges related to irrigation and drainage (I&D) have stalled the great strides made over this period, when developing countries as a whole more than doubled their irrigated areas. Among the key issues are these:

- Governments have led the expansion of large-scale irrigation, but their management performance has been suboptimal. Supply-led approaches and large-scale irrigation infrastructure that were to fuel growth have resulted in bureaucratic institutions and inflexible water-delivery systems incapable of responding to farmers’ needs.
- The water needed for irrigation is in increasingly short supply. Rising demand for agricultural water competes with increased domestic and industrial consumption. For years, groundwater provided a profitable new resource, but in many basins groundwater is depleted.
- The productivity of water use must be improved. Despite gains in the last half-century, water productivity remains startlingly low in many areas. Drip irrigation technology, which optimizes water application to crops, has been adopted on less than 1 percent of irrigated lands worldwide. Productivity improvements in large-scale irrigation will require major programs of modernization—a combination of institutional change and investment in system improvement.
- In sum, new I&D investments and higher productivity from existing assets are needed to meet rising demand, improve food security, and reduce poverty. Yet investment has been declining and productivity is rising only slowly.

One solution that has been tested over the last two decades has been participatory irrigation

management (PIM), whereby water user associations (WUAs) are drawn into in the financing and management of irrigation schemes, as responsibility for operation and maintenance (O&M) is transferred to farmers and their organizations. PIM has made impressive strides, but efficiency has risen only marginally, and in many schemes O&M has proved to be beyond farmers’ capacity—for example, the management of headworks and major distribution systems. In addition, major I&D investments are often simply beyond the financial capacity of farmers.

In light of these challenges, the idea of involving private sector investors and managers in large, publicly managed I&D schemes has been raised as a way of relieving both government and farmers’ groups of management burdens while improving the efficiency of key functions in the process of tapping, storing, and delivering water for agricultural use.

**Opportunities for public-private partnerships**

A public-private partnership arrangement is, by definition, a contract between a public client and a private service provider. PPP has been practiced with some success for two decades in water supply and sanitation (WSS), a sector that bears important similarities to I&D.

The PPP contracts used in WSS fall into two major categories, depending on whether payment for the service is tied to operational results. If the private firm’s fee is not so tied, the contract is termed a public contract, which may be partial (a service contract for the provision of a specific service) or comprehensive (a management contract). If the private firm is paid according to operational results, the PPP contract is termed a public service delegation (PSD). Under this heading come the arrangements known as lease, affermage, concession, build-operate-transfer (BOT), and divestiture (or privatization). In all cases, the service provider normally collects fees from the end user, not from the government.

The crux of the distinction is how risks are allocated between the public client and private operator. In a public contract, the private operator is paid regardless of whether service fees are collected, leaving most of the risk with the public sector. In a PSD, the private operator assumes the risks of collecting service fees from water users.

WSS experience has shown that the private sector can usefully participate in several of the functions found in all I&D systems (table 1). Under some circumstances, private firms have been able to help mobilize financing and implement investment programs, whereas governance functions, such as oversight, monitoring and regulation, typically remain with government. It is in operations, maintenance, and management (OMM) where the private sector could shine, significantly raising the quality and efficiency of services in many WSS projects around the world, although at the cost of higher water tariffs.

Overall, the WSS experience shows that PPP may not relieve government’s investment burden much but does help in establishing the principle of financial autonomy and raising professional standards through improved management.

In I&D, PPP is a more recent business. PPP arrangements in the sector suggest that investment and OMM are the key functions for possible private sector involvement, with nine out of ten cases studied in the report having an OMM component. PSD is favored over public contracts in four out of five cases because of their longer term, comprehensive coverage, and transparent treatment of risks. However, the levels of risk—country risks, commercial risks, and water-specific risks—are higher in I&D than in WSS, which has constrained develop-
ment. As in WSS, PPPs in I&D have resulted in improved but more expensive water service, as efficiency gains have not compensated fully for reductions in government subsidies.

Because the private sector excels at many of the functions required in I&D, a PPP arrangement may be optimal in providing timely and higher quality water service that is responsive to farmers’ needs. However, the same benefits may be gained from other third-party providers, such as a reformed and financially autonomous government agency, a nongovernmental organization specialized in irrigation management, or a corporatized WUA. The right solution will depend on national and local circumstances.

**Recommendations**

If farmers are to be able to meet the food needs of growing populations under conditions of increasing water scarcity, I&D services will have to become more efficient and reliable, as well less reliant on undependable government financing. Here are three recommendations on how to enlist private firms in reaching those goals.

**Improve efficiency through PPPs**

I&D systems require high standards of management and professional skills. In some cases, and for some functions, the needed management capacity and level of skills may best be provided by private sector service providers, and PPP arrangements may be the best way of improving standards. The scope for involvement of a third-party service provider varies by function, as discussed above. The private partner can boost efficiency in design, contracting, and management, helping to ensure financial sustainability through cost control and cost efficiency. It is in OMM that third-party service providers can have the greatest impact in improving performance, raising standards across all functions.

**Reduce risks to attract third-party providers**

Excessive risk makes PPP arrangements unattractive and ultimately unworkable. Some risks can be mitigated by contractual provisions, but others are inherent in PPP and require guarantees of different kinds to attract private investors. The principal risks involved are the following:

- **Commercial risks.** Private providers run high risks of not being able to recover user fees from farmers. Among the recommended protections against commercial risks are tariff indexation and resets, a grace or transition period at the start of the contract, government risk guarantees, and financial third-party partial risk guarantees.

- **Country risks.** The political and social sensitivity of water, food, and agricultural production is an important risk factor. Devaluation and export market risk are also important. Mitigation tools include government risk guarantees, involvement of international financial institutions, matching currencies, and third-party partial risk guarantees.

- **Water-specific risks.** Where water is scarce or the climate variable, and where agricultural water competes with other uses, water risks are high. Recommended protections are tariff indexation and resets, government risk guarantees, and termination payments.

**Enlist the World Bank in expanding PPPs**

The Bank should provide sustained support to reforms in which private firms or other qualified third organizations are enlisted to help increase the efficiency and performance of water service, with realistic investment and service targets and a fair allocation of risks and responsibilities between parties.

The Bank should play the role of an honest broker, supporting the elaboration of the partnership between the government and third-party professionals. Technical assistance should be provided as needed to help governments select from among private participation options. The Bank should also support initiatives to promote the development of small-scale providers and WUAs.

Because achieving the conditions for sustained progress often takes years, long-term Bank involve-
ment will be needed in policy dialogue, technical assistance, and capacity building for governments, WUAs, and private operators.

The World Bank Group, through the International Finance Corporation, could also provide financing for projects involving PPP. Through the Multilateral Investment Guarantee Agency, the Bank Group could underwrite partial guarantees to improve the terms on which finance is accessed on capital markets.