

be outweighed by their adverse effect on yields. (The economic returns to clean fallow systems is high on the research priorities of the new International Center for Agricultural Research on Dry Areas (ICARDA) to be located near Aleppo.)

Potential for Developing Irrigated Agriculture

8.19 Syria's basically Mediterranean climate with its long dry season rewards the development of water resources for irrigation. Until recently, the highest priority had been given to the implementation of projects connected with the Euphrates Basin. Such projects still receive the bulk of the resources committed to agricultural development, but planners are also considering raising the priority of other types of small-scale high-payoff projects aimed at rehabilitating low-lift pump schemes and exploiting groundwater potential.

8.20 An example of the change in emphasis is the Akkar Plains proposal being studied by the government in 1977. Comprising some 20,000 hectares of arable land, the Plain is ultimately targeted for surface water development. In the meantime, however, a program is being contemplated that would provide for additional groundwater development in the area. Doubling and tripling of yields is not unusual for warm season crops grown under irrigation. Drilling additional wells would minimize the costs of the distribution system and the lengthy delays that inevitably accompany major construction works. They also provide the kind of precise water control that is crucial to the successful production of fresh vegetables.

8.21 The Akkar Plain needs water. However, it also needs drainage, especially at the micro level. In many areas, surface water tends to collect in low-lying areas and, because of the relative impermeability of the black clay soils, it damages crops before it evaporates. "Bedding", the creation of raised beds on which plants are grown, has been found to be an effective antidote to this condition in other parts of the world and needs to be investigated in Syria. Fertilizer trials are also badly needed in the area. While black soils have a high latent fertility if properly managed, intensive vegetable production is demanding of soil nutrients. Currently, there is relatively little information available on optimum fertilizer use under sustained multiple cropping. Lastly, there is an immediate need for more and better windbreaks to counteract the strong winds that are characteristic of the coastal area.

8.22 Reconsideration of immediate priorities for investment in irrigation is quite properly being extended to activities in the Euphrates Basin. Currently, 20,000 hectares in the Basin are under cultivation in a series of pilot state farms. An additional 60,000 hectares are in various stages of construction and initial reclamation (see Chapter 7).

8.23 The difficulties that have been encountered in bringing the land into production are not unexpected and range all the way from the management of the individual production units to engineering problems arising from the high gypsum content of the soil. (It has been hard to keep channels and canals in working order when leakages dissolve the base on which the distribution system has been constructed.) There is also some question about the wisdom of the basin type of irrigation system that is currently in use. It does have the virtue of being relatively simple to operate but has the serious disadvantage of creating a series of ridges or bunds that are extremely hard on machinery and produce a high degree of variation in water application. Both foreign and local agricultural experts have recommended that additional resources be spent on the kind of micro-levelling that would make it possible to dispense with the basin system. Given the improvements in irrigation efficiency that would result, as well as the improved performance of the implements and equipment assigned to the project, this suggestion is well worth detailed investigation.

8.24 The relatively low productivity of the pilot projects is as much a function of the scarcity of skilled planners, farm managers, and equipment operators as anything else. This suggests that serious consideration should be given to emphasizing activities that improve the capacity of the projects already constructed rather than attempting to accelerate further large-scale capital investments. There is no doubt about the desirability of eventually irrigating at least a goodly proportion of the 600,000 arable hectares that lie within the Basin. However, there is much to be learned about the most appropriate approach to farming systems in the current project area. Developing a firmer foundation of knowledge concerning optimal long-run cropping patterns as well as on the best approaches to the more immediate problems of reclamation would appear to have a high payoff. A similar argument could be made concerning the provision of additional training activities that might be associated with the areas already under cultivation.

8.25 One of the most interesting developments in the area of irrigated agriculture relates to groundwater exploitation in the Aleppo Plain. Wells are being sunk in substantial numbers and roadside observations indicate that some farmers are introducing sprinklers. These are used primarily for summer vegetables, vines and melons, although in bad years wheat and lentils are irrigated during the maturation period. The overall potential for a rapid expansion of this form of development is currently being hampered by a lack of knowledge concerning the recharge capacity of the local aquifers. Estimates of the groundwater situation range from "abundant" to "relatively limited", but judging from the rate at which wells are now being sunk, additional study of the area's water balances should have a high priority.

Potential for Range Management and Livestock Production

8.26 Improving the productivity in the arid grazing areas presents a conundrum characteristic of all unregulated pastoral regions. Significant deterioration of Syrian rangelands has occurred as a result of the encroachment of settled cultivation on the marginal areas with 200 millimeters mean annual rainfall, and the increasing population of people and animals on the remainder.

Experience with rangelands in other arid areas has shown that a deteriorated area has an amazing ability to recover when adequately managed. However, improvements have inevitably involved short-run reductions in use. This is particularly true when the rejuvenation program involves the seeding of atriplex and other nonindigenous drought-and-salt-tolerant plants. The establishment of these species requires that lands be withdrawn from use for a period of from two to four years depending on land quality and local precipitation. Moreover, after the vegetation is established, controlled grazing must be practiced. It is therefore unrealistic to expect that the benefits of a more effective integration of livestock and sedentary agriculture in Syria will be realized without a comprehensive range management plan and a substantial commitment of material, administrative, and political resources to implement it. Indeed, there is a real danger that responding to the perceived needs of the area's inhabitants--for example, by drilling wells so that the flocks do not have to trek so far to water--will only exacerbate the situation.

8.27 The same might be said of proposals to provide buffer storage of fodder against drought years. Such programs would indeed diminish the wasteful sacrifice of herds when, in a bad year, grazing is not available. However, if the reserve is not also accompanied by a management program that holds the total number of animals relatively constant, it may merely increase the rate of deterioration of an already overburdened ecology. On the other hand, reducing the fear of drought may also reduce the propensity of the Bedouins to build up herd size in anticipation of forced sales.

8.28 Rainfed cropping systems are dictated almost entirely by agroclimatic conditions. To some extent this is also true of livestock, the grazing activities on the steppe being a case in point. However, Syria has recently embarked on an ambitious program of expansion in production of milk, meat, eggs, and poultry. Because such facilities can be located with less concern about the agroclimatic conditions than crops, the issue of regional comparative advantage in agriculture becomes more crucial.

8.29 Until recently, it was assumed that substantial amounts of hay would be produced in the areas of northern Syria with more than 400 millimeters of rainfall. However, transportation costs from such areas appear to be prohibitive even if the technical difficulties of hay making are overcome. For example, the limited information available suggests that dairymen around Damascus are able to obtain fodder from nearby farmers at much less than they would pay if it were coming from, say, the Qamishliye area. This suggests that it may be necessary to develop livestock activities in the fodder producing area and ship high density products such as slaughtered meat, condensed milk, and butter to the major points of consumption.

8.30 Most livestock investments currently being planned are relatively intensive and rely on confined herds and flocks. However, increases in the output of certain types of livestock products could be brought about by an improvement in the integration of nomadic and sedentary agriculture. For example, if it were possible to reduce the grazing period and the density of