a million acres, roughly forty miles on a side. An area of these dimensions has a number of economic merits apart from hydrology. But also it has advantages from the standpoint of water management.

Hydrological considerations pertaining to project size include the following: (1) Project areas should be selected to fall within areas commanded by major canals. Two or three project areas may be developed in each canal area; (2) The project area should be large enough to warrant the maintenance of a permanent engineering staff consisting of irrigation, drainage, electrical and mechanical engineers. A properly staffed chemical analysis laboratory will be needed in regions where salinity and alkalinity control is important. A minimum staff of three or four senior engineers would be required to operate the complex of canals, drains, tubewells, observation wells, laboratories and electric power facilities as an efficient integrated system. A project area of one million acres is sufficiently large to support a senior staff of the size together with an adequate number of junoir engineers and technicians. Smaller project areas with a smaller number of senior engineers might not be coordinated properly and operational efficiency might be impaired; (3) The project area should be sufficiently large so that the tubewells will be effective in lowering the water table in a reasonable length of time. Small project areas have relatively a larger perimeter for lateral infiltration of ground water from unpumped lands than large areas. The effect of lateral infiltration in retarding the rate at which the water table can be lowered is exemplified in the experience with the Jaranwala test project, which began in 1958, in which 90,000 acres were to be pumped by 145 wells. The wells were operated during the first few years over only about half the area. The water level dropped only three feet in thirty-six months of continuous pumping. Earlier test installations of tubewells showed little or no effectiveness in lowering the water table. In the next section a mathematical treatment of the lateral infiltration problem is presented.

Lateral Infiltration of Ground Water into Project Areas from Unpumped Lands

The rate at which ground water will flow into a project area in which the water table has been lowered by tubewells will depend on the following factors: (1) the transmissibility and the coefficient of storage of the aquifer; and (2) the gradient of the water table normal to the perimeter of the project area. The gradient at various points around the perimeter will be a function of (i) the geometry of the project area in relation to the surrounding area; (ii) the presence or absence in the region of major sources of ground water recharge such as rivers; (iii) the magnitude of the rate of ground water recharge from canal and watercourse seepage and irrigation and rainfall over the project area and the region outside - generally the recharge rate will be larger inside the project area than outside because of back-seepage