abrupt than it was in the standard run: higher land yield LY causes more land erosion LER, and the exponentially growing exogenous factors (population POP, persistent pollution index PPOLX, and industrial output IO) all grow to higher levels during the extra 10 years, causing lower land fertility, increased air pollution, and increased land removal for urban-industrial use.

Run 4-9 (Figure 4-78) shows a simulation in which both the amount of potentially arable land total available PALT and the land yield multiplier from capital LYMC are reestimated in a pessimistic fashion. PALT is set to 2.4 billion hectares and LYMC is set to the pessimistic estimate shown in Figure 4-71. A lower land yield LY and less potentially arable land PAL prevent food production F from reaching as high a value as that obtained in the standard run. However, the peak level of food production exhibited in Run 4-9 seems to be more sustainable than in the standard run. Note that food production F stays at its peak value for about 25 years before declining. The more stable behavior of food in this run is in part due to the fact that lower land yields LY lead to less land erosion LER than in the standard run.

Sensitivity Runs—Other Parameter Values

The previous sensitivity tests have shown the results of changing the estimates of the two basic constraints in the agriculture sector—total potentially arable land PALT and maximum land yield LY. The following runs show the model's sensitivity to estimates of three other relationships for which there is a lack of precise supporting data. Figures 4-79, 4-80, and 4-81 show three possible estimates (standard, pessimistic, and optimistic) for the hypothesized relationship between development costs per hectare and the amount of potentially arable land left to develop (DCPH), between land erosion and land yields (LLMY), and between air pollution and land yields (LYMAP). These three relationships control the rate at which food production can be either increased or eroded.

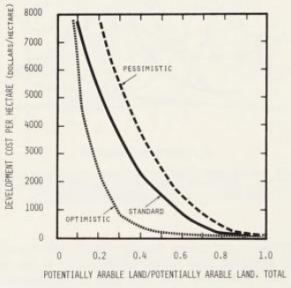

Figure 4-79 Standard, pessimistic, and optimistic estimates of the development costs per hectare table

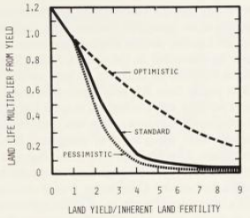

Figure 4-80 Standard, pessimistic, and optimistic estimates of the land life multiplier from yield table

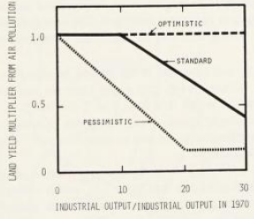

Figure 4-81 Standard, pessimistic, and optimistic estimates of the land yield multiplier from air pollution table