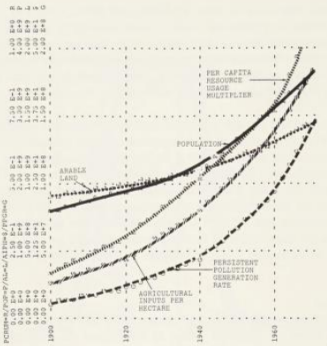

Figure 6-28 Inputs to Run 6-3, the historical run of the pollution sector

and the persistent pollution assimilation rate PPASR. This difference grows continuously as PPAPR rises, for even though PPASR is also increasing, it lags behind PPAPR by a constant 2.1 years (=1.4×AHL). This historical run was used to determine the value of PPOL70 that would make PPOLX equal 1.0 in 1970.

Although the index of persistent pollution PPOLX grows considerably during the 70-year period, we made the conservative assumption that historical levels of pollution have no significant adverse effects on any of the variables in the model. Run 6-3 shows that the assimilation half-life AHL remains constant at 1.5 years throughout the historical run, reflecting the assumption that 1970 levels of persistent pollution are not high enough to interfere with the pollution assimilation process. Run 6-3 also shows that the lifetime multiplier from pollution LMP remains constant at 1.0 during the 70-year period, indicating that the growing level of persistent pollutants has no deleterious effects on the life expectancy of the model population. The rate of degradation of land fertility LFDR increases slightly from 1900 to 1970, but the small 1970 value of 1 percent reduction in fertility per year is easily offset by land fertility regeneration through land maintenance in the model.

Behavior in Response to Continued Material Growth

Run 6-4 (Figure 6-31) shows the behavior of the persistent pollution sector when the material growth trends of the past 70 years are assumed to continue through the year 2100. Figure 6-30 illustrates the time-dependent behavior of the four exogenous

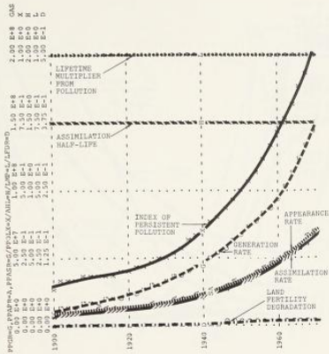

Figure 6-29 Run 6-3: historical run of the pollution sector

inputs assumed for this run. Both population POP and agricultural inputs per hectare AIPH are assumed to grow continuously at their historical rates of growth of 1.2 and 2.7 percent per year, respectively. Under this assumption, population exceeds 17 billion persons and agricultural inputs approach 1,500 dollars per hectare-year by the year 2100. Arable land is assumed to reach a maximum level of 2.7 billion hectares by the year 2060, almost twice the 1970 level. Per capita resource usage reaches its maximum value of 7 times the 1970 value by the year 2060 and then levels off, for it is assumed that, at levels of income above 1,400 dollars per person-year, increases in income will not be accompanied by any increase in per capita resource usage PCRUM. These four inputs generate the persistent pollution generation rate PPGR shown in Figure 6-31 which grows at an average rate of 3.2 percent per year over the 200-year period.

Run 6-4 (Figure 6-31) shows that the continued growth in pollution generation produces a "pollution crisis" within the 200-year time horizon of the model. As in Run 6-3 (Figure 6-29), the persistent pollution appearance rate PPAPR lags behind the growing persistent pollution generation rate by 20 years throughout the run, corresponding to the delay involved in the transfer of persistent pollutants to the biosphere. Before 1970 the index of persistent pollution PPOLX is relatively low in Run 6-4, and the pollution assimilation half-life AHL is constant. Thus PPOLX grows at the same rate as PPGR. After 1970, however, the accumulated persistent pollu-