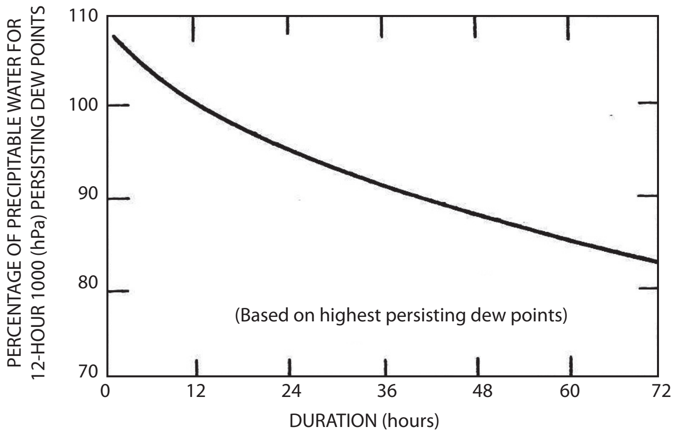

Figure 3.10. Decrease of maximum precipitable water with duration (after United States Weather Bureau, 1958)

3.3.4.2 Envelopes of *P*/*M* ratios

Finding suitable station precipitation data uninfluenced by orography is a problem. In the example study, the search was confined to the large flat valley between the coastal mountains to the west and the Sierra Nevada to the east, and to some coastal stations unaffected by nearby steep slopes. Except for a few short intense rainfalls, most data were observation day or highest 24 consecutive 1-hour amounts. Envelope curves of highest *P*/*M* ratios found in the restricted region are shown in Figure 3.13.

Adequate data on intense rainfalls for establishing a seasonal trend in *P*/*M* ratios would have been desirable, but there were not enough of these data in the problem area. However, many plots of maximum 24-hour precipitation at non-orographic stations indicated no definite seasonal trend for any magnitude. On the other hand, such trends did exist for 6- and 72-hour precipitation (Figure 3.14).

It was concluded that seasonal trends of moisture and *P*/*M* ratios for the 24-hour duration must counteract each other since there was no trend in 24-hour precipitation. On the basis of this concept, the greatest 24-hour *P*/*M* ratio was assigned to February, the month having the lowest maximum precipitable water; and ratios for other months were evaluated in proportion to their maximum precipitable water, as indicated by their maximum persisting 12-hour dewpoints.

The ratios of 6- to 24-hour and 72- to 24-hour precipitation (Figure 3.14) were used to establish *P*/*M* ratios for 6 and 72 hours. This was possible since 12-hour moisture, the denominator M in the ratios, was used for all durations. The durational variation of *P*/*M* ratios is thus the same as the durational variation in precipitation *P*. Monthly curves of durational variation of *P*/*M* ratios are shown in Figure 3.13.

3.3.4.3 Reduction of convergence PMP for elevation

In the example study (United States Weather Bureau, 1961*a*), PMP values computed as described in the first two paragraphs of section 3.3.4 were reduced for elevation. For gently rising slopes where storm precipitation was apparently little affected by upwind barriers, the decrease in convergence PMP was assumed to be proportional to the decrease of precipitable water *W* in a saturated column of air. This decrease was computed as the difference between *W* in a column with the base at the ground elevation, at a point 8 km upwind from the problem area, and that with the base at the ground elevation of the convergence PMP. The 8 km distance upwind marks the average location of the formation of the storm precipitation particles falling on the problem area.

In estimating PMP by methods other than the orographic separation method, the usual procedure is to base the decrease on the difference between observed storm amounts on slopes and in valleys. In one study (United States Weather Bureau, 1961*a*), the non-orographic, or convergence, PMP was reduced by 5 per cent for every 300 m increase in elevation.