conditions), and then provides a set of methods to convert them into the PMP in the design watershed for the purpose of PMF estimation in high-risk projects (usually reservoirs and nuclear power stations).

The approach based on watershed area (the direct approach) focuses on the direct estimation of PMP with a given duration according to the requirements of a specific project (usually the design of a reservoir) in the targeted watershed. The reason for introducing the specific project here is that different design scenarios could result in the selection of different design PMPs potentially resulting from different causative factors. For instance, if a large high-dam reservoir with powerful regulating and storing capacity is constructed at a site, the total flood volume will be the controlling factor for the project regarding flood control. Therefore, the duration of the design flood will be relatively long, and the storm may be created through the superposition and replacement of several storms. If a small low-dam reservoir with small regulating and storing capacity is constructed at the same site, peak flood discharge will be the controlling factor for the project regarding flood control. The required design flood duration may hence be shorter, and a storm may be created by a single storm weather system or by local violent convection.

1.4.2.2 Methods

There are six methods of PMP estimation currently used:

(a) The local method (local storm maximization or local model);
(b) The transposition method (storm transposition or transposition model);
(c) The combination method (temporal and spatial maximization of storm or storm combination or combination model);
(d) The inferential method (theoretical model or ratiocination model);
(e) The generalized method (generalized estimation);
(f) The statistical method (statistical estimation).

Most can be used in medium- or low-latitude areas, but when used in low-latitude areas (tropic zone), the method for deriving some parameters needs to be properly revised (see Chapter 6).

In addition, two other methods can be used for deriving PMP/PMF in extremely large watersheds. They are:

(a) The major temporal and spatial combination method;
(b) The storm simulation method based on historical floods (see Chapter 7).

The characteristics of and the application conditions for these eight methods are, briefly, as follows.

1.4.2.2.1 *Local method*

PMP is estimated according to the maximum storm of the observed data in the design watershed or specific location. This method is applicable where there are several years of observed data.

1.4.2.2.2 *Transposition method*

In this method an extraordinarily large storm in the adjacent area is transposed to the design area or the location to be studied. The work focuses on two aspects. The first is to ascertain the storm transposition probability, which can be done in three ways:

(a) By determining the meteorologically homogeneous zone, studying the possible transposition range of the storm and carrying out a detailed analysis of the design watershed conditions;
(b) By making a variety of adjustments for the transposed storm, based on the differences in geographic and topographic conditions between the original storm occurrence area and the design area. This method, which is widely applied, is used for design areas where high-efficiency storms are rare.

1.4.2.2.3 *Combination method*

This method reasonably combines two or more storms in a local area, based on principles of synoptic meteorology and experience of synoptic forecasting, in order to form a sequence of artificial storms with a long duration. The work focuses on selection of combinations, determination of combination schemes and reasonable demonstration of combination sequences. This method is applicable for deriving PMP/PMF in large watersheds with long durations, and requires strong meteorological knowledge.

1.4.2.2.4 *Inferential method*

The inferential method generalizes the 3-D spatial structure of a storm weather system in the design area to create a simplified physical storm equation for the main physical factor that influences the