SECTION 5

DATA ACQUISITION AND PROCESSING

By

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1. INTRODUCTION

The distributed and physically-based nature of the SHE requires, that in each application study, a vast amount of data and parameters describing the physical characteristics of the catchment are available. It should of course be emphasized, that different types of applications and different hydrological regimes being considered may call for various degrees of accuracy in the estimation of the individual basin parameters, and the evaluation of some parameter values may simply be based on experience. The data availability, however, will in any case determine the degree of reliability, which can be put into the simulation results.

In order to conduct a successful application study with the SHE, major emphasis should be devoted to the data collection/assembly and data processing phase. The data processing should also include a detailed evaluation of the hydrometeorological records and other data records assembled, and these should be corrected for errors and incompatibilities.

Lack of information on some basin parameters may require that a short term program of field measurements is carried out with the aim of improving the parameter data base and also to gain a first hand knowledge about the hydrological regime in the catchment to be studied. The necessary time for this activity should therefore also be evaluated.

In some cases many data collecting agencies are involved and should be visited. This may be very time consuming even with a efficient assistance from these organizations. It is therefore important that adequate time should be allocated for the data preparation process.

2. DATA REQUIREMENTS OF THE SHE

In the following a brief introduction to the required data is listed. These comprises of:

Catchment geometry:

- Topography (from toposheets on e.g. 1:50.000 scale)
- Soil depths (distance to impervious layer)
- River geometry (cross-sections, route of the river and information about structures)

Land use and soil parametric data:

- The spatial distribution of soil - and vegetation types (from e.g. 1:250.000 maps).

  For each vegetation type:
  - Temporal variation of either 1) root depth and leaf area index or 2) canopy drainage parameters, soil shading indices and canopy and aerodynamic resistances.

  For each soil type:
  - Soil moisture characteristic ψ - θ relationship
  - Hydraulic conductivity function K - θ relationship
  - Horizontal hydraulic conductivity

Surface parametric data:

These data are required for each grid square, and include:
- Strickler roughness coefficient for overland flow and river flow
- Cracking/Bypass coefficients
- Depth to drains and subsurface drainage coefficients.

Snowmelt Parametric data.

Input data:

- Rainfall and meteorological station network, and records of data obtained at these stations (possibly including potential evapotranspiration data).

- Streamflow data.

- Other relevant data which can be utilized in the model calibration and validation, e.g. water table, soil moisture data etc.

- Boundary and initial conditions.

As mentioned previous, some of these data may not be general available. For example, a complete information of the ψ - θ relationship is seldom available. However, experienced users of the SHE may from other application studies already have gained some knowledge about the possible form of this relationship, and utilize this in the evaluation of this curve.

3. DATA HANDLING PROCEDURES

The current trend in the SHE applications, where progressively larger amounts of data are being processed, has called for a powerful data handling package. The package attached to the SHE comprises of two parts:

1) A pre-processor package:

This package produces maps of spatially distributed data and enables an automatic setup of input data for the SHE at a desired grid square scale. Digitized data such as contour lines from toposheets are transformed to average elevation values compatible with the chosen grid square size. Also soil and land-use maps can

be digitized, and codes attached to each type can be allocated to each grid square.

The river system can automatically be estblished from digitized information at selected points in the river system, where also cross-sectional data are provided. The programme package will interpolate between the points given and produce data in all river links.

2) A post-processor package:

With this package, it is possible to retrieve, compile and present simulation inputs and outputs in a convenient form either as tables or as graphs. The graphics are based on the commercial UNIRAS colour graphics software.

A flow chart illustrating the file structure and the complete SHE programme package is shown in Fig. 1.

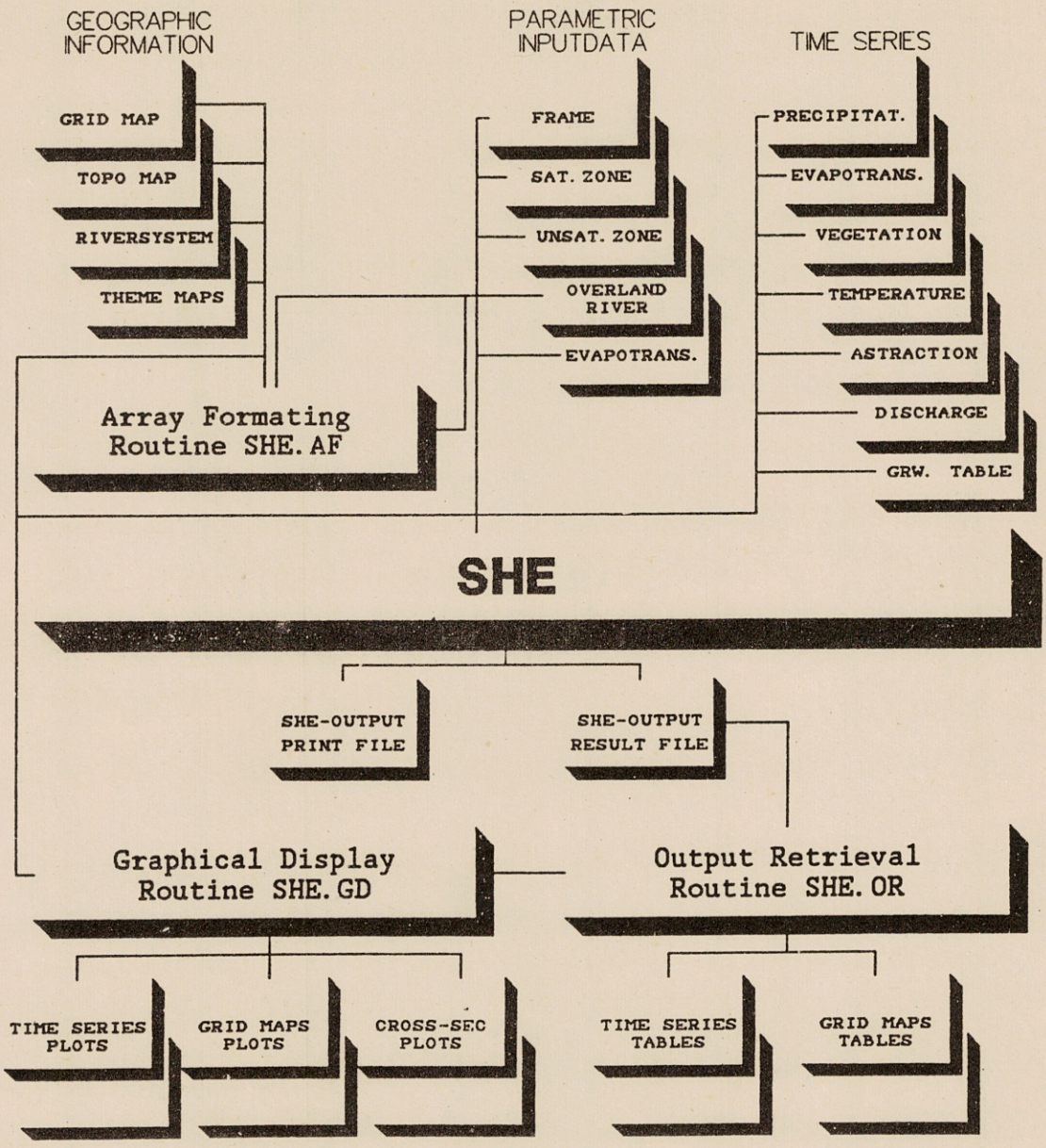

Fig. 1 Flow chart of the SHE Programme Package.