

# THE WATER BUDGET

The WATER BUDGET is the annual balance and change in the inputs and outputs of a hydrological system. It shows seasonal changes of PRECIPITATION, the input and EVAPOTRANSPIRATION, the output. The graph is usually produced for a given climate type, but it is clear that local factors may cause some changes to this general pattern.

The Budget / Balance can also be shown in a simple formula :

$$\mathbf{PPT = E + R +/- S}$$

PPT	PRECIPITATION
E	EVAPOTRANSPIRATION
R	RUN OFF / OVERLAND FLOW
S	SOIL MOISTURE STORAGE

S, Soil moisture storage is shown as +/- since the soil/ground store may be replenishing or may be being used / utilised.

The same formula can be used to estimate run off / overland flow :

$$\mathbf{R = PPT - E +/- S}$$

PRECIPITATION (PPT) : The inputs of water to the system from the atmosphere in the form of rain, hail, sleet and snow. on a monthly basis from January to December.

POTENTIAL EVAPOTRANSPIRATION (PE) : The output of water from the system back to the atmosphere in the form of evaporation from water and soil surfaces, and the transpiration loss from the biomass (plants). PE is the total amount of evapotranspiration that could take place if there was enough water available.

In the wet season the ACTUAL EVAPOTRANSPIRATION (AE) is usually equal to the PE as enough water is available. During the dry season, however, the AE can be well below the PE as there is a WATER DEFICIT.

The temperature of the air is the main factor determining the ability of the air to accept water vapour as it controls humidity, so the PE line on the graph mirrors the annual temperature regime.

SOIL MOISTURE RECHARGE (SMR) : for the first few months when PPT exceeds PE the storage of soil moisture increases until the store is saturated.

WATER SURPLUS (WS) : When the soil moisture store is saturated there is then a period of WATER SURPLUS until PPT falls below the PE. During this period floods are possible and water will be available for the irrigation of crops.

SOIL MOISTURE UTILISATION (SMU) : Once the PPT falls below the level of the PE the AE gradually falls below the PE as soil moisture is used up.

WATER DEFICIT (WD) : When the soil store is depleted the stage of WATER DEFICIT occurs as the AE falls to the level of the PPT. This is a period of water shortage, possible drought and a possible increase in wildfires.

It may be necessary to store excess water from the wet season to have enough water available in the drier season for homes, industry and agriculture