completely covered with vegetation (without specifying the type), and large enough for oasis effects to be negligible. . . . since moisture is not restricted, potential evapotranspiration is limited solely by available energy." Penman (1956) defined potential transpiration as "the amount of water transpired in unit time by a short green crop, completely shading the ground, of uniform height and never short of water." These two definitions imply that evapotranspiration from a well-watered, active crop with full ground cover is determined primarily by meteorological processes. (Stomatal closure and reduced transpiration usually are important only under limited water or other plant stress conditions). In quantifying these processes, Penman (1956) derived an equation which showed that potential *ET* could be expressed as a function of net radiation, atmospheric vapor pressure deficit (dryness of air), temperature, and windspeed. This equation expresses fully the climate dependence of potential *ET* and can be adapted for estimating actual *ET*. The Penman equation will be described in Section 2.3.

2.2 SURFACE DEPENDENCE OF EVAPOTRANSPIRATION

There are several surface factors which modify the energy balances within Equation 2 and hence influence evapotranspiration. Surface factors include: (1) ground cover (vegetation); (2) soil water availability; and (3) stomatal behavior.

Ground cover affects *ET* in several ways. It affects the albedo, or reflectivity, of the surface. Vegetative surface albedos range from about 0.2 to 0.25. Water surfaces, on the other hand, would have a typical albedo of 0.05. Soil albedo is highly variable; it is usually low (less than 0.1) when organic matter content is high, and may be as large as 0.5 for beach sand. Albedo also varies widely with soil color, which changes with soil water content.

Ground cover changes the amount of radiant energy impinging directly on the soil and thus the amount of energy absorbed by the soil (soil heat flux density term, *G*). Soil properties, including water content, will also affect the amount of energy flowing into the soil compared with the amount of direct evaporation from the soil. The height and density of ground cover influence the efficiency of turbulent exchange of both heat and water vapor from canopies.

Changes in soil water will cause differences in direct evaporation from the soil, and differences in water availability to plants. As plants become water stressed, their stomata close, which results in a reduction of plant water loss as well as plant CO_2 uptake. This is one factor that the potential *ET* equation does not take into account. Stomatal resistance under non-stressed conditions varies among plant species. However, *ET* differences are usually small, and the potential *ET* concept works well across most types of vegetation with full canopies.