

Soil Moisture Equipment for Water Balance Studies on the Edwards Aquifer Recharge Zone

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Project Need, Description and Expected Outcomes

Current and projected water needs for the state of Texas are very large, especially in the semiarid western portion of the State. No area in the State exemplifies these needs more than the Edwards Aquifer Recharge Area and the upstream “contributing zone” of the Edwards Aquifer. Population growth in the Edwards region has been tremendous, partly because of the relatively abundant and clean ground water that has traditionally been available in the region as well as the abundant and clear flowing streams in the region. Ground water and streamflow are intimately tied together and are the result of the highly permeable and porous limestone that underlies the region. Population pressures in competition with other needs such as in-stream flow, endangered species, irrigated farming are putting increasing pressure on water resources in the region. One possible management strategy for increasing streamflow and ground water recharge in the area is that of vegetation management (Wilcox 2002). Much of the region is covered by a relatively dense canopy of juniper and oak, which has increased substantially during the last 100 years (Archer 1994). For this reason there is a high level of interest in using brush control as a mechanism of increasing recharge (Lemberg et al. 2002). The scientific foundation for this management strategy, however, has not been laid. Much work remains to fully understand if and how trees are interacting with the water cycle and at what scales these interactions are occurring (Jackson 2001).

A state-of-the-art research program is being developed at Texas A&M that is providing international leadership in this area. Beginning with a small grant from TWRI we have developed a large scale rainfall simulation methodology for conducting detailed water balance studies on shrublands. Recently, we have won support from the highly competitive *Water Initiative* Grants of the National Science Foundation, in collaboration with the Environmental Research Institute at the University of Texas. The review panel stated that our experimental approach was among the most innovative they saw in the competition. We are also getting support from Texas A&M for graduate students, from the San Antonio Water System for field logistics and potentially from the Edwards Aquifer Authority for studies over cave features. All of these studies are being conducted on the Edwards Plateau area. Our approach is conceptually simple. We apply simulated rainfall over an area as large as 10 x 12 m and monitor pathways for water movement including overland flow, shallow subsurface flow, soil moisture, and interception. The science base we are laying down is a strong one and we anticipate that at the completing

of this funding cycle (four years) we will significantly advance our understanding of how woody plants modify the water cycle.

Because of the large number of collaborators and funding cut backs by the NSF, we have had to scale back on the soil moisture monitoring equipment that we would ideally like to use for our rainfall simulation studies. In this TWRI grant we are requesting funds for soil moisture monitoring equipment that we can use on these studies and future studies focusing on water use on rangelands. A list of equipment is included below.

References

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