1 Summary

In the irrigated cotton growing areas of Australia incipient traces of soil salinity are on the rise. Unfortunately, little information is available at the farm, sub-catchment or regional scale in cotton areas to determine the threat of further soil salinisation. Without suitable methods to generate this information management strategies required to prevent its spread or understand the threat can not be ascertained. The main aim of project US22 and 30C was the development of methods and techniques to generate information which could be used to better understand the salinity threat in the irrigated cotton growing areas at the field, sub-catchment and regional scales.

On the field-scale a Mobile Electromagnetic (EM) Sensing System (MESS) was developed in collaboration with the National Centre for Engineering in Agriculture (University of Southern Queensland). Supplementary funding for the MESS was obtained via a grant from Salt Action in association with the Coordinating Committee of the lower Namoi valley water users and the Cooperative Research Centre for Sustainable Cotton Production. The MESS was used successfully to demonstrate its applicability in identifying areas of irrigation inefficiencies in an irrigated cotton field in the lower Gwydir valley. Other applications of the MESS include soil salinity assessment, location of suitable storage sites and in precision agriculture.

At a sub-catchment level a relatively inexpensive broadscale EM34 survey was demonstrated in the lower Namoi valley. Along with strategic soil sampling and the use of a simple salt-balance model estimates of groundwater recharge were made across a large portion of the valley west of Narrabri. The work also reflected the physiography and hydrogeology of the area studied. The results suggest that most of the irrigated cotton farms are located on the heavier textured clay plains and do not appear to be contributing much to groundwater recharge. Those farms associated with the prior stream formations, the low dissected floodplains and the Pilliga Sandstone are likely to be less water use efficient and contribute more to groundwater recharge. These areas may require more detailed investigation.

A regional scale assessment was made using reconnaissance soil survey information (CRC-1.2.1) and a quantitative decision support model (CRC-1.5.4) to determine the possible impact on irrigated cotton production systems of the application of increasingly saline water. This was carried out across the lower Namoi , Gwydir and Macintyre valleys. The results of the lower Namoi valley are shown. In general, the results suggested that at the present time irrigated cotton production is sustainable using water quality currently available. However, and with respect to the modeling carried out, the clay alluvial plains are susceptible to saline waters particularly if the subsoil is sodic. The reason is that deep drainage is reduced and salts are more likely to accumulate in the rootzone. Conversely, non-sodic clay subsoils and the lighter textured soils will become more permeable and hence less water use efficient with the use of