

1.3 CHARACTERISTICS OF SYSTEMS ANALYSIS APPLICATIONS

Successful systems analysis applications exhibit a number of common characteristics. These are reviewed here because they provide insight into whether a systems study of a particular problem may be worthwhile. If the planners' objectives are very unclear, few alternative courses of action exist, or there is little scientific understanding of the issues involved, then mathematical modeling and sophisticated methodologies are frequently of little use. Successful applications of systems analysis are characterized by:

1. A systems focus or orientation: Attention needs to be and is devoted to the interaction of elements within the system as a whole as well as to the elements themselves.
2. The use of interdisciplinary teams: In many complex and nontraditional problems it is not at all clear from the start what disciplinary viewpoints will turn out to be most appropriate. It is essential that the participants in such work—coming from different established disciplines—become familiar with the techniques, vocabulary, and concepts of the other disciplines. It might be said that participation in interdisciplinary research requires a willingness to make mistakes at the fringes of one's technical competence.
3. The use of formal mathematical models: The overwhelming preference of most systems analysts is to use mathematical models to assist in system description and evaluation and to provide an unambiguous record of the assumptions and data used in the analysis.

Not all water resources planning problems are suitable candidates for study using systems analysis methods. The systems approach is most appropriate when:

4. The system's objectives are reasonably well defined and organizations and individuals can be identified who have the necessary authority and power to implement possible decisions.
5. There are many alternative decisions that may satisfy the stated objectives and the best decision is not obvious.

This text on quantitative planning techniques will be particularly useful for water resources problems which have two additional characteristics: