EO: Costs and Benefits

Then US Secretary of State Colin Powell told the first Earth Observation Summit held in July 2003 in Washington DC, USA, that the World Meteorological Organization (WMO) estimated farmers gained $15 value from every dollar spent on forecasting the weather: a 15:1 benefit/cost ratio. Evaluating the clear benefits in dollar terms of remote sensing or Earth Observation (EO) is difficult, but such a study would prove very beneficial to the remote-sensing community in terms of justifying expenditure for EO systems.

Analysis

In assessing the benefits/costs of EO, reference can be made to studies of other types of spatial data, such as GIS data. Mapping organisations often value their maps by cost of production. This is, however, incorrect, since a map that nobody uses has little or no value. A similar argument could be made for EO data. In assessing the benefit/costs of GIS data, Tomlinson Associates show that the benefit/cost ratio for the first year of developing a GIS may be less than 1, but this should improve to more than 5:1 as GIS development progresses. The cumulative benefit/cost may therefore exceed 3:1. Might a similar approach be adopted to justify the launch of EO satellites? The literature reveals that benefit/costs analyses have spawned a range of valuation techniques, but discussion here will be restricted to ‘opportunity costing’ as a mode of analysis. This approach is based on the savings resulting from availability of EO data in various applications, including disaster assessment or search-and-rescue: situations where adequate maps are unavailable and data is urgently needed. Savings have also been recorded in the agriculture sector, where it is used for assessing quality of crops, disease, volume of production and growth rate; and in mineral detection.

Assessment

The literature also reveals issues regarding assessment of benefits/costs. Some positive benefits/costs do not continue indefinitely, such as those relating to discovery of mineral deposits. The ‘lead time’ for positive benefit/cost is likely to be much longer than for GIS. Some applications of EO may never lead to positive benefit/costs and yet be essential, such as disaster monitoring, global-warming research, monitoring of the environment, and those committed to ‘public good’ and ‘pure science’ applications. Benefits/costs studies often become quickly out of date as technology improves. A large proportion of the cost of space systems is fixed and EO systems are usually multi-purpose and not easily compared to terrestrial and space systems. Space systems often offer a unique capability that cannot be duplicated by other means, and in most cases space systems need to be closely combined with terrestrial systems to be fully effective.

Benefits

In summary, the benefits/costs of EO systems are not easily assessed and no country appears to have made a detailed analysis. However, there are many clear examples of the real benefits of EO and it would certainly be a worthwhile undertaking for the many countries that are developing satellite systems. Documented positive benefits/costs studies could be used to justify to decision-makers future EO development.