
A Modeling Framework for Decision Support: Bridging the Gap between Earth Science & Socio-Economics  Robert G. Chamberlain, Jet Propulsion Laboratory, Pasadena, CA  Farrokh Vatan, Jet Propulsion Laboratory, Pasadena, CA  Climate change is a global issue. Assessment of the effects of plans, policies, and actions demands a model that encompasses the entire Earth System, including anthropogenic factors. Physics-based climate models of the factors that drive global temperatures, rainfall patterns, and sea level are necessary but not sufficient to guide decision making. Small changes in climate parameters may cause large changes in the availability of arable land, agricultural water, drinking water, and other natural resources. Coupling these changes with actions taken by farmers, industrial entities, environmentalists, politicians, and other policy makers will result in changes to economic revenues, international relations, food production, disease vectors, and beyond. These consequences will not be felt uniformly around the globe or even across a given region. Policy models must comprehend all of these considerations.

Given the inherent uncertainties in both the natural and societal regimes, any model used for decision support must include the capability to exercise different scenarios and assess the range of potential outcomes. In addition to natural processes, the system model must also encompass human attitudes, demographics, and economics. It must consider the effects of education and the role of the media. It must address how people make group decisions. Recent advances in military modeling and simulation for stability and reconstruction operations can be applied to models that address all these areas of concern.

Combining physics-based models of the Earth’s climate and biosphere with societal models of population dynamics, economics, and politics is a grand challenge with high stakes.

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