

Editorial

Science and Technology for Sustainable Well-Being

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Introduction

The American Association for the Advancement of Science (AAAS) is not about the advancement of science just for science's sake. Rather, as indicated by the Association's motto, "Advancing Science, Serving Society," it is about advancing science in the context of a desire to improve the human condition. This mission necessarily entails attention to the social as well as natural sciences; attention to the embodiment of science in technology through engineering; and attention to the processes by which understandings from the natural sciences, the social sciences, and engineering influence or fail to influence public policy. All of these long-standing preoccupations of the AAAS are integral to the theme of the 2007 Annual Meeting and of this essay, "Science and Technology for Sustainable Well-Being." I begin my exploration of that theme with some premises and definitions relating to wellbeing and sustainability, before turning to taxonomy of shortfalls in sustainable well-being and a rough quantification of those that are reflected in morbidity and mortality. I then address the status of five specific challenges in which science and technology (S&T) have particularly important roles to play: meeting the basic needs of the poor; managing the competition for the land, water, and terrestrial biota of the planet; maintaining the integrity of the oceans; mastering the energy-economy-environment dilemma; and moving toward a nuclear weapon-free world. I close with some thoughts on what more is needed in order to improve the pace of progress, including what the AAAS is doing and can do and what individual scientists and engineers can do.

Human well-being rests on a foundation of three pillars, the preservation and enhancement of all three of which constitute the core responsibilities of society: 1) Economic conditions and processes, such as production, employment, income, wealth, markets, trade, and the technologies that facilitate all of these; 2) Sociopolitical conditions and processes, such as national and personal security, liberty, justice, the rule of law, education, health care, the pursuit of science and the arts, and other aspects of civil society and culture; and 3) Environmental conditions and processes, including our planet's air, water, soils, mineral resources, biota, and climate, and all of the natural and anthropogenic processes that affect them. Arguments about which of the three pillars is "most important" are pointless, in part because each of the three is indispensable: Just as a three-legged stool falls down if any leg fails, so is human well-being dependent on the integrity of all three pillars. The futility of attempts to strengthen any one of the pillars in ways that dangerously weaken one or both of the others is underlined by their interdependence. The economic system cannot function without inputs from the environmental



system, nor can it function without elements of societal stability and order provided by the sociopolitical system. And societal stability itself cannot be maintained in the face of environmental disaster, as the effect of Hurricane Katrina on New Orleans demonstrated is true even in the most economically prosperous and technologically capable country in the world. This understanding about the elements of well-being leads, when combined with the proposition that improvements in well-being are most meaningful if they can be sustained, to a set of definitions that embody the essence of the sustainable-well-being challenge: a) Development means improving the human condition in all of its aspects, not only economic but also sociopolitical and environmental; b) Sustainable development means doing so by means and to end points that are consistent with maintaining the improved conditions indefinitely; and c) Sustainable well-being, in my lexicon, entails pursuing sustainable development to achieve well-being where it is now most conspicuously absent, as well as converting to a sustainable basis the maintenance and expansion of well-being where it already exists but is being provided by unsustainable means.

