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Visions to realize in two generations

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A principle measure of the success of *Homo sapiens* by mid-century will be the extent to which collectively we have decreased our interference in the workings of the biosphere – the flow of energy and nutrients, the vast array of species, the balance of the grand biogeochemical cycles such as carbon and nitrogen, and most directly tied to terrestrial life, the quality and quantity of fresh water. With a healthy biosphere, we also have the opportunity to provide the necessary quality of life for our own species, from basic life support, to human rights, to cultural pursuits. A damaged biosphere curtails options. The two goals of a healthy biosphere and human civilization are inexorably entwined. Carrying capacity estimates are plagued by false assumptions derived from shifting technological and scientific understanding. However, from any given point in time, known processes and existing energy conversion efficiencies, crop yields, and end-use patterns provide enough information to make rough estimates of our impacts and whether or not continued activity is possible without degradation of basic life support. Planning can be based on what we know how to do, rather than hoping future generations will find better practices to solve the problems our generation produces. Acting on what we know can temper our activities so that they lead to well-being for our species and the biodiversity of the planet. If we learn more, of course we can incorporate new knowledge into what we consider best practices, but shouldn't we act today with our present understanding?

The interdisciplinary global change sciences are developing the concept of biospheric thresholds, such as the concentration of carbon dioxide in the atmosphere not to exceed, species not to be lost, or ocean pH not to go below. Preliminary threshold estimates are crude with little agreement; however they shine light on the workings of the biosphere and provide us with a choice as we strive to learn more. We either continue our course with unknown consequences shifting the burden to future generations or we actively pursue a path toward mid-century where civilization can look back upon the first half of the 21st century knowing that we have turned the tide and are well on our way to recovering a healthy biosphere and well-being for our species. Along with human rights for all peoples we have established an ecological bill of rights upholding the biodiversity of Earth – both guiding human activity. Sorting through the values, the ethics, the cultural goals with the technological and scientific challenges will mark these next 42 years perhaps as no other time of transformation in modern civilization.