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Learned Discourse

USING ASSISTED BIOTIC COLONIZATION TO COPE WITH HABITAT LOSS DUE TO SEA LEVEL RISE

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Sea level rise is already damaging coastal areas, and habitat damage will only increase. Wetlands and other coastal habitats serve many useful ecological purposes well documented in the literature. As sea level rise inundates former terrestrial coastal areas, the lost wetlands, cypress forests, spawning areas, and other valuable habitats can be replaced in newly inundated areas by assisted biotic colonization. Some species may be able to colonize without assistance, but some colonizing species may not be successful in the “new normal” climate.

If the rate of sea level rise is as rapid as scientific evidence suggests, some carefully selected areas for recolonization should already be in place. Intense, assisted colonization could be carried out in field situations where appropriate conditions exist to provide evidence on the best methods and procedures for the point in time when the rate of sea level rise diminishes and environmental conditions have reached a greater level of stability for colonizing new, previously terrestrial sites. Sea level rise varies throughout the planet, so professional judgment will be essential in both site preparation and the timing of assisted colonization.

Sea level rise will displace huge numbers of people, especially when large coastal cities are affected. A decades-long period of social disequilibrium is probable, which means that assisted biotic colonization may well depend on people and funds from outside the affected region. Regions adjacent to the coastal region will probably be fully occupied with refugees from coastal areas as well as nearby low-lying island groups (e.g., Maldives, Bahamas) or densely populated river deltas (e.g., Ganges, Mississippi). The initiation of major planning is not premature for the many problems associated with sea level rise.

Excuses will probably be offered for doing nothing to preserve the coastal portions of the Biosphere threatened by sea level rise. However, the present Biosphere is both the planet's life support system and the primary source of renewable resources upon which the human economy depends. Sea level rise is inevitable because the forcing factors that cause it are irreversible in time frames of interest to humans.

> Mankind perceives that it has evolved within a certain mosaic of ecosystems upon which it has slowly come to realize it is dependent. But it also shows a biologically imperative pragmatism wherein we, albeit anthropocentrically, believe that the earth's present life-supporting capabilities provide the best opportunities for that component of organisms and that mosaic of ecosystems with which we most want to share our lives during our remarkably short period of tenureship on earth (Curry 1977, p. 1).

By using assisted biotic colonization, humanity is, in fact, merely replacing lost habitat in which *Homo sapiens* evolved and to which its survival is inextricably linked. Humans are also attempting to replace habitat in various areas of the planet that is being destroyed by anthropogenic greenhouse gas emissions that humanity had the power to control but not the will. Consequently, replacement of lost coastal ecosystems is both an ethical imperative and in humankind's enlightened self interest (e.g., Chapman 2012).

Assisted biotic colonization should be viewed in the context of replacing critical components of the biospheric life support system damaged by anthropogenic activities. In the case of sea level rise, anthropogenic greenhouse gas emissions produce an increase in global mean surface temperature that causes glaciers to melt and water to expand when warmed. Because the residence time of carbon dioxide (a major greenhouse gas) in the atmosphere is estimated to be 1000 years, the rise is effectively irreversible, and, therefore, restoration of coastal areas to predisturbance condition is unlikely to ever be possible.

Throughout human history, humankind has been somewhat aware that it is dependent on the natural world. However, ecological overshoot, which began in 1987, has necessitated giving immediate attention to the relationship of humanity to natural systems. Assisted biotic colonization requires a consilience between the social and natural sciences, which is only in the early stages of development. All global, interactive crises require integration of a variety of classical academic disciplines that have, until recently, been operating essentially in isolation from each other, although a transdisciplinary approach to global crises is beginning to emerge.

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