

## Historical Mega-projects and Important Innovations Notes

Important classical references:

Pyrrhic victory (very taxing on victor)

Carthaginian peace (brutal, crushing “peace”)

Malthusian starvation (exponential population growth, linear food growth)

Promethean world (titan that created human worlds in defiance of gods)

*The Alchemy of Air* (Haber-Bosch & Nitrogen fixation)

- Key insight is knowing that crop growth is limited by fixed nitrogen bottleneck, and there is not enough natural fertilizer (compost, manure) in the world to support large land masses of crops sustainably. But there *is* enormous amounts in the atmosphere.
- Malthus predicted civilizational collapse (and advocated eugenics/social darwinism as a method to reduce population), and was wrong because we invented synthetic fertiliser, which was supported by ancillary innovations like the steel plow, tractor, pesticides, refrigerator, and more, and also because geometric growth, for reasons to be explored later, is never sustained by a population for extended periods of time. Both legs of his argument are specious.
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