



# An Agricultural Engineer's View Of The Universe

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## In The Beginning

Early humans applied their ingenuity to obtaining food – the first “agricultural engineers”

Engineering developed into “Civil” and “Mechanical” branches, with agricultural development left largely to carpenters and blacksmiths



## Early World View

The world seemed big and wild and indestructible, to be subdued for humankind's benefit ([Durning](#), 1997)



## The Industrial Age

- Planet earth appeared limitless in its ability to supply raw materials and absorb wastes.
- An “extract, use, discard” mentality developed.
- It was a nice simplification to ignore “natural capital”, concentrating only labour and capital costs (Prugh et al, 1995).
- Growth appears to create riches.
- Machinery greatly increased people’s ability to alter the environment and began to cause changes in the atmosphere.



## Today

Have 2.8 Ha of land surface per individual for food, fibre and fuel production plus any native animals.

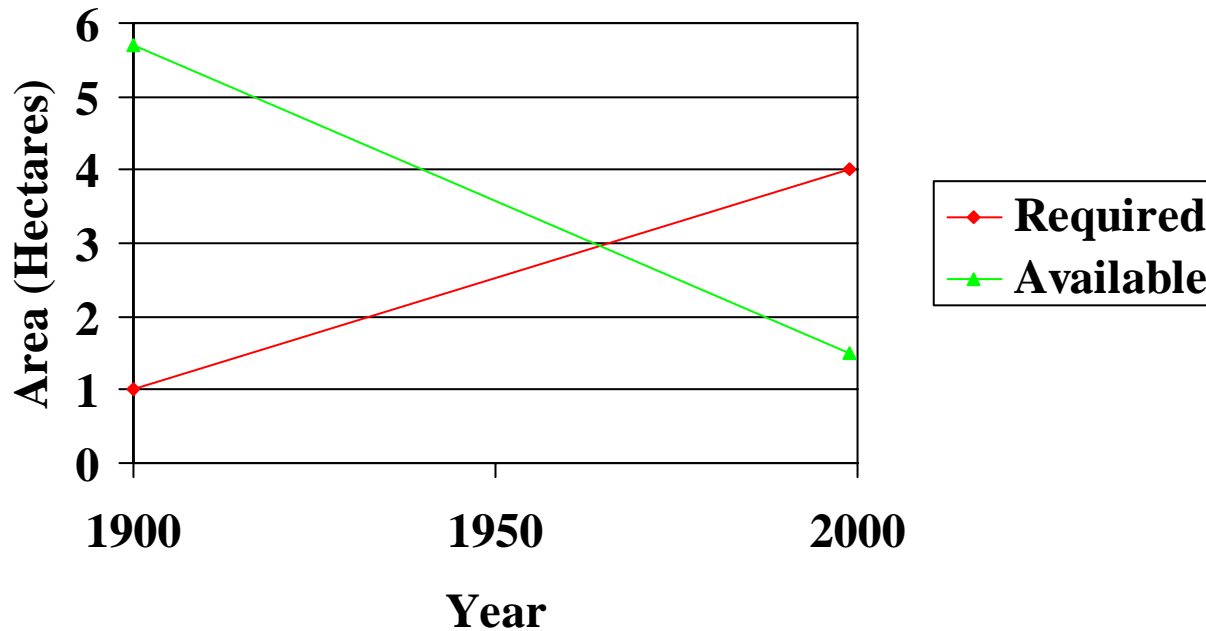
In 1900 had 5.7 Ha of productive land and needed 1 Ha per person.

In 1999 have 1.5 Ha of productive land but need 4 Ha per person. Hawken et al (1999)



## 100 Years of Development

### Land per Person





## Energy Use

- Australia uses 5.6 toe per per person per annum (America uses 8.1 toe)
- A large proportion of the worlds population uses less than 1 toe per person per year
- To be sustainable energy use in “developed” countries will have to reduce



## A New World View

Planet earth as a limited and fragile resource which must be carefully managed, not exploited for the benefit of the lucky few.  
([Durning](#), 1997)



## The Future

Technologies currently available can halve input requirements and double outputs for some processes, the so called “Factor 4”.

Need to look actively for more environmentally friendly ways of meeting ecologically sustainable needs if our children and grand children are going to inherit a pleasant place to live.



## Conclusions

We need to move away from linear “extract/use/discard” systems that overload the earth’s ability to supply inputs and absorb outputs towards cyclic “reuse, recycle, reduce” systems that mimic nature.

Transport is a waste of energy, we need to move into the cities and reuse wastes to produce food in local areas.