

# Towards Engineering For Sustainability

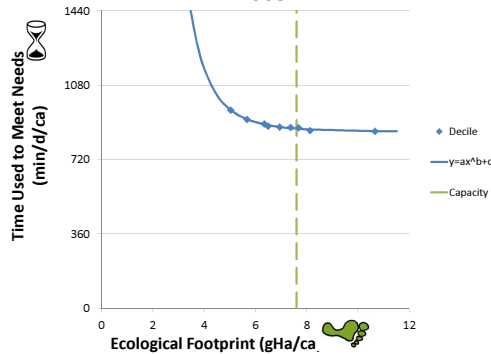
## It's About Time - Exploration of the Resource/Time Curve

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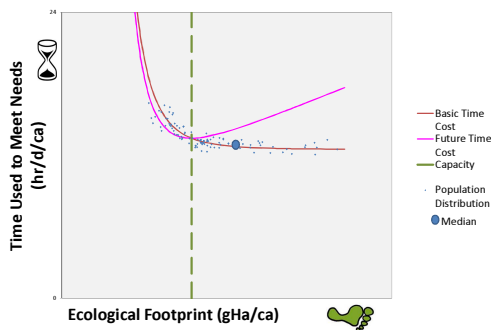
### Problem Statement

- Engineering for Sustainability must seek to maximize social benefit while minimizing negative ecological impacts.
- To do this, the relationship between social benefit and ecological impact must be understood.
- Negative ecological impact can be understood through using the Ecological Footprint concept, understanding that having a Ecological Footprint in excess of the community-managed-biocapacity will produce a future time cost when the over-exploited resources are not available at some time in the future.
- Potential social benefit is the amount of time available to the community for activities other than those required to meet needs. Actualizing that potential requires Human Development.

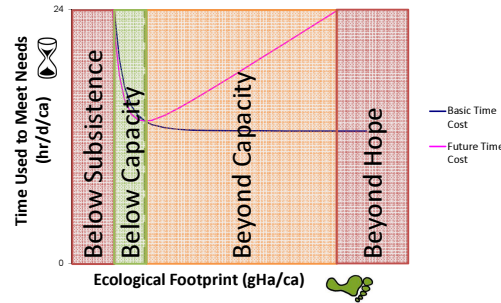
Resource/Time Use (R/T Curve) Canada, 2005



Generic R/T Curve



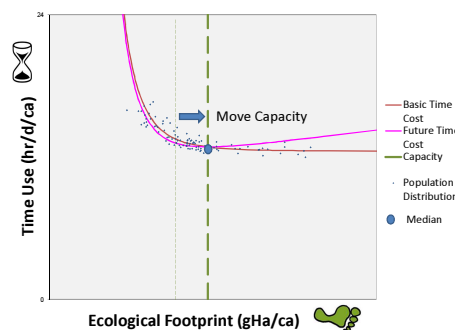
R/T Curve, with Economic Conditions



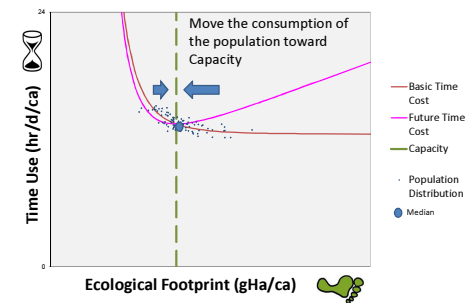
### Economics of the Community

- Below Subsistence = economic failure. Disease, famine, mass migration. Needs are not met.
- Below Capacity = classic economic 'growth is good'. Any increase in consumption produces a decrease in the time it takes people to meet their needs. Life is good, while in this range.
- Beyond Capacity = economic confusion. Actualized quality of life does not increase with consumption. At some point, resources cease to be available, and consumption must drop and time to meet needs must go up. Transition from one state to another, either by choice, or by default.
- Beyond Hope = economic collapse. Consumption patterns can not be supported by available resources, and when resources cease to be available, the time required to meet needs will be in excess of 24 hours per day. Collapse is imminent.

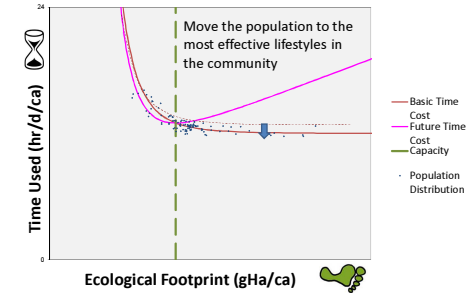
R/T Curve, with Resource Development



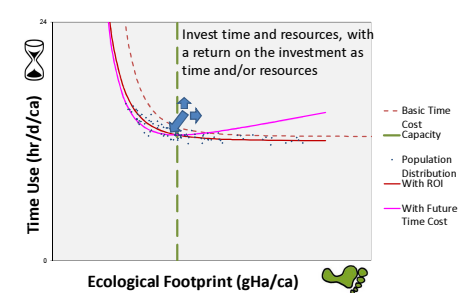
R/T Curve, with Community Development



R/T Curve, with Human Development



R/T Curve, with Technological Development



### Conclusion

The time/resource curve for a given community is sensitive to scale, technology, culture, resource availability, and the intentions of the community. It allows the conversion of units between time and resources, allowing optimal solutions, which will ultimately lead to Sustainability Engineering.