

TOWARD SUSTAINABLE CITIES

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Framing Premise 1

“Today’s city is the most vulnerable social structure ever conceived by man”
(Martin Oppenheimer).

Cities are threatened by:

- Peak oil
- Soil losses and related resources shortages (e.g., peak phosphorus)
- Climate change (e.g., rising sea levels)
- Resultant geopolitical instability



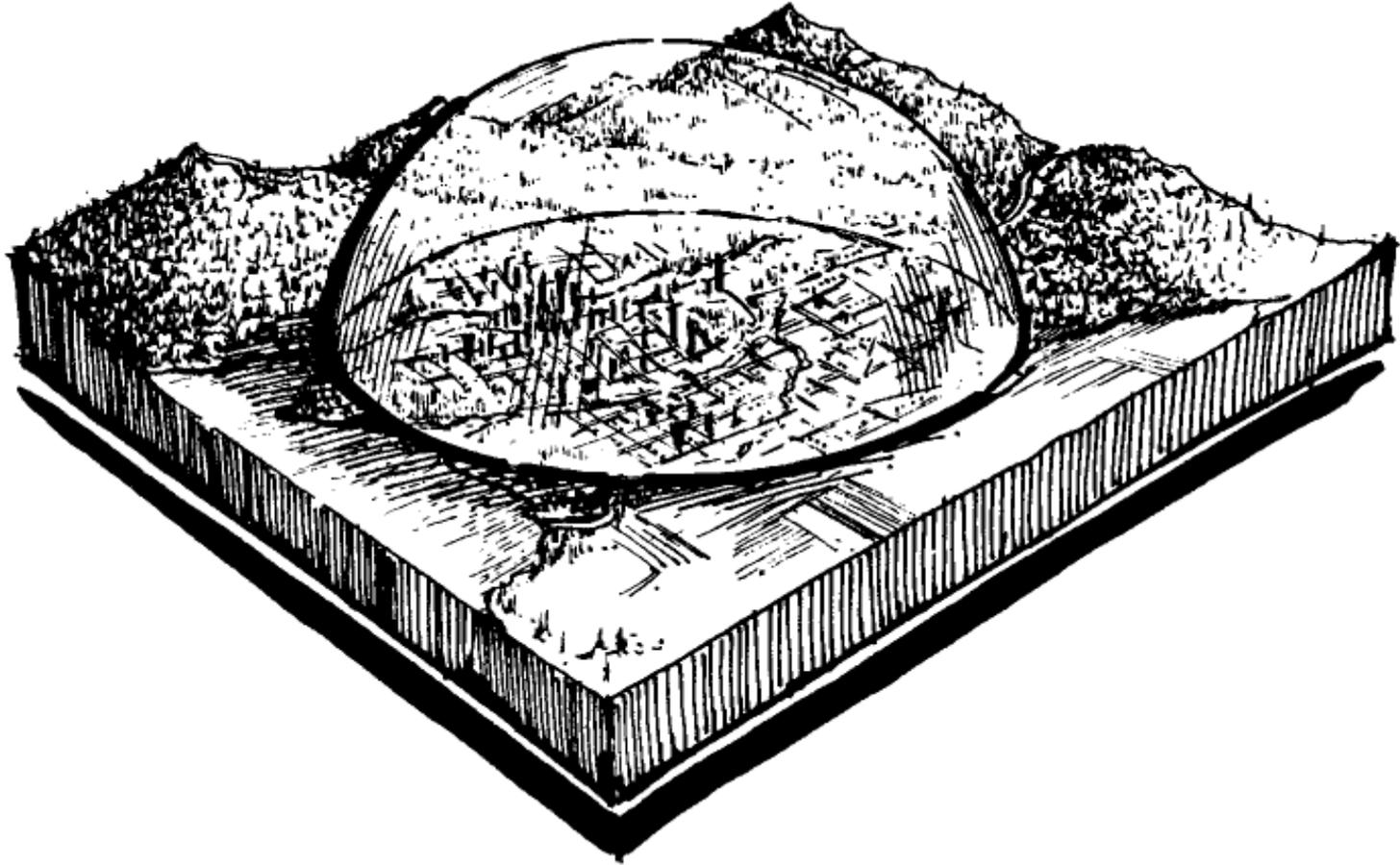
Framing Premise 2

“Cities as presently conceived are inherently unsustainable, yet cities are the key to sustainability”

(Rees and Wackernagel 1996).



Modern cities are not complete human ecosystems



(Enclosed in a bell-jar, most cities would simultaneously starve and suffocate.)

In ecological terms, cities are parasites on their global hinterlands

- “Great cities are planned and grow without any regard for the fact that they are parasites on the countryside which must somehow supply food, water, air, and degrade huge quantities of wastes” (Odum 1971).

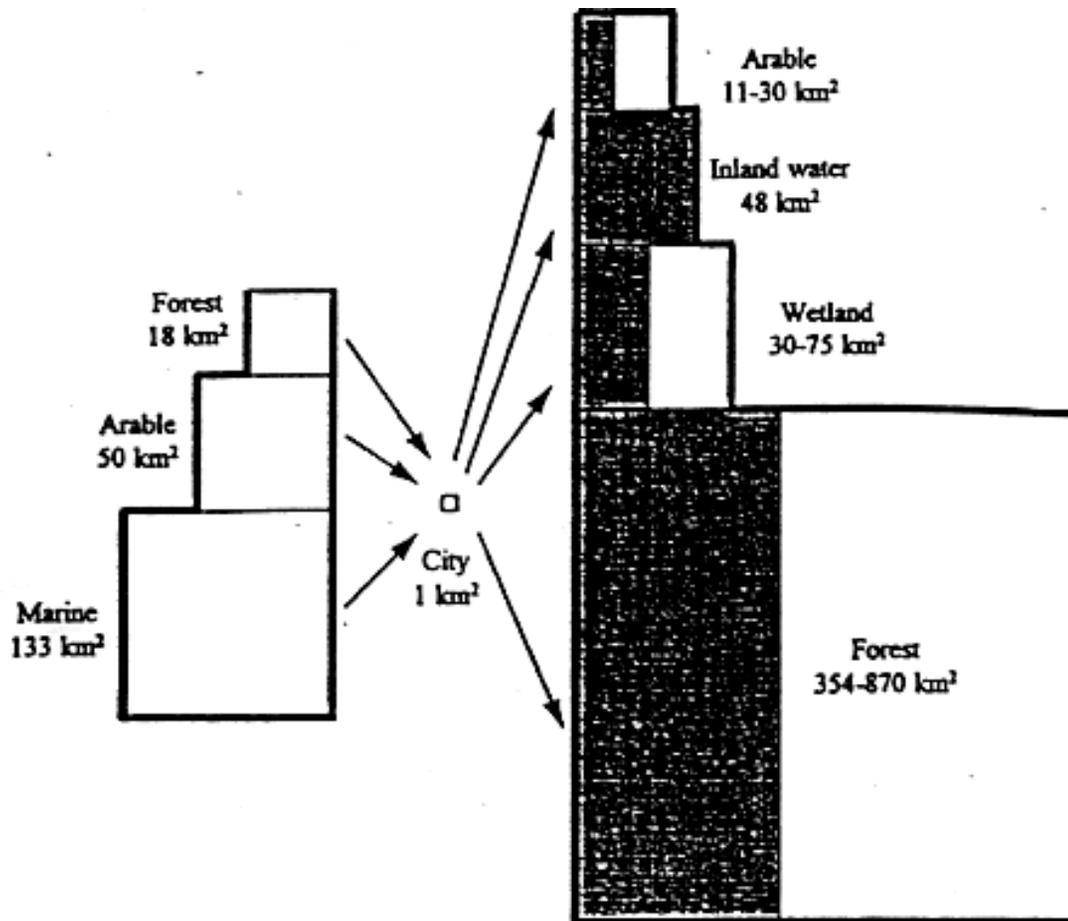


The Ecological Structure of Cities

(The modern human ecosystem has two discrete spatial components)

- ❑ In eco-thermodynamic terms, cities are “dissipative structures”—nodes of intense energy and material consumption and waste production.
- ❑ The complementary production-assimilation component of the human ecosystem lies outside the city.
- ❑ This extra-urban area is nevertheless an essential component of the human urban ecosystem.
- ❑ Because of the spatial separation of production and consumption, modern cities change the circular nutrient cycles of ecosystems in to irreversible unidirectional throughput flows.

The twenty-nine largest cities of the Baltic states of Europe have an aggregate eco-footprint 565-1130 times as large as the cities themselves (Folke et al. 1997)



- Blocks on the left represent ecosystem area appropriated for resource production (biocapacity).
- Blocks on the right represent ecosystem area appropriated exclusively for waste assimilation under two sets of assumptions.

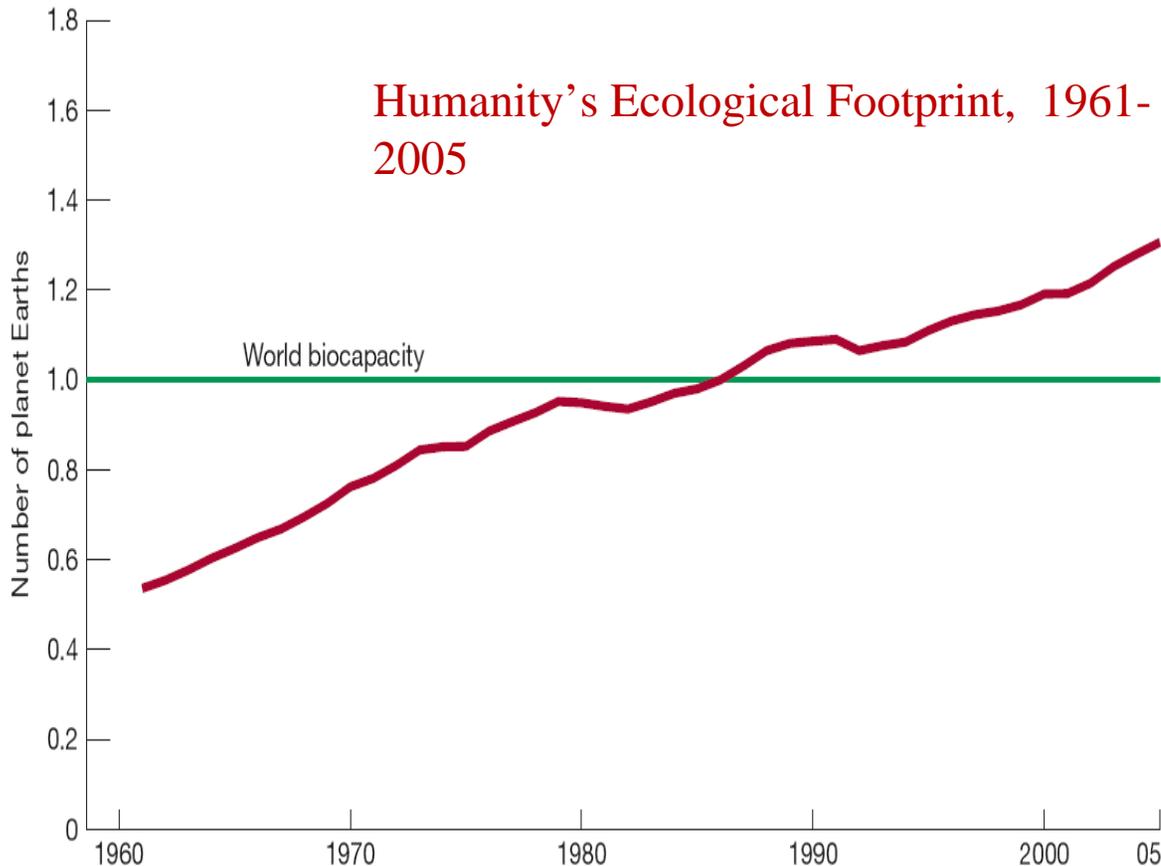
The Ominous Case of Tokyo

- ❑ Population: 33 Million (approx. 26% of Japanese pop)
- ❑ Area: 4700 square km (approx) (470,000 ha)
- ❑ Total eco-footprint at 4.9 global ha/capita: 161,700,000 ha
- ❑ Area of Japan: 37,770,000 ha
- ❑ Japan's biocapacity: 76,800,000 global ha

Tokyo's eco-footprint is about 344 times larger than the region, 4.3 times the area of Japan and represents 2.1 times the nation's domestic biocapacity.



Consider this in global context: The world is in overshoot



- The human enterprise already exceeds global carrying capacity by about 30%.
- How secure are cities that are totally dependent on distant sources of supply in an era of rapid climate change and potential resource scarcity?

Efficiency ≠ Sustainability

- ❑ Most approaches to urban sustainability today—hybrid cars, green buildings, smart growth, the new urbanism, green consumerism—assume that sustainability resides in greater material and economic efficiency. Regrettably:
- ❑ “It is a confusion of ideas to suppose that the economical use of fuel is equivalent to diminished consumption. The very contrary is the truth.” (Stanley Jevons 1865).
- ❑ *There is no particular virtue in being more efficiently unsustainable.*

What this Means for High-Income Countries

- ❑ There is no substitute for consuming less.
- ❑ For sustainability with equity, EU countries should work to *reduce* their average ecological footprints by 55% (from 4.7 gha); North Americans need to reduce their EFs by 77% (from 9.2 gha) to an equitable Earth-share (2.1 gha).
- ❑ This would create the ecological space required for needed growth in the developing world.

Reducing the Ecological Burden of Cities

- ❑ Constructing, operating and maintaining the ‘built environment’ of cities accounts for about 40% of the materials used, and 33% of the energy consumed, by the global economy.
- ❑ Private consumption by urbanites accounts for much of the rest.
- ❑ Sustainability requires **public policy** directed toward reducing both public and private consumption—we must exploit the urban sustainability multiplier.

Cities have an advantage:

The Urban Sustainability Multiplier

Eco-cities have regulatory powers to create:

- Compact form and a high proportion of multiple-family dwelling units which reduces per capita consumption of building materials and service infrastructure.
- A greater range of options for recycling, reuse and re-manufacturing, and a concentration of the skills needed to make these things happen.
- Greater possibilities for electricity co-generation and the use of waste process heat from industry or power plants to reduce the *per capita* use of fossil fuels.
- Great potential for reducing (mostly fossil) energy consumption by motor vehicles through walking, cycling, and public transit—*the car-free city ideal*.

The 'city' must strive to be come a complete human ecosystem

- ❑ If 99+% of the land that supports cities lies outside their boundaries, shouldn't we redefine what we mean by 'urban land' in a whole-systems framework?
- ❑ A 'city-as-(eco)system' would be an urban region comprising both the built environment and as much as possible of the population's supportive hinterland.
- ❑ Urban eco-regions could thus re-establish cyclical flows of nutrients through the regional ecosystem.

Toward Modern Eco-City States

- ❑ Cities should be reconceived and redesigned to incorporate as much supportive ecosystem area within their political jurisdictions as possible.
- ❑ Eco-regional city states would maximize their self-reliance and material independence (trade as necessary but not necessarily trade).
- ❑ Bioregionalism and perma-culture provide pre-formed philosophical and conceptual models for reintegrating heartland and hinterland.
- ❑ Decentralized decision-making reflects the principle of subsidiarity, the argument that policy action affecting local populations and environments should always be implemented at the most local relevant planning level.

Urban Eco-Regions: 50-Year Design Goals

- ❑ Reintegrate the geography of living and employment, of production and consumption, of city and hinterland.
- ❑ The regional eco-city, “... rather than being merely the site of consumption, might, through its very design, produce some of its own food and energy, as well as become the locus of work for its residents” (Van der Ryn and Calthorpe 1986).
- ❑ Following this logic, urban regions would gradually become less a burden on, and more a contributor to, the life-support functions of the ecosphere.

NB: All these points fly in the face of conventional trade theory and globalization trends.