Food Sensitive Urban Design

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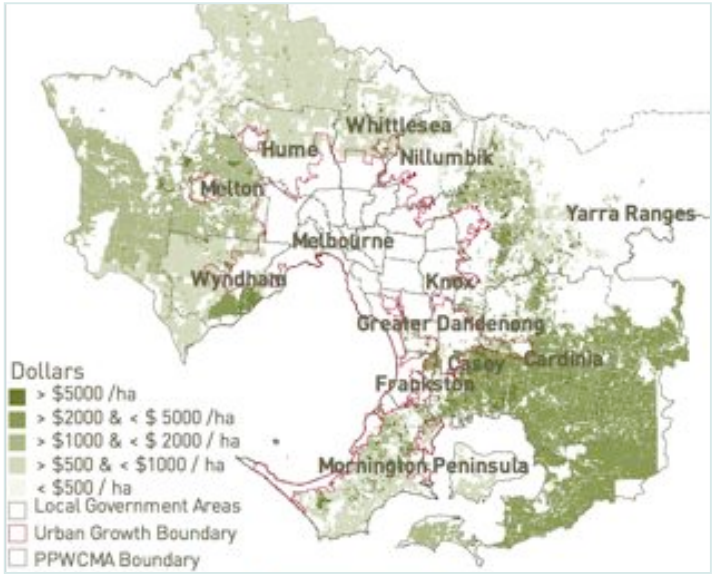
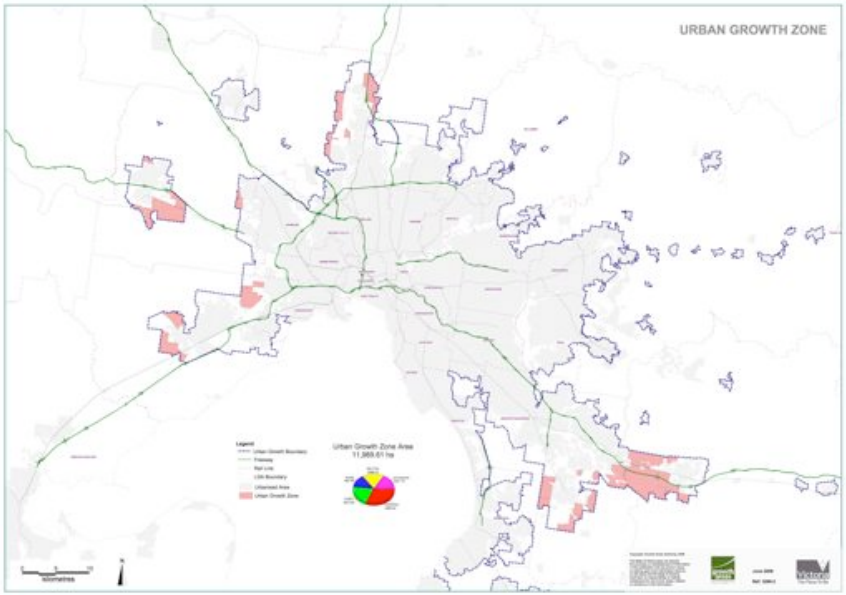
Why *Food Sensitive Urban Design?*

- Because food is a big problem and getting bigger fast - security and sustainability
- Equitable access to healthy food doesn't just happen
- Strong community interest - demand and opportunity
- Most people in Australia, and the world, now live in urban areas

Land and soil

The bad news
• Limited land on the planet, limited available for production - competing uses, residential and biofuels • Since 1945, Aus cities taken over > one million hectares of rural land. Trends by 2021 Melbourne lost another 25,000 hectares rural • 30% of the world's cropland has been abandoned due to soil erosion & degradation (last 40 years)



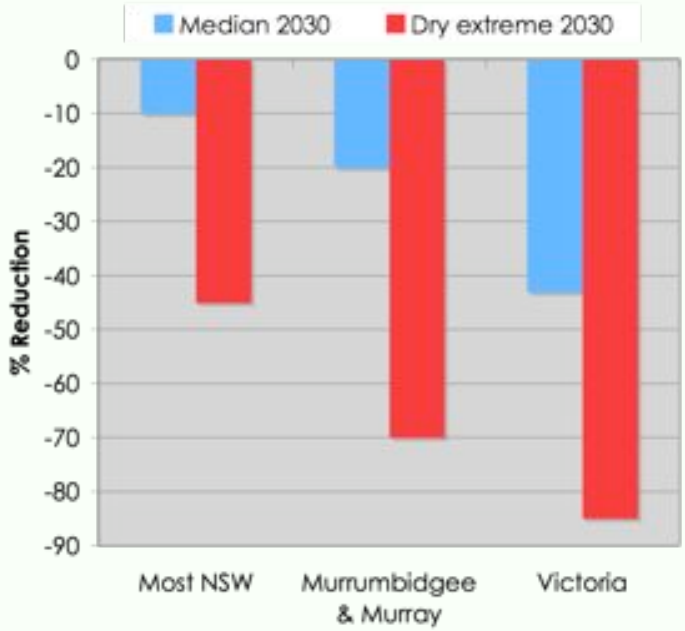


Water Scarcity

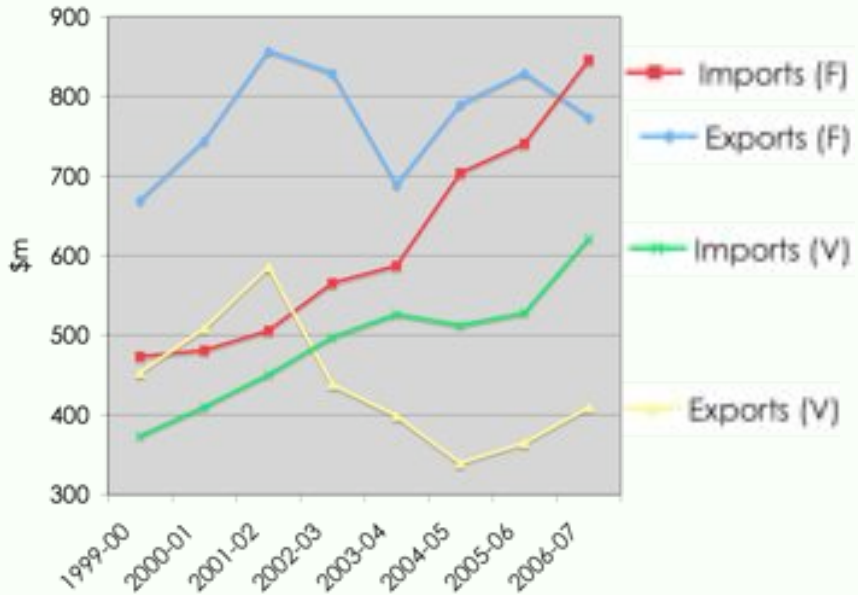
Water Use

- Competition for scarce supplies - water goes to ‘highest value’ use
- Vic exporting 40% of managed water, this is 25% of historical average streamflows
- Decreasing supply security

Less water for irrigation



Aus Fruit & Veg - Imports and Exports



Nutrient scarcity

Increasing demand for food = increasing demand for nutrients

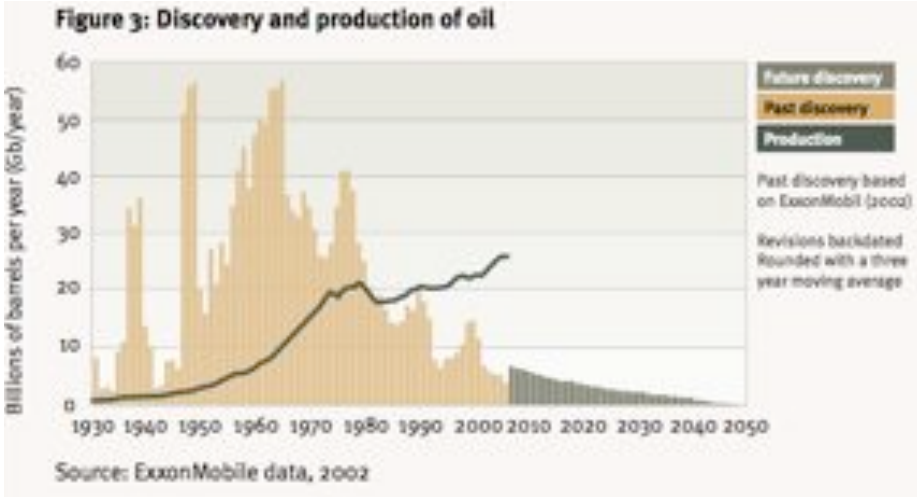
Region / Nutrient	1959/60	1989/90	2020
	(million nutrient tons)		
World total	27.4	143.6	208.0
Nitrogen	9.5	79.2	115.3
Phosphate	9.7	37.5	56.0
Potash	8.1	26.9	36.7

Sources: FAO, IFPRI

Nutrient Inputs to Australian Agriculture

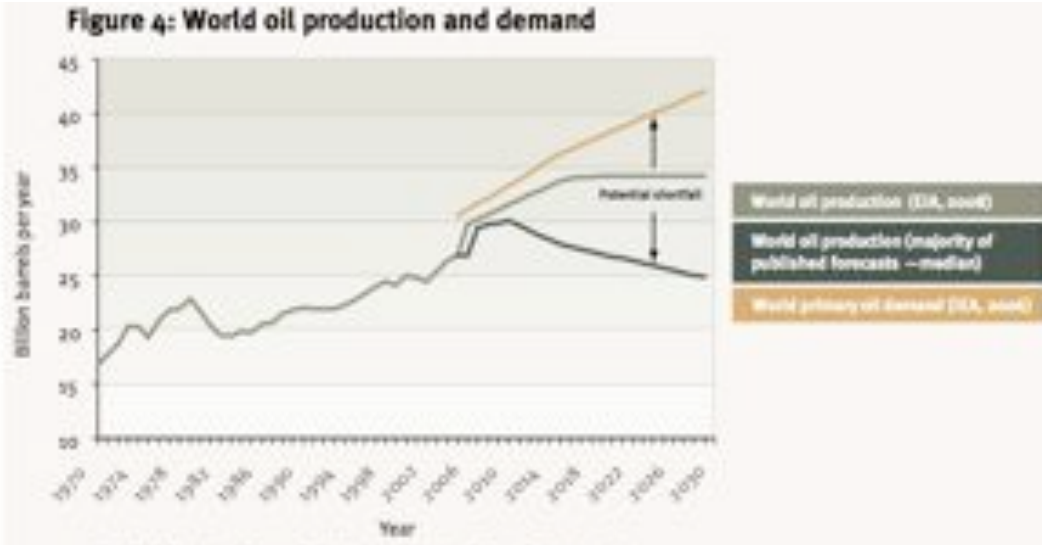
- Nitrogen fertilisers are derived from natural gas - a non-renewable source that is closely linked to the oil price.
- Phosphate fertilizers are derived from phosphate rock, which is finite and expected to 'peak' in the near future.

The end of cheap oil



The peaking of oil supplies is imminent and will occur in the window 2011-2013. ***In planning terms 2011-2013 is effectively tomorrow.*** *This means the crisis is already upon us and companies and individuals need to be planning their response now*
UK Industry Taskforce on Peak Oil & Energy Security, November 2008

The world's energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable environmentally, economically, socially
International Energy Agency - World Energy Outlook 2008



Climate change

- *If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO2 will need to be reduced from its current **385 ppm to at most 350 ppm**, but likely less than that.*

- *Continued growth of greenhouse gas emissions, for just another decade, practically eliminates the possibility of near-term return of atmospheric composition beneath the tipping level for catastrophic effects.*

- *The most difficult task, phase-out over the next 20-25 years of coal use that does not capture CO2, **is Herculean, yet feasible when compared with the efforts that went into World War II**.*

Changing conditions & extreme weather
Production declines due to drought and poor weather between 2004 and 2006 (wheat and coarse grains) • US - 16 and 12 per cent; • Australia - 52 and 33 per cent; • EU - 14 and 16 per cent.

Our challenge - zero carbon food systems . . .

Hansen et. al. October 2008, *Target Atmospheric CO2: Where Should Humanity Aim?*

Energy and emissions

- Food accounts for 28% of our household greenhouse gas emissions
- CPRS will have an impact on food prices, affecting low income households in particular (40% of income spent on food)
- Big reductions in emissions from food supply chains will require change at every point
  - … Choice of what to grow (and eat)
  - … Choice of fertilisers, production methods - aim to sequester carbon
  - … Choice of where to grow and how to distribute

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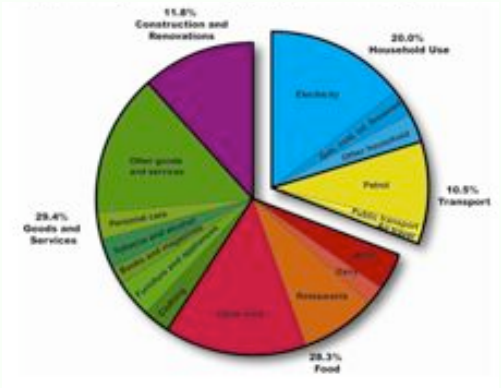
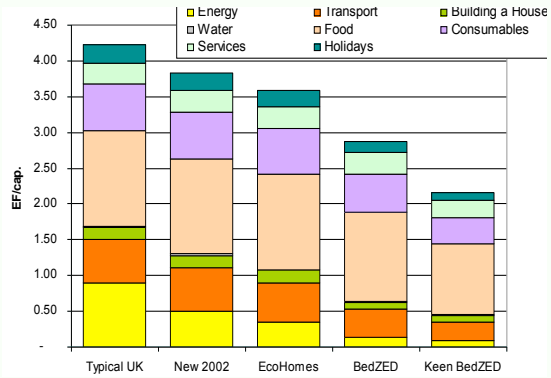
Average household emissions profile (Aus)



Ecological Footprint reductions from best practice development (UK)



What about people . .

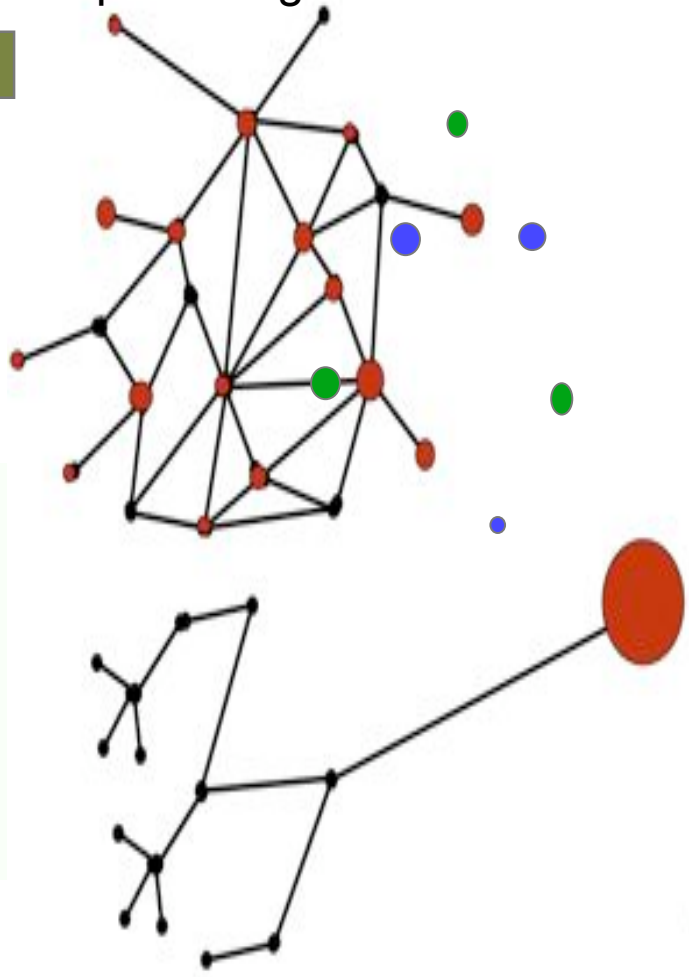
- All of these things are contributing to increasing food prices
- Global food crisis and already lots of people in Australia who are ‘food insecure’
- Urgent need to make ‘big’ agriculture sustainable, resilient and profitable for farmers
- Also, people doing things for themselves . .

Networked distributed systems

Resilience - in the face of complex, unpredictable and rapid change

Diversity

Flexibility & Redundancy



Reduce reliance on transport and energy

- Use what you've got first
- Don't use energy to move things around if you don't have to

Food = water, electricity, oil, nutrients, waste, jobs

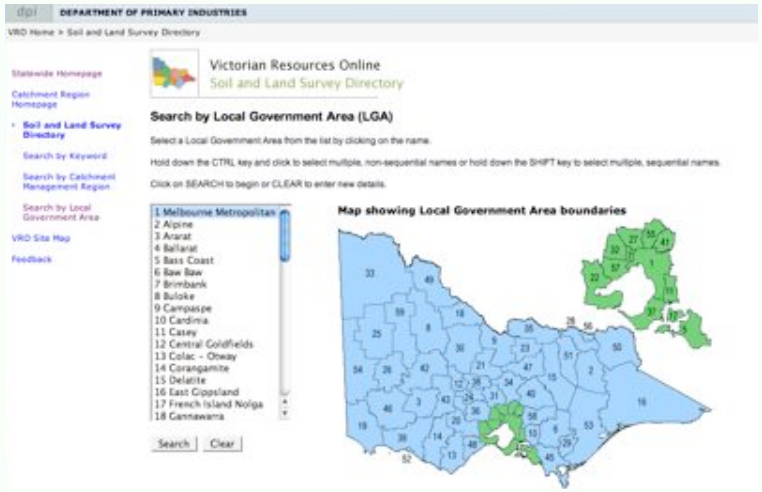
- We can use food to guide thinking through the system

Not about food **OR** housing anymore . .

» We have an opportunity to do this differently

Plan to keep what we can

- Consider soil capability ***within*** urban developments



- Contamination - CERES

Look around and up

- Lots of room in the suburbs

- 90% of the area of Melbourne CBD is rooftops

Sources: Victorian Resources Online, Melbourne Water

Lots of Nutrients . .

Food Waste

- 47% of municipal waste sent to landfill in 2002/03 (Victoria)
- New and old waste processing methods (composting and high-tech)
- Bulky - use fertiliser outputs as close as possible to where they are generated.
- Victoria about to spend $10M on alternative waste treatment
  - eliminate methane and other greenhouse gases
  - produce renewable energy;
  - produce saleable nutrient rich compost

Human Waste

- Australians produce up to 10 billion litres of urine a year
- Over 80% of the phosphorus and nitrogen in household waste loads can be beneficially used on farmland (DCT)
- The use of stockpiled biosolids for agricultural production is already being explored

Use the water we have . .

- Over 80% of Melbourne's current water use could be met with the rain that falls on the city
- Direct conversion of rainfall to useable water
- Almost 3GL (approx. 12% of total) water is used to irrigate open spaces (≈ 1GL) and private gardens (≈ 2GL)
- Could produce between $5.7 million (Australian average) and $29.4 million (best practice small-scale) dollars worth of fruit and vegetables

Localised and scaled opportunities

In the city

Eco-cities must be farming cities... [as] urban farming creates green space, recycles wastes, cuts down on freight transport, prevents soil erosion and is good for the micro climate
(New Scientist, 2006)

On the edge

There is more life on the edge where two systems overlap. Systems can then access the resources of both.

(SEED International)

- New opportunities for farmers
- A chance to get it right

So how would we go about *Food Sensitive Urban Design?*

WSUD contributes to urban sustainability and provides the conditions for attractive, human-scale living environments through integration of urban planning and design with the management, protection and conservation of the whole water cycle

(Melbourne Water)

FSUD contributes to urban sustainability and provides the conditions for attractive, human-scale living environments through integration of urban planning and design with the production, distribution of and equitable access to healthy food

- Trying to more closely match the pre-development stormwater runoff regime – both quantity and quality
- Optimising the use of rainwater that falls on our urban areas
- Reducing the amount of water we transport between catchments, both in water supply import and wastewater export

- Trying to make use of urban productive capacity and resources to provide secure, healthy and sustainable food
- Optimising synergies between food, energy, water and nutrients
- Reducing the need to transport food (hence water and energy) by producing it closer to where it will be eaten

Very compatible with *Water Sensitive Urban Design*

» Same tools, just add food . .

WSUD	FSUD
Grassed or landscaped swales	Moisture stored in soil
Infiltration trenches and bio retention systems	✓
Wetlands	Cleaning and **nutrient capture**
Rainwater tanks – stormwater harvesting & reuse	✓
Greywater harvesting & reuse	Fruit trees
Rain gardens, rooftop greening, urban forests	✓
Porous pavements whole subdivision	

Best practice WSUD means a 45% reduction of nitrogen and phosphorus
(Melbourne Water)

More than community gardens

- Everybody loves community gardens, but they're just the tip of the iceberg . . .
  - Infrastructure
  - Maximise local production and processing
  - Distribution and access
  - Amenity, community and opportunity

Infrastructure

Images courtesy of Jenny Donovan and Adam Smith - David Locke Associates

http://www.dlaaust.com/

» Building Blocks

…Make use of soils and space: consider food production - solar access, ability to reconnect blocks of land

…Water infrastructure: recycling, stormwater to adjoining farmers, WSUD, ensure access to water for food production

…Food and human waste to energy and nutrients: invest in infrastructure where necessary

…Building blocks . . commons for markets, community gardens, city farms etc as inhabitants arrive or want to develop them

…Plant the seeds: open pollinating fruit trees, vegetable seeds throughout, easy access to plant material

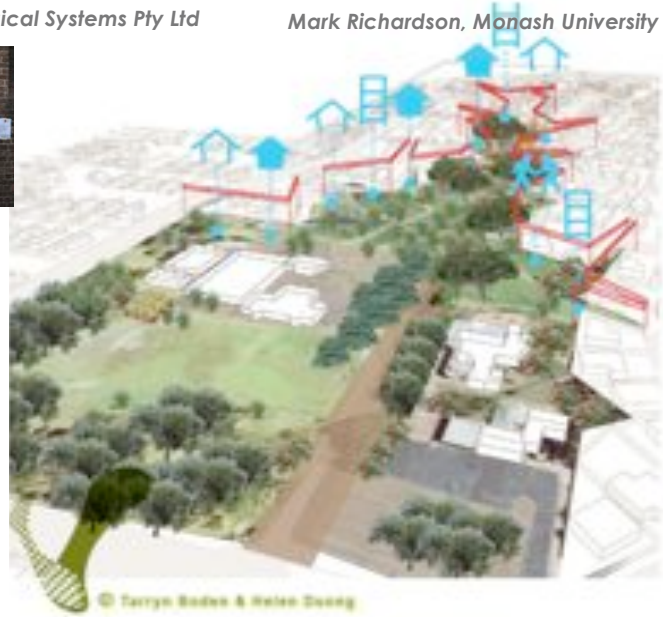
…

Production & Processing

» From backyards and parks to vertical farming

Urban Ecological Systems Pty Ltd

Mark Richardson, Monash University



Distribution & Access

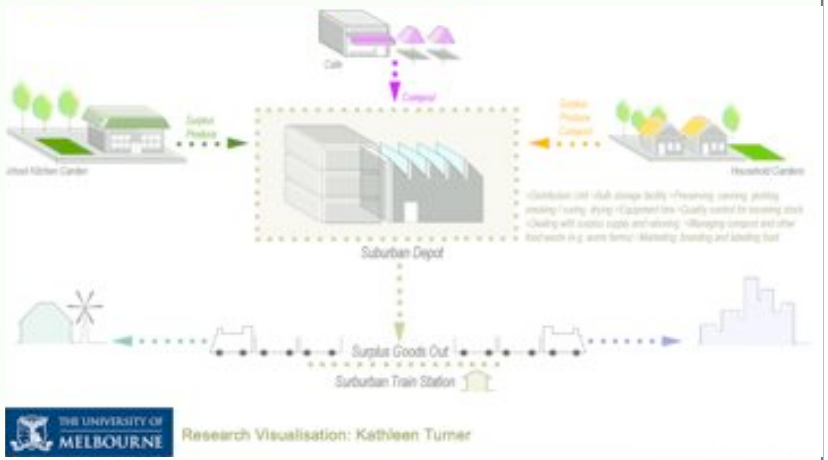
- Building on farmers' markets and community supported agriculture
  - … Regional labels and supermarkets
  - … Farmer owned and run (non-profit) distribution
  - … Distribution hubs
  - … Networked surplus

Swedish & German models

- The regional foodbasket reduces CO_2 emissions from transport by 60%

(Technical University of Munich)

VEIL Urban System Mapping



Amenity

Images courtesy of Jenny Donovan and Adam Smith - David Locke Associates

http://www.dlaaust.com/

Oasis Place

Oasis place is a concept for a town square that reconciles a wide range of social, ecological and environmental objectives and creates a place that celebrates the role of food production to the urban population and allows them to enjoy the health, social, ecological and economical benefits that arise from participating in the production and equitable access to good food.

Communities & Opportunities

Local communities are better able to withstand cycles of change if they know more about the ecological drivers of their region, embrace the processes of natural change, and are empowered to make their own decisions
(Walker and Salt 2006)

» Space, resources and information for people to respond as they need to

Connections

» All the things that people and communities have been and are doing

» Cannot predict or control what new communities will want

Skills and jobs

Some principles . .

Plan and design for food from the beginning

- People need food, in urban and rural areas
- Urban areas have plentiful access to resources that can make food affordable, sustainable and profitable
- To be liveable tomorrow's communities will need to have resilient and affordable access to food - that won't happen if it's not sustainable
- Getting past agriculture OR residential, need to work out AND (don't write off the good land that's already been re-zoned)
- At least three birds with every stone . . food, water, energy, jobs, communities, health, resilience

Build the systems and infrastructure that make it possible

- Start with what is there: map and plan use of available resources - soil capability and nutrient sources, open spaces, storm, waste and rainwater, solar access, biodiversity and genetic resources
- Put in the infrastructure for resilient and affordable water, energy and food
- Close the loops: putting food in the centre changes the value of waste water, organic waste and energy generation (look for win-wins)
- Scratching the neighbour's back / bridging the rural-urban divide: water, nutrients and market access for the farms across the road, fresh food to the outer suburbs
- It's easier to do it from scratch

Choices and opportunities for diverse people, communities and circumstances

- We're facing complex and unpredictable change - design so that people have options to improve their food access (this includes sovereignty)
- Not prescriptive but enabling . . make sure the basics are there for people to use if/when they need to - space, water, sunlight, information (incl. re. contaminated land), choice of outlets, non-oil dependent access, plant open-pollinating fruit trees in public spaces
- Encourage enterprise and diversity - leaving flexibility in the system, options and niches for people to innovate
- Recognise and protect (enhance) ability to produce food in regulation and planning schemes

We have to do it now

A vision without action is just a dream; an action without vision just passes time; a vision with an action changes the world. (Nelson Mandela)

- Let's get serious - there are technical instruction manuals for WSUD
- Research - soils, contamination, water, biosolids, inputs
- Innovation - science & technology, systems, people
- Elegance and simplicity