What do Food Systems Designed for the 21st Century Look Like?

John Williams
NSW Natural Resources Commissioner
And Member the Wentworth Group of Concerned Scientists

Food or Environment - Who will be the winner?

- unequal distribution of food
- conflict over control of the world's dwindling natural resources present a major political and social challenge to governments and policy makers likely to reach crisis status
- as climate change advances
- world population expands.
- energy , fertilizers and pesticides increasingly expensive

Food or Environment

- **Essentially, global agricul**
  increased substantially to r

Food for extra 70 million people EACH YEAR

- **easing impact on**
  nt.

•Water resources/rivers stressed
• loss of production due to land degradation is 19 millions tons grain PER YEAR

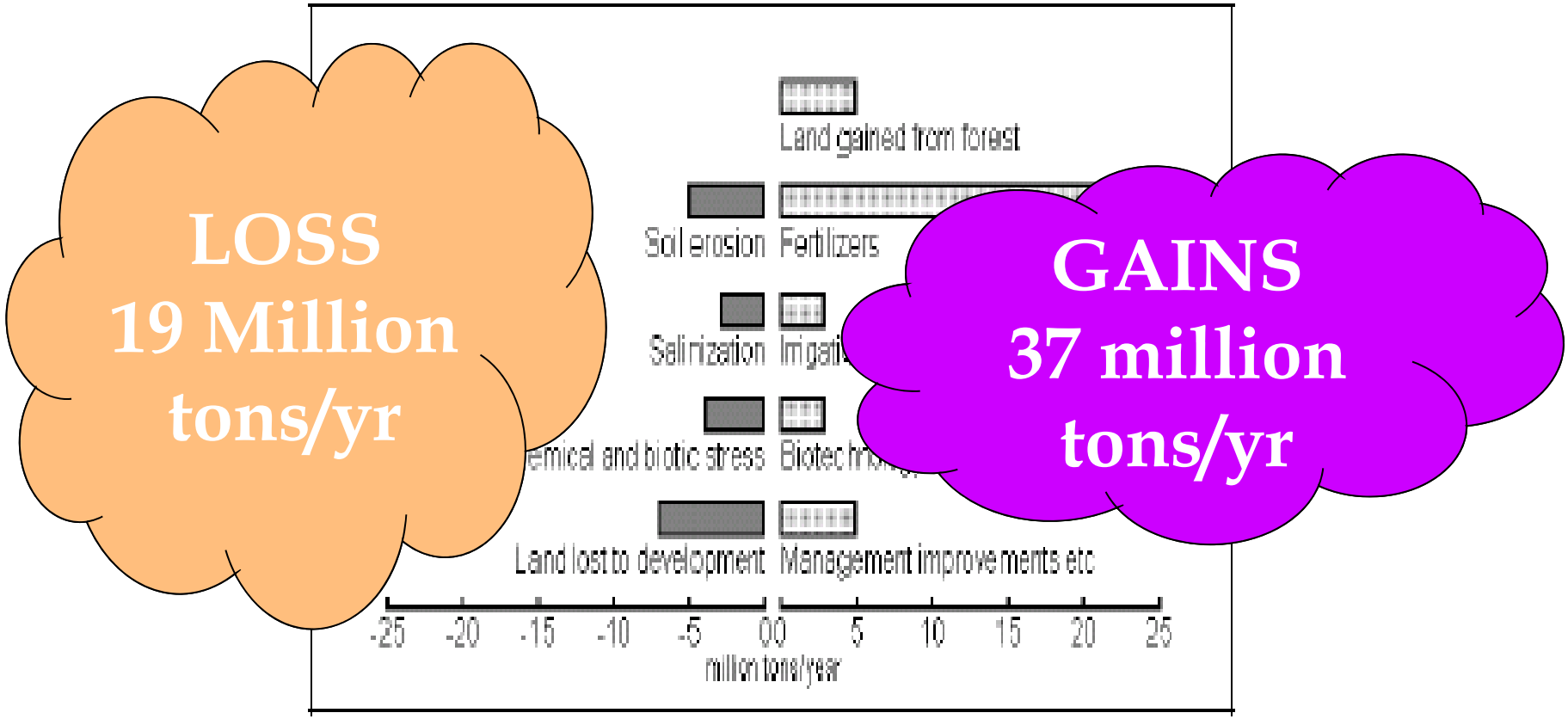


Figure 2. Schematic gains and losses balance out to yield the global food production. (Doos undated)

Food or Environment

To avoid the emerging food crisis without further and increased damage to the environment…..

- **at a time of rising costs for energy**
- **Evidence that peak P is near**
- **within a spectre of climate change**

Food or Environment

This is perhaps the greatest challenge yet to face

- **agricultural sciences**
- **food policy**
- **society**

DECINE IN PRODUCTIVITY GAINS MUST BE REVERSED

OVER 40 YEARS = 1.75% pa
Currently = 1% pa

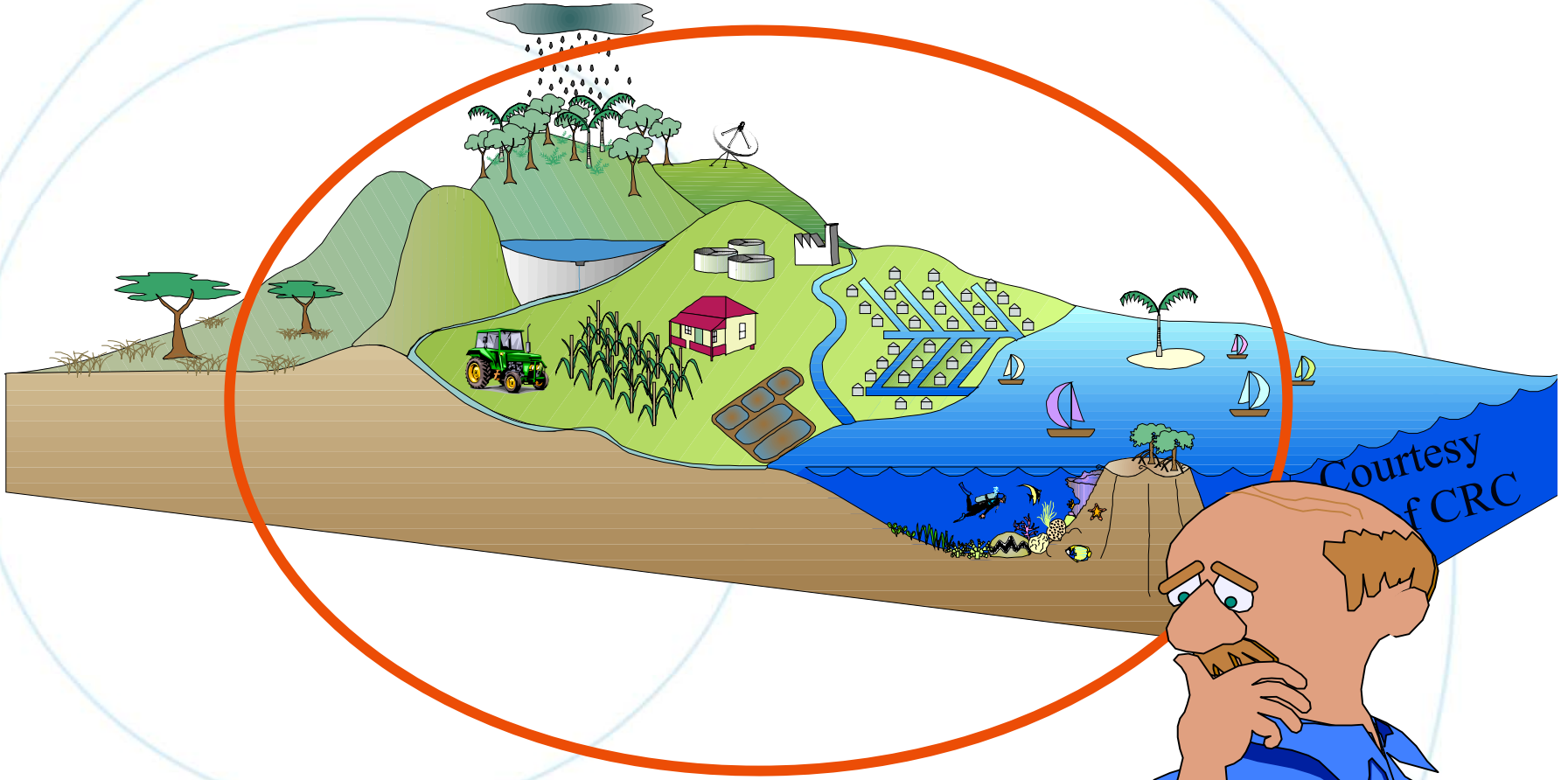
NEEDS TO BE BETWEEN 2-3% pa

Whole Systems Science Solutions Urgent

- We've got to look at ecological, energy and water systems as a whole to appreciate the impacts or the footprint of our food on our natural resource base.

- This was a core message from the recent International Assessment of Agricultural Science & Technology (IAASTD) report

natural resources commission



WHOLE SYSTEM PLEASE

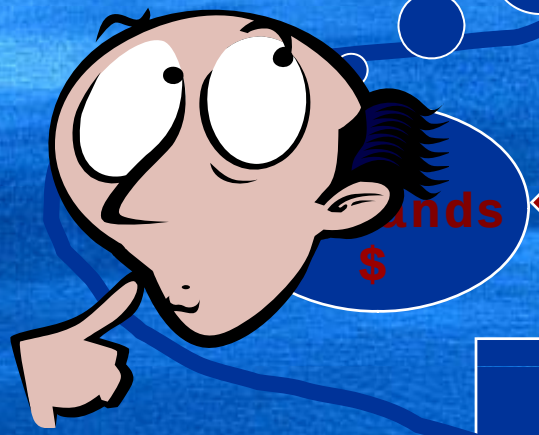
River and Water Resource Management

Water in

- **Irrigation**
- **River & Wetlands**
- **Groundwater**

ARE ONE

Solutions to whole complex system are needed !!!



nds
$

rrigation

$

ainage

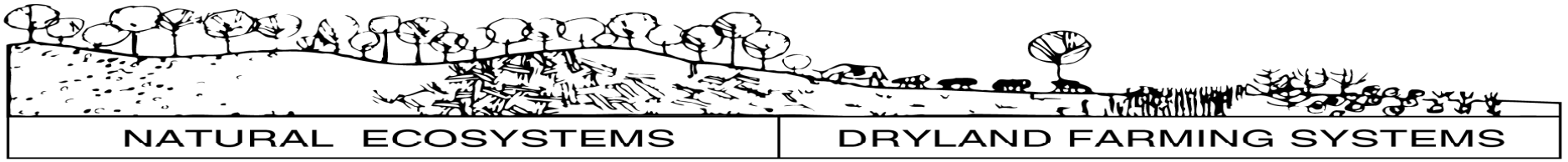
$
Town/City

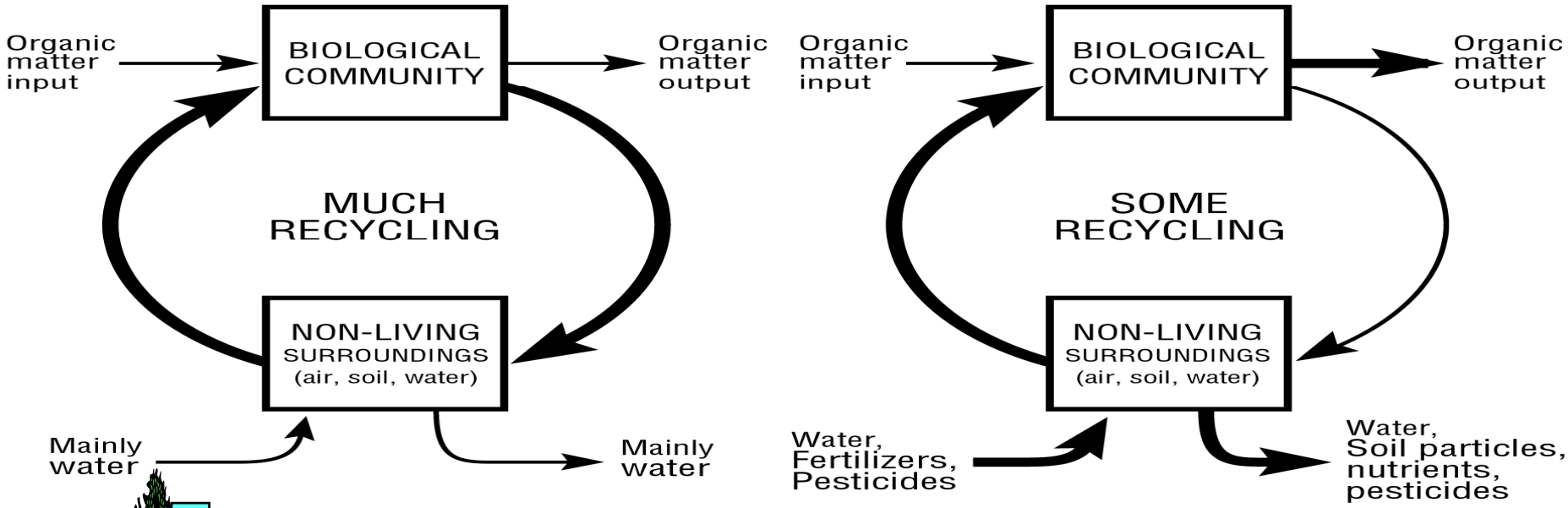
Healthy River, Estuaries & Fisheries

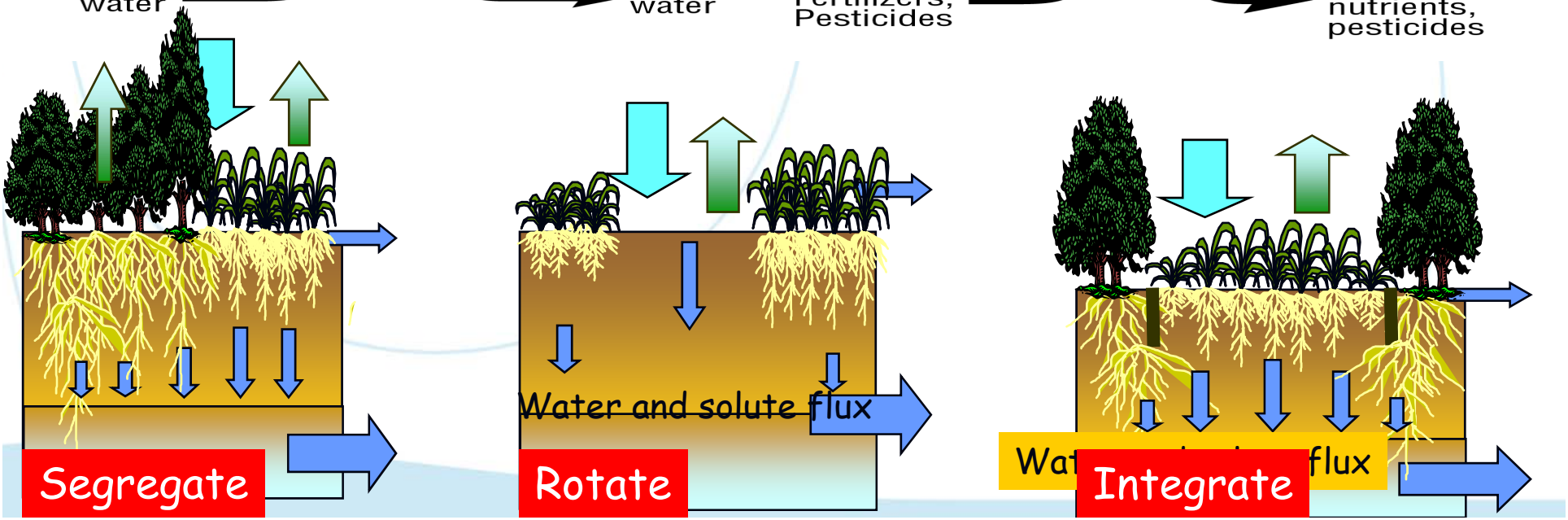
$

Whole Systems Science Solutions Urgent

- It's clear that business as usual is not an option.
- For too long, the emphasis of agricultural science has been on delivering innovation and technologies to increase farm-level productivity.
- Too little attention has been paid to a more holistic integration of natural resource management with food and nutritional security (IAASTD, 2008).
- Fortunately, there is increasing recognition that this current mode of operation requires revision.


NATURAL ECOSYSTEMS
DRYLAND FARMING SYSTEMS


Organic matter input
BIOLOGICAL COMMUNITY
Organic matter output
MUCH RECYCLING
NON-LIVING SURROUNDINGS (air, soil, water)
Mainly water
Mainly water
Organic matter input
BIOLOGICAL COMMUNITY
Organic matter output
SOME RECYCLING
NON-LIVING SURROUNDINGS (air, soil, water)
Water, Fertilizers, Pesticides
Water, Soil particles, nutrients, pesticides


Segregate
Water and solute flux
Rotate
Integrate

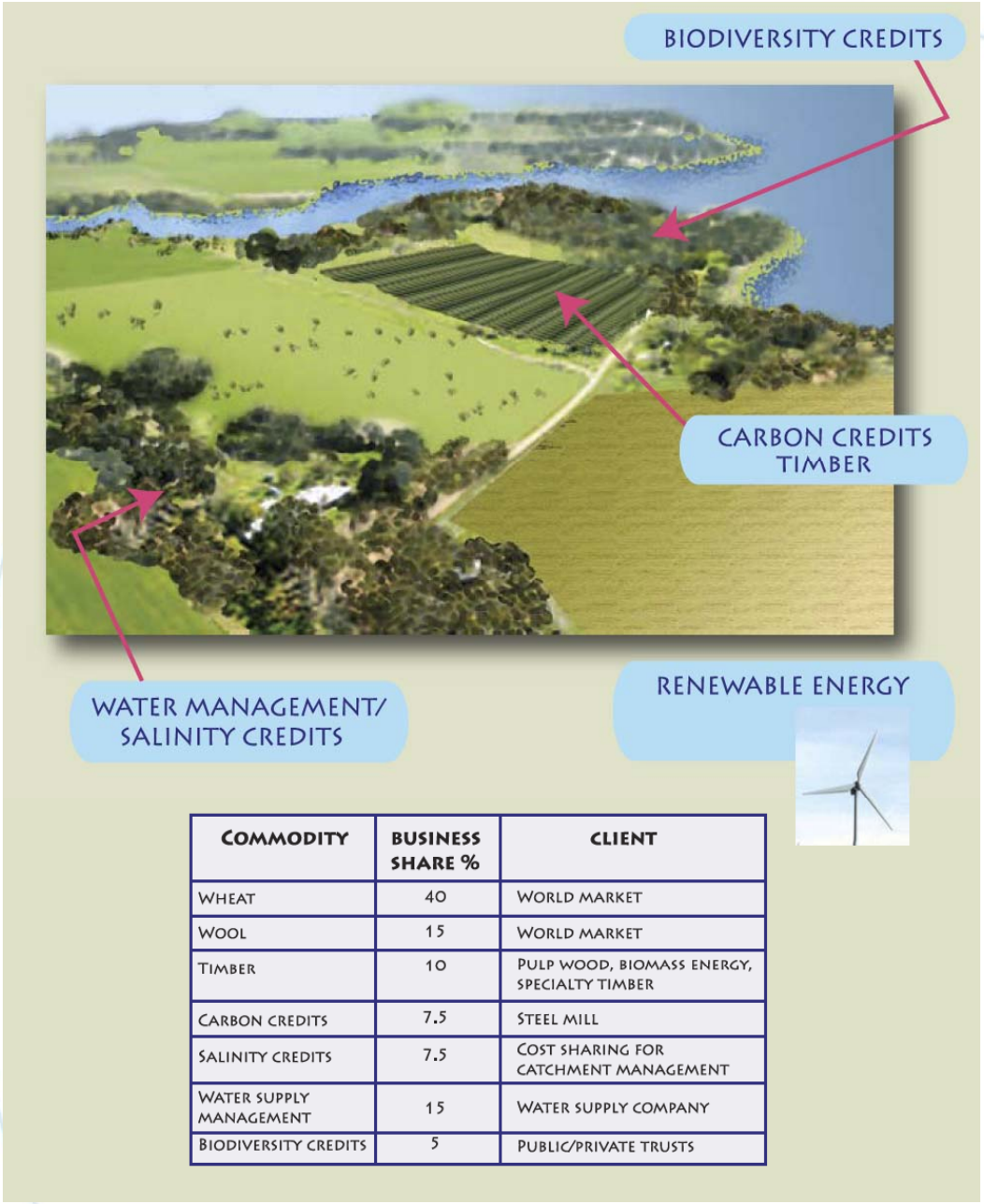
Challenges for Agricultural Science

Sorghum established with minimum tillage and a trash blanket is an example of improved farming practice to cope with climate variability and improve soil health. Development like this is needed to increase food security and reduce damage to the environment. Photo: Matt McKenzie

Millet sown into native pasture, helps to integrate productivity with the ecological processes of the landscape. Photo: Matt McKenzie

Pricing Food for Sustainability

- Rewarding the provision of ecosystem services is a good start
- We need investment in the economic valuation of ecosystem services
- With a market for these services, farmers in the future will not only be paid for the goods they produces but also for the services they deliver through the management of healthy landscapes, rivers, wetlands and estuaries for the public good



COMMODITY	BUSINESS SHARE %	CLIENT
WHEAT	40	WORLD MARKET
WOOL	15	WORLD MARKET
TIMBER	10	PULP WOOD, BIOMASS ENERGY, SPECIALTY TIMBER
CARBON CREDITS	7.5	STEEL MILL
SALINITY CREDITS	7.5	COST SHARING FOR CATCHMENT MANAGEMENT
WATER SUPPLY MANAGEMENT	15	WATER SUPPLY COMPANY
BIODIVERSITY CREDITS	5	PUBLIC/PRIVATE TRUSTS

A future form of sustainable agriculture

(Credit: Dinah Johanson. Modified from Wayt Gibbs, *Scientific American,* 2005)

Pricing Food for Sustainability

- Cost of food doesn't include cost of maintaining natural resource base.
- We need governments to adopt policies that create incentives for sustainable practices and costs to the environment being internalised.
- Traditionally, food prices do not include the cost of environmental damage. The natural resource base (land, water, biodiversity) for agriculture continues to suffer.
- We can't afford to keep running down the systems that feed us.

Pricing Food for Sustainability

- For as long as the cost of maintaining and improving the natural resource base in agricultural systems is not included in the price of food, farmers will never be able to farm sustainably and profitably.
- We need market and trade policies that remove perverse subsidies.

Pricing Food for Sustainability

- **regulatory framework to ensure food production minimises damage to natural resources & environment**
- **need an Australian standard for sustainable agriculture for local & imported products**
- **'*Australian Sustainable Agriculture Standard*' must include whole life cycle analysis of energy, water, land & biodiversity inputs into production**

Some Ways Forward

- Expand this reformed R&D effort
- Australian Science has important place to play
- Reform of markets and regulations to ensure cost of food includes the costs to natural resources and environment
- Orientate to a more market-based system of production, distribution and consumption of food

Conclusion

- It is a time of Change.
- We cannot afford to be "asleep at the wheel!"
- It is a time for turning Challenges into Opportunities.
  We will have to make choices.
  It will pay to be on the front foot.
- Adaptation and innovation will be important.
- It is not the time to panic!
- But it is the time to think and change.

References

- von Braun, J., 2007. The world food situation: new driving forces and required actions. Food Policy Report. International Food Policy Research Institute. Washington DC.
- Cribb, J., 2008. 'CSIRO erodes its own grand place in the world' in The Canberra Times, 9 June 2008. http://canberra.yourguide.com.au/news/opinion/editorial/general/csiro-erods-its-own-grand-place-in-the-word/785452.aspx
- IAASTD, 2008. The International Assessment of Agricultural Knowledge, Science and Technology for Development. See at http://www.agassessment.org/
- Kiers, E.T., Leakey, R.R.B., Izac, A., Heinemann, J.A., Rosenthal, E., Nathan, E. and Jiggins, J., 2008. 'Agriculture at a Crossroads' in Science, Vol 320, 18 April 2008, 320-321,
- Williams, J., and McKenzie, F. (2008). Farming without Harming, Australasian Science, Vol 29, No7, 31-34, August, 2008.
- Foresight. The Future of Food and Farming: Challenges and choices for global sustainability (2011) Final Project Report. The Government Office for Science, London.