

Environmental / Ecosystem Services explained

Peter Ampt

Australia 21 Fellow

Manager, FATE Program, UNSW
(Future of Australia's Threatened Ecosystems)

With thanks to Steve Cork



Ecosystem / Environmental Services Explained

Let's try to be clear about what we mean!!

- Ecosystem or environmental services?
- What they are, what they're not.
- Why are they important to landholders?
- What has already been done?
- Key questions.

ORIGINS

- Environmental Services (*SCEP 1970*)
- Public-Service Functions of the Global Environment (*Holdren & Ehrlich 1974*)
- Public Services of the Global Ecosystem (*Ehrlich et al. 1977*)
- Nature's Services (*Westman 1977*)
- Ecosystem Services (*Ehrlich & Ehrlich 1981*)
- Nature's Services (*Daily 1997*)
- Ecosystem Services (*Costanza et al 1997; Millennium Assessment 2005*)

ECOSYSTEM SERVICES

“... benefits that people obtain from ecosystems”

(Millennium Ecosystem Assessment 2005)

<http://www.millenniumassessment.org>

ENVIRONMENTAL SERVICES

‘This research examines changes in environmental services that are arising from improvements in farming practices and analyses the economic value to the community of these services.’

Gillespie, R, Dumsday, R & Bennett, J 2008

Estimating the Value of Environmental Services Provided by Australian Farmers

Research Report, Australian Farm Institute, Surry Hills, Australia.

Ecosystem services

... identifies a manageable set of benefits that people get from ecosystems

... to engage a wider range of stakeholders in dialogue about what benefits are needed where, when and by whom

ECOSYSTEMS NEEDED FOR ...



Water filtration and purification



ECOSYSTEMS NEEDED FOR ...

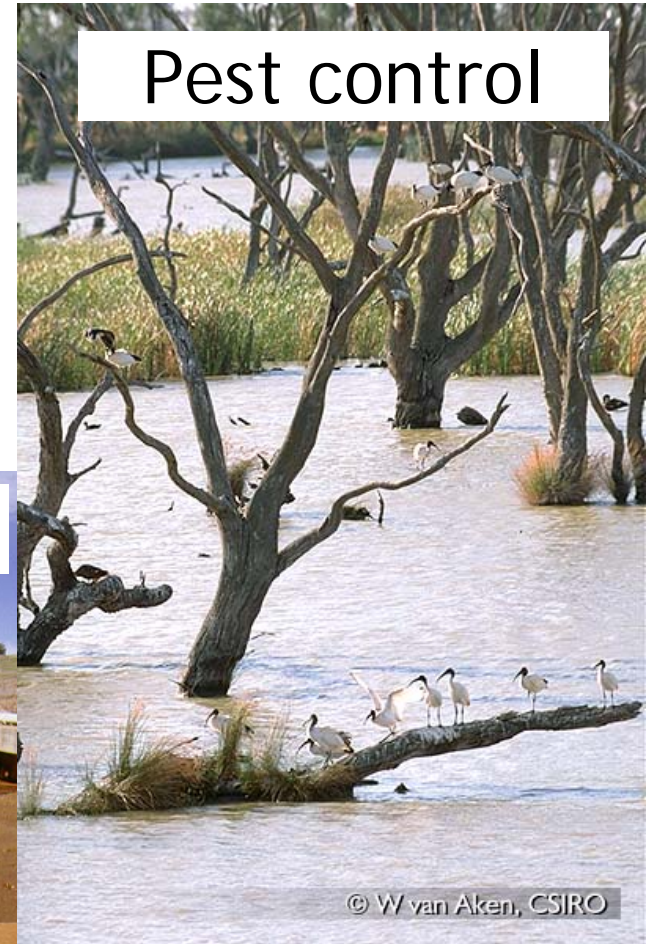
Flood mitigation



Waste assimilation



Pest control



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ECOSYSTEMS NEEDED FOR ...



Pollination



Seed dispersal

ECOSYSTEMS NEEDED FOR ...



Aesthetic, cultural, educational values

NEW YORK CITY'S WATER

TECHNOLOGY SOLUTION

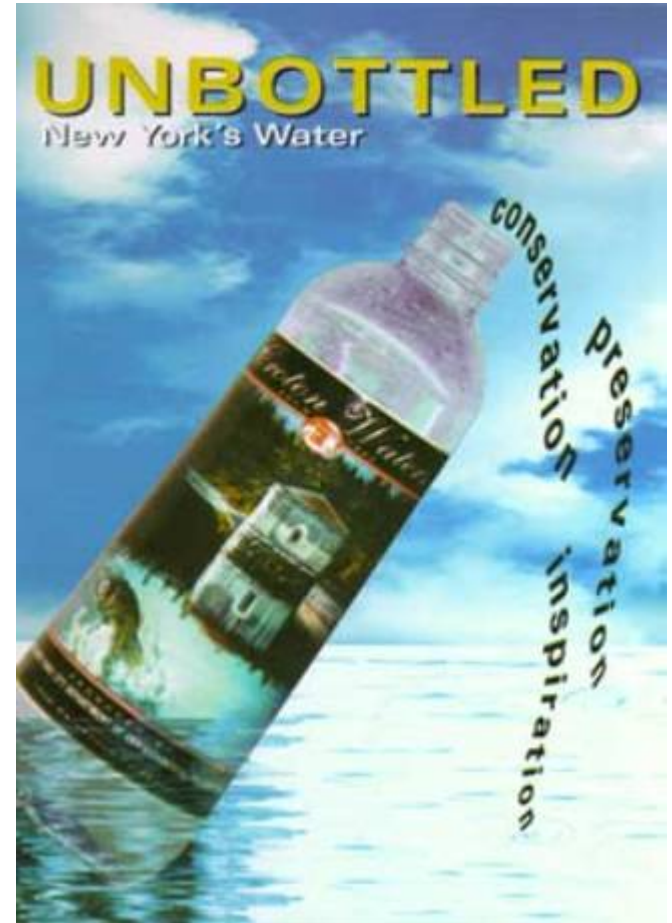


- Filtration facility
- \$8-10 billion + ongoing

ECOSYSTEM SOLUTION



- Repair catchment
- \$1-2 billion one-off



REPLACEMENT: FLOOD MITIGATION



REPLACEMENT: SOIL FERTILITY



Ecosystem Services

... *is* part of society's response to ESD – *not* an alternative

... *is* a way of adding value to well established approaches in economics and ecology – *not* a replacement

... *is* a way of framing and communicating planning and policy issues – *not* a new discipline or set of techniques

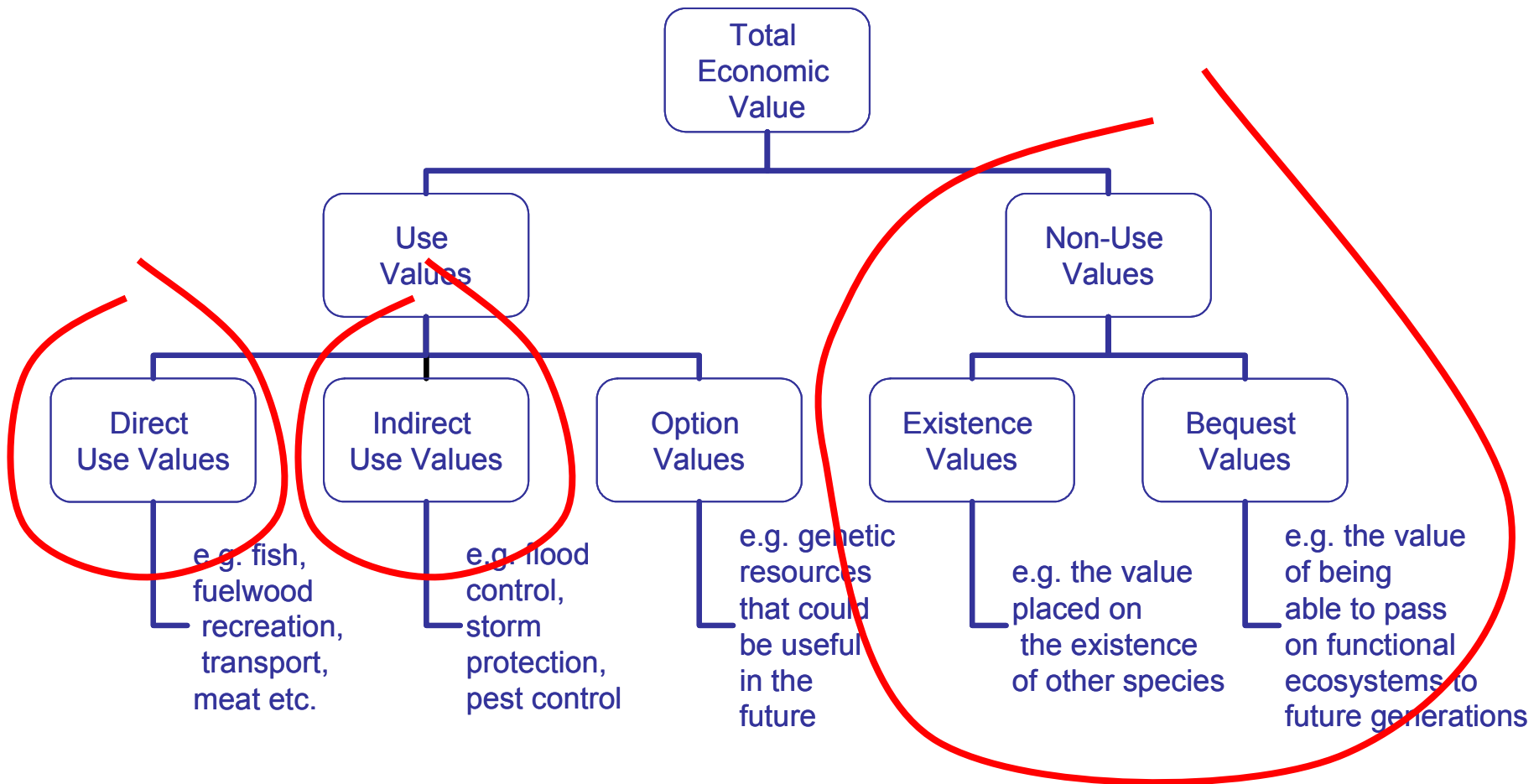
... *is* a meaningful way of community and stakeholders contributing transparently to catchment and land-use planning

The value of the world's ecosystem services and natural capital

Robert Costanza et al *Nature* **387**, 253 - 260 (15 May 1997);

- For the entire biosphere, the value (most of which is outside the market) is estimated to be in the range of US\$16-54 trillion (10¹²) per year, with an average of **US\$33 trillion per year**.
- Global gross national product total is around US\$18 trillion per year.

Ecosystem services = services provided by ecosystems *not* land managers



ECOSYSTEM SERVICES

Supporting

- NUTRIENT CYCLING
- SOIL FORMATION
- PRIMARY PRODUCTION
- ...

Provisioning

- FOOD
- FRESH WATER
- WOOD AND FIBRE
- FUEL
- ...

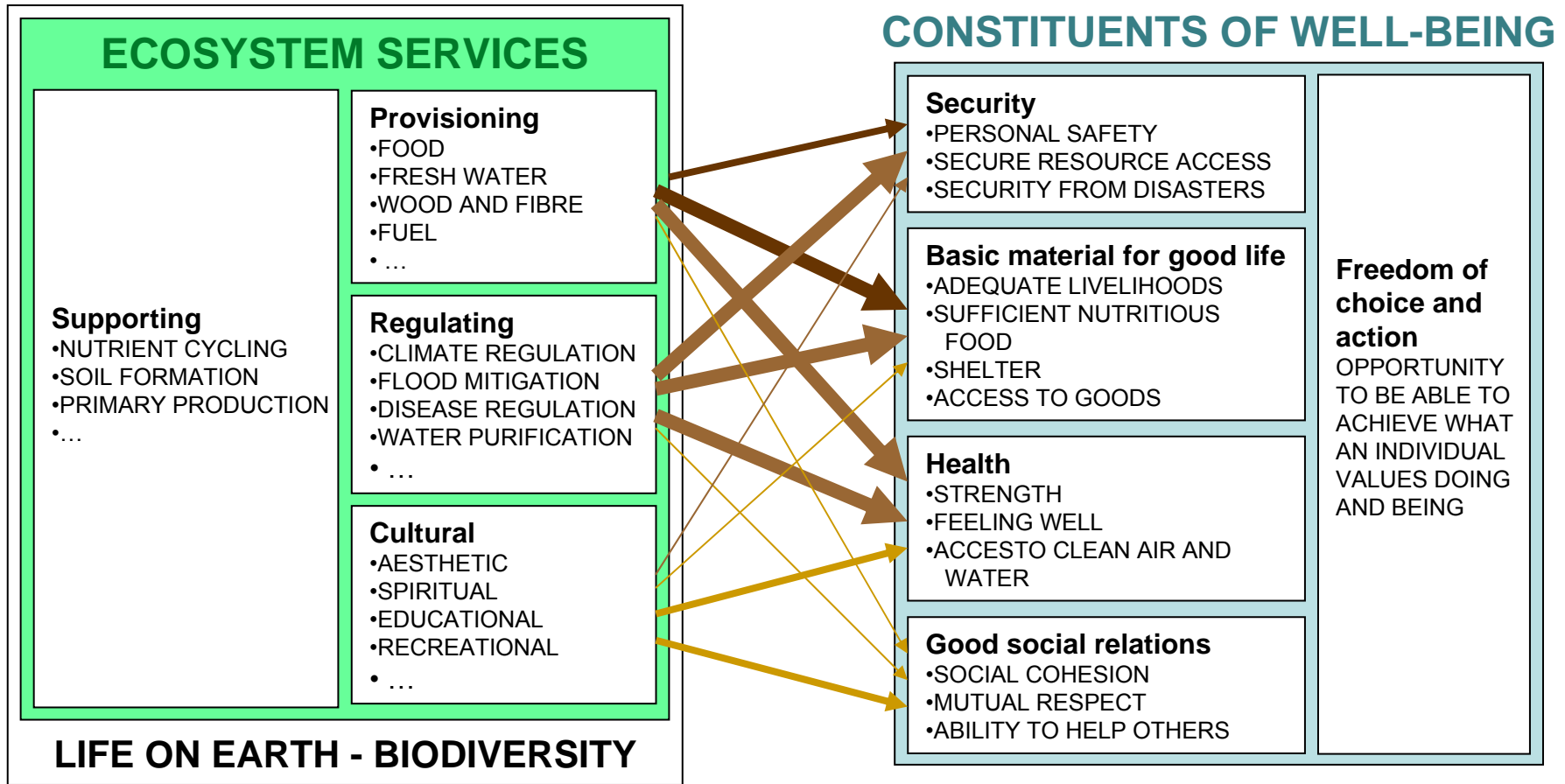
Regulating

- CLIMATE REGULATION
- FLOOD MITIGATION
- DISEASE REGULATION
- WATER PURIFICATION
- ...

Cultural

- AESTHETIC
- SPIRITUAL
- EDUCATIONAL
- RECREATIONAL
- ...

LIFE ON EARTH - BIODIVERSITY



ARROW COLOURS: Potential for mediation by socioeconomic factors*

Low

Medium

High

ARROW WIDTHS: Intensity of linkages between ecosystem services and human well-being

Weak

Medium

Strong

* if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation

Millennium Ecosystem Assessment - Global Status Ecosystem Services

Provisioning Services

Food	crops	▲ substantial production increase
	livestock	▲ substantial production increase
	capture fisheries	▼ declining production due to over-harvest
	aquaculture	▲ substantial production increase
	wild foods	▼ declining production
Fiber	timber	+/- forest loss in some regions, growth in others
	cotton, hemp, silk	+/- declining production of some fibers, growth in others
	wood fuel	▼ declining production
Genetic resources		▼ lost through extinction and crop genetic resource loss
Biochemicals, natural medicines		▼ lost through extinction, over-harvest
pharmaceuticals		
Fresh water		▼ unsustainable use for drinking, industry, and irrigation; amount of hydro energy unchanged, but dams increase ability to use that energy

Regulating Services

Air quality regulation		▼ decline in ability of atmosphere to cleanse itself
Global climate regulation - global		▲ net source of carbon sequestration since mid-century
- regional and local		▼ preponderance of negative impacts
Water regulation		+/- varies depending on ecosystem change and location
Erosion regulation		▼ increased soil degradation
Water purification and waste treatment		▼ declining water quality
Disease regulation		+/- varies depending on ecosystem change
Pest regulation		▼ natural control degraded through pesticide use
Pollination		▼ apparent global decline in abundance of pollinators
Natural hazard regulation		▼ loss of natural buffers (wetlands, mangroves)

Cultural Services

Spiritual and religious values		▼ rapid decline in sacred groves and species
Aesthetic values		▼ decline in quantity and quality of natural lands
Recreation and ecotourism		+/- more areas accessible but many degraded

WHATEVER WE CALL THEM ...

- They are real
- They support our economy, lifestyle, well-being, existence
- They are not automatically self-sustaining
- They are being degraded
- They are usually ignored
- Some are in markets, some might be, some probably never will be
- Rights and responsibilities are unclear

ECOSYSTEM SERVICES APPROACH

Seeks to integrate the ecological, social and economic dimensions of natural resource management by:

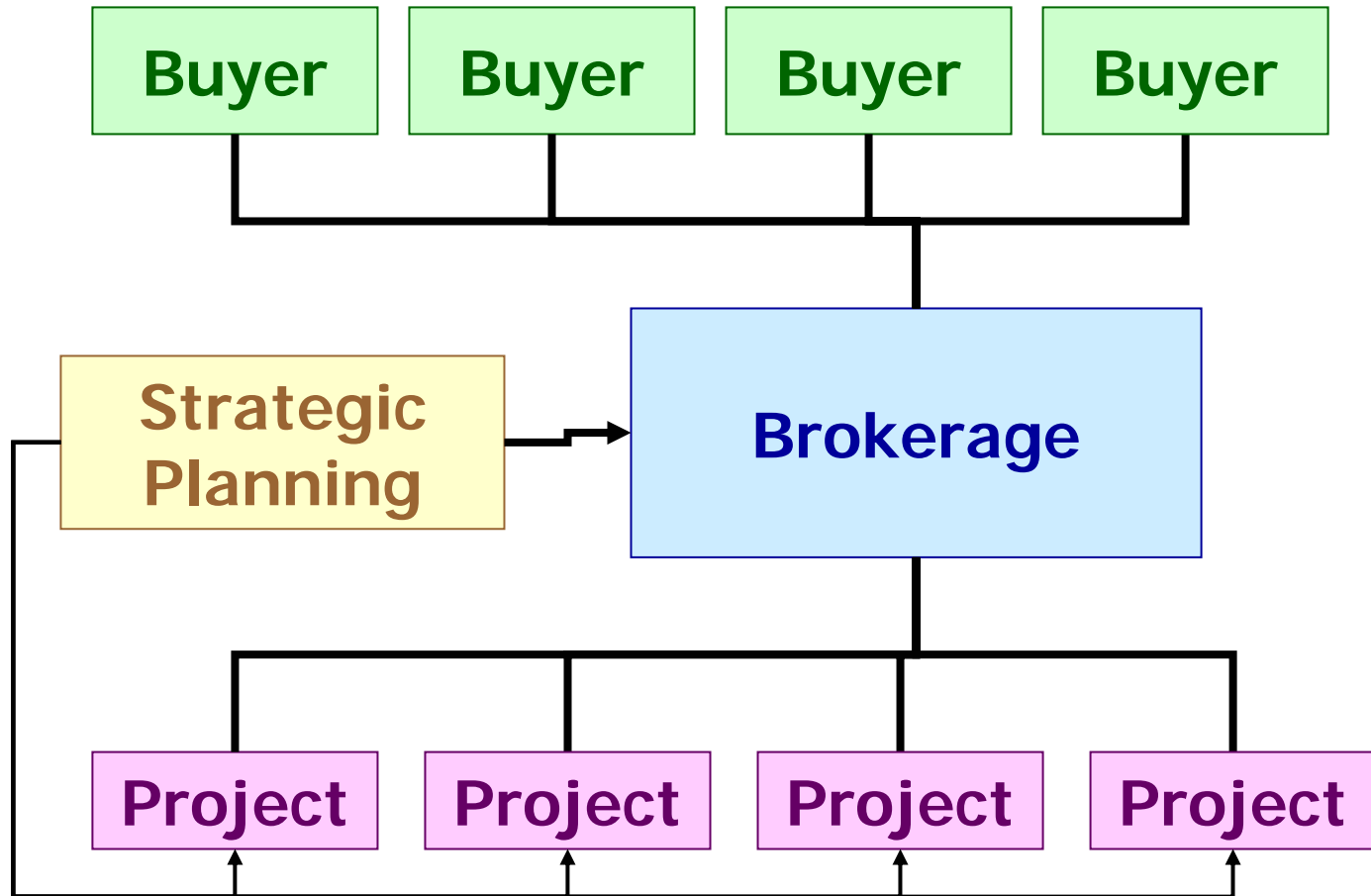
- explicitly identifying and classifying the benefits that people derive from ecosystems;
- describing and communicating these benefits in concepts and language that a wide range of people can understand;
- posing and trying to answer a set of critical questions about sustainable management of ecosystems and human welfare;
- The answers could involve payments to people who, by their actions, contribute to maintenance of ecosystems that provide services, hopefully paid for by those that benefit from those services.

NATIONAL ES STRATEGY

- Develop and communicate key messages and frameworks ...
- Build links between the maintenance of ecosystems and commerce ...
- Develop structures, mechanisms and institutions ... for preservation and enhancement of ecosystem services ...
- Acknowledge International obligations and generate opportunities ...

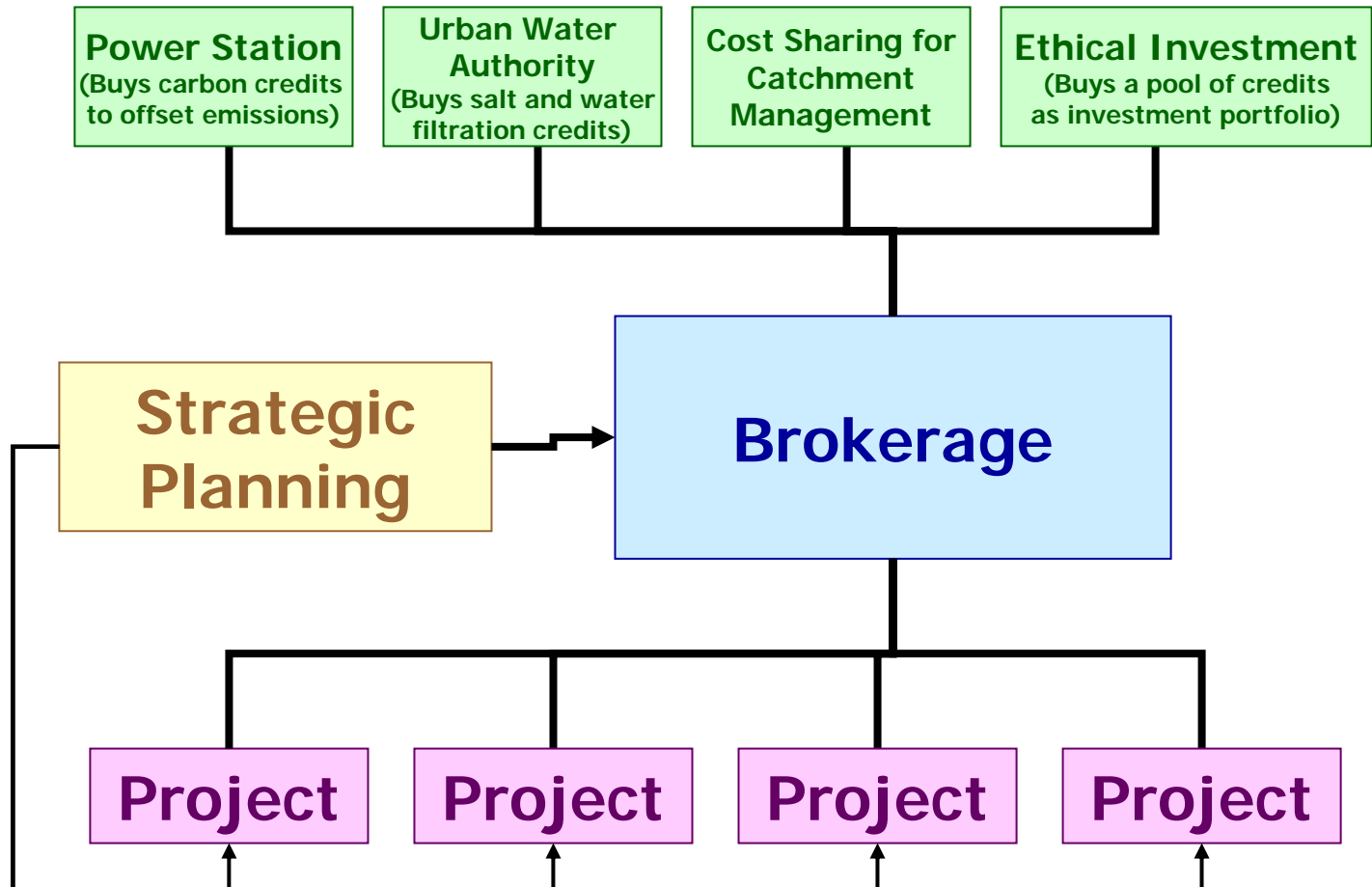
Markets for Ecosystem Services - how might they work?

David Shelton, CSIRO Sustainable Ecosystems, Ecosystem Services Project



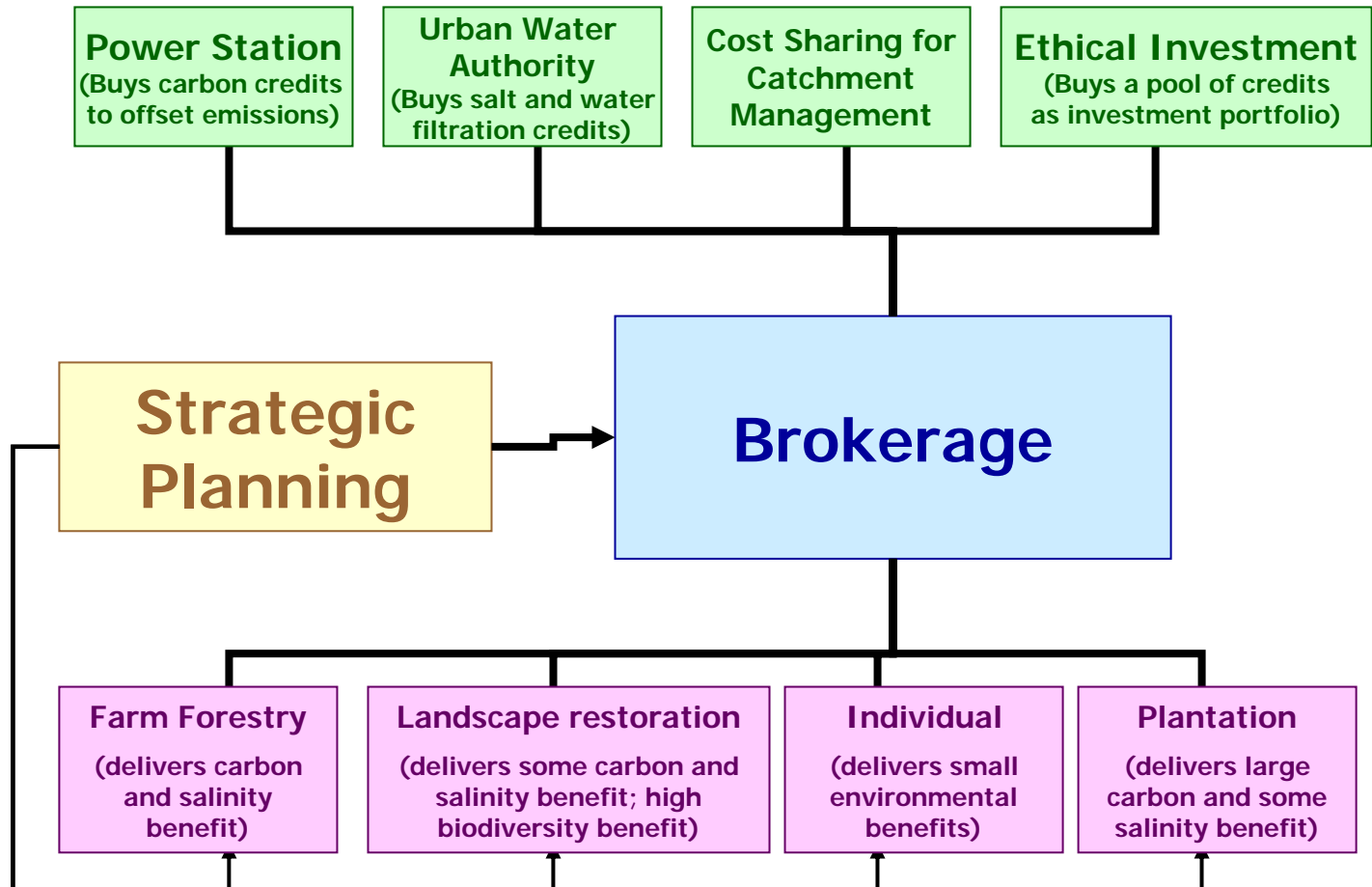
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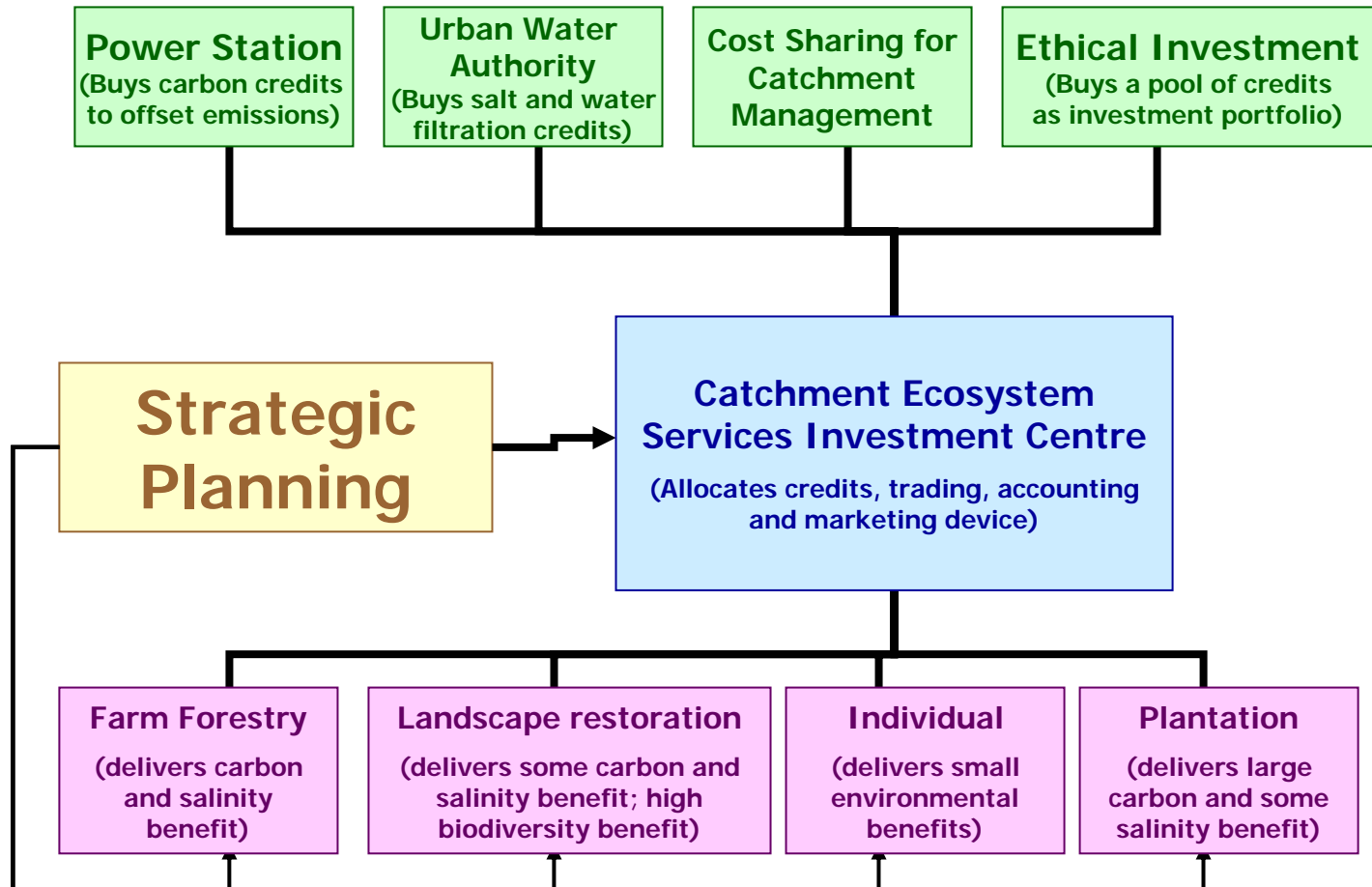
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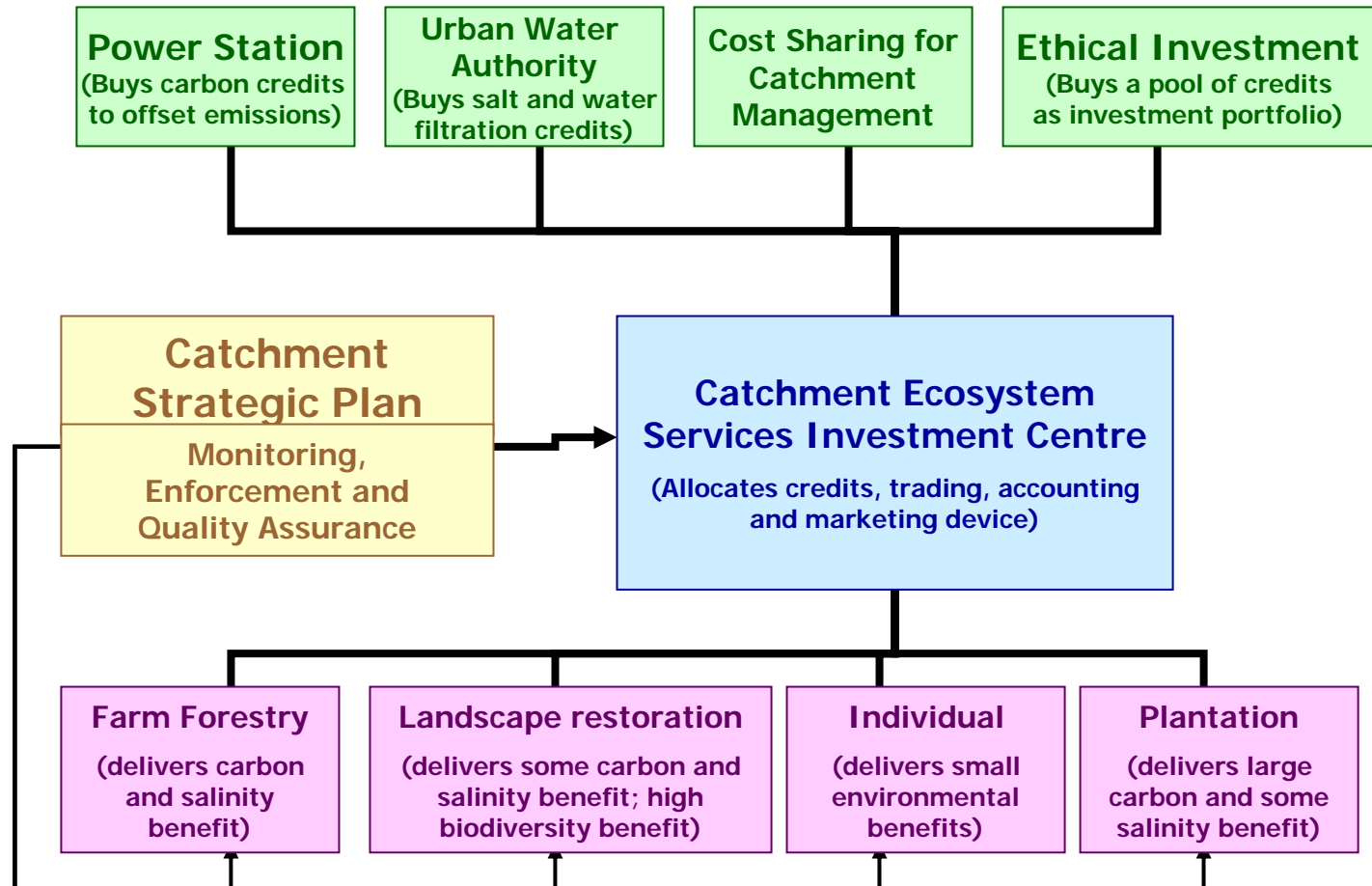
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A Typical Farm in 20 Years?

Commodity	Share of farm business (Net Present Value)	Client
Cerals	40%	World Market
Wool	15%	World Market
Timber	10%	Pulp Wood Specialty Aust Timber Merchants
Carbon Credits	7.5%	Japanese Steel Company
Salinity Credit	7.5%	Cost Sharing for Catchment Management
Water Filtration Credit	15%	Water Board
Biodiversity Credit	5%	Philanthropic Trust

David Shelton, CSIRO Sustainable Ecosystems,
Ecosystem Services Project – ended 2006!!

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Gillespie, Dumsday & Bennett AFI Research Report 2008

Attempts to estimate the dollar value to Australia of farmers adopting sustainable practices such as:

- biodiversity conservation;
- protection of water resources;
- soil formation and protection;
- nutrient storage and recycling;
- pollution breakdown and absorption;
- climate stabilisation;
- pest and weed control and
- conservation of potential future bio-resources.

Does this mean:

- By implication farmers should be paid for these actions?
- Farmers should feel proud about (and be paid for) reducing the damage but not fixing the problem?

KEY QUESTIONS

- Who does what for whom?
- Who benefits? Who pays?
- How do we set the level for duty of care?
- Where does land stewardship above duty of care start?
- What if public good is also private benefit?
- Should payments be for actions or outcomes?
- What could/should governments do?
- How can an ES that is in a market help maintain others?
- In what ways can landholders be pro-active?

Being pro-active

- EMS and environmental accreditation?
- Collaboration – Landscape Corporation?
- Conservation through sustainable use strategies:
 - Native perennial dominated pastures?
 - Pasture cropping?
 - Kangaroos?
 - Multiple-use ‘reserves’?
- Carbon Farming?

