Pushing a New Paradigm

Creative Transitions to Sustainable Futures

across all the well-beings

CWEA joined up to the World

14th, 17th, 21st May, 2018

Join the conversation: https://cwea.arlo.co/courses/288-sustainabilitycreative-transitions-to-sustainable-futures-we-need-to-change-things-but-how-come-and-help-work-on-new-ideas-and-models-for-a-sustainable-future

Coordinated by Colin Meurk – colinmeurk02@gmail.com

Abstract

Instigating a New Paradigm - Creative Transitions to Sustainable Futures across all the Well-Beings

In three evenings, we will explore joined-up approaches to **economy, society, place-making, kaitiakitanga,** best ecological practice, and how to inspire society and culture on this fragile planet to change course. Should be easy! We will interrogate the latest insights on **global trajectories and emerging crises**, structured around the standard 'well-beings', then conduct a **visioning exercise** addressing the need for radical solutions, their shape and implications. The focus will shift to defining and designing **practical transitions from BAU to soft-landings** onto a **sustainable future**. We will critically explore ideas that are evidence-based, life-affirming, reality-checked and within the comfort zone of real people - across cultures, religions, ethnicities, and personalities. A big ask? And **we can only make a start**, but this and follow-up **discussion will direct and refine research questions** around trends, consequences, sustainable needs, optimal design and acceptability of change. The precautionary principle and the need for urgent change suggests global society needs to have a **Plan B** ready for when near future governments desperately ask 'what can we do'? **Our method will be interactive** – using techniques of collaborative learning and **co-creation of solutions to wicked problems**; we will acknowledge and employ existing groups and initiatives in the city and around the world (not start from scratch). We will work the crowd to get your input. Our objective here in Ōtautahi-Aotearoa is to be a **beacon** that shines through the gloom.

Creative Transitions to Sustainable Futures

across all the well-beings

GENERAL INTRODUCTION

- **Your hosts tonight** (tangata whenua, CWEA, ecologists, soil scientists, engineer, sociologists, economist, systems specialists and you; many from Manaaki Whenua)
- **Setting the scene** generally
- **Course Framework**

- **Personal Introductions** – background, interests, what you hope to get from course (1 minute – yeah right ☺)
- Introduction to the **topic of the night**
- Facilitated discussions around **goals/visions** (Nick Kirk)
- Facilitated discussion around **transitions & step designs**

Framework for CWEA Evening Class

3 nights with food for body & soul

6 Bottom Lines/Pillars of Sustainability/Well-beings

- **Ecology/Eco-sphere (14th)**
  - Physical environment (role in health)
  - Biodiversity (role in place-making)
- **Sociology/Socio-sphere (17th)**
  - Psycho-Socio-Political dynamics & Governance
  - **Cultural dimensions**
- **Economics/Econo-sphere (21st)**
  - Conventional BAU accounting
  - Steady State Equity

NB The three pdfs available to download from this web link represent the 3 themes (above), introduction to the evening, presentations, and feedback summaries from discussions. The overall personal feedback from a third of registrations is presented on last pages of 3rd pdf.

Acknowledgements

- You all for attending
- Wendy Butcher of Canterbury WEA
- Nick Kirk, Ronlyn Duncan & Franca Buelow
- Gwen Grelet, Edward Mitchell, John Scott, Thomas Caspari, John Peet & Katherine Peet
- Anja Hess & Marivee McMath for preparing and analysing the feedback
- All those who have supported the concept of *Creative Transitions to Sustainable Futures*
- Many of the contributors are staff or associates of *Manaaki Whenua – Landcare Research* but participated at this event in their private capacity
- **Note** – with more attending that anticipated, the intended format had to undergo a bit of adaptive management

Structure/Format for WEA Course each night

- **Introduction** to the night's topic (CDM, invited catalysts, participants)
- Brief **Review**: State of **World Knowledge & Thinking** on one each of 3 broad topics per night; excerpts from '**Looming Disasters**' ☹
- **Visioning** - moving to optimism, hope, empowerment ☺
  - **Facilitated discussion** on what people would like to see/achieve in their life time; by end of century, end of next century – **goal setting**
  - Define likely/necessary **soft landing** points
- **Backcasting** – designing the stepping stones from BAU to the vision, softly landing
  - **Facilitated discussion** on what is needed & **how to transition** (everyone - regardless of beliefs/personality/history) along a sustainable/acceptable trajectory towards those goals – what change can society cope with & under what circumstances – with reality checking.
- What this **means/requires** economically (equity), psycho-socially, culturally, governance-wise, ecologically
  - For CHCH, NZ, World (does CHCH have a role?)
- **Identify unknowns/gaps** to inform **Research opportunities/proposals**
  - **designing transitions to fit real people's comfort zone** & if there is interest to view it as
  - a stepping stone to further discussions – **building a new manifesto/consensus.**

Our World without Economic Growth

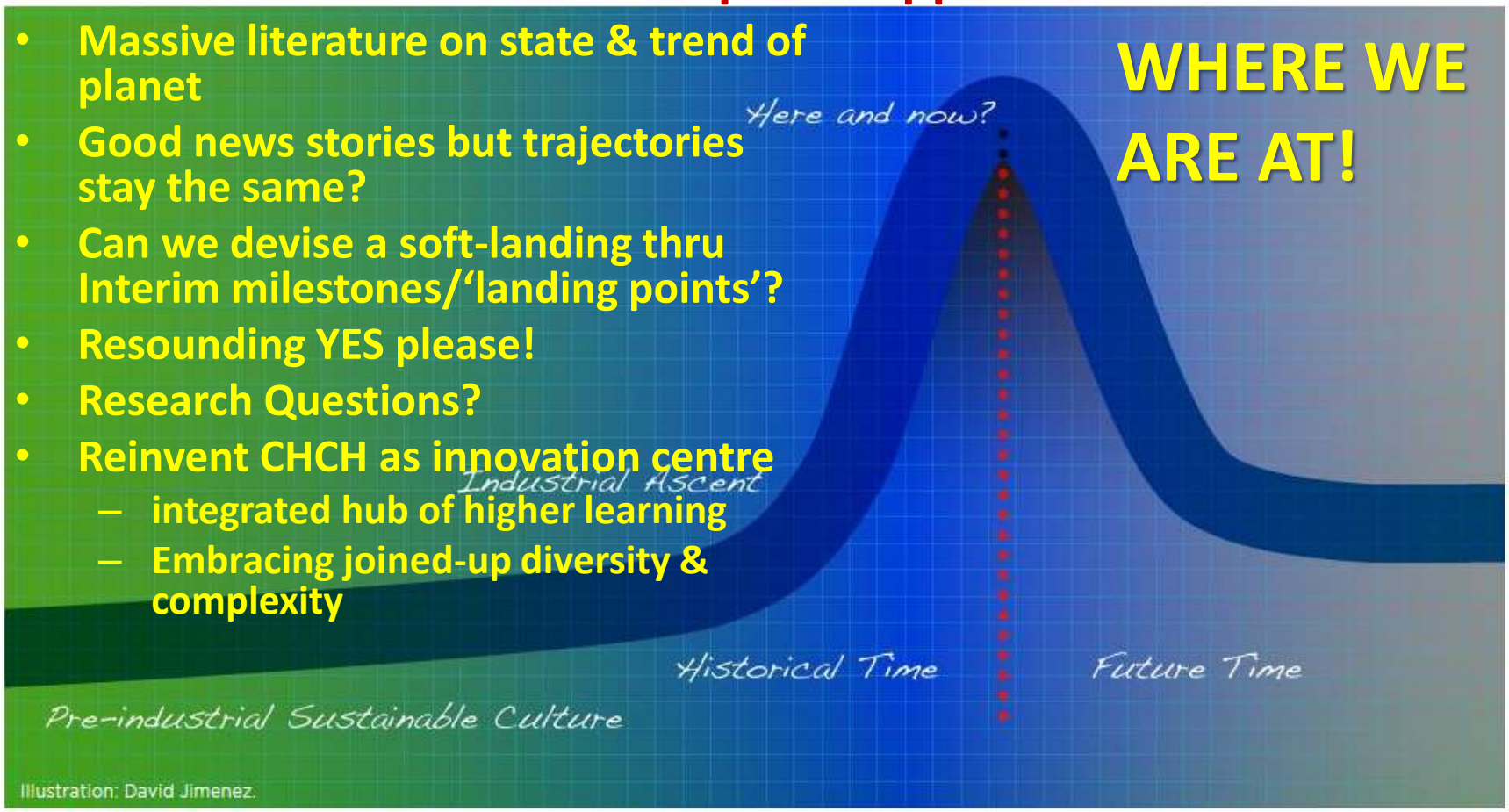
SCIENCE & TECHNOLOGY : Energy, Economics, Business

2010•04•14 Christopher Doll United Nations University

8 Comments | Email | Tweet | Share

Peak oil, peak cow, peak potable water, peak arable land, peak money peak happiness !!??

- Massive literature on state & trend of planet
- Good news stories but trajectories stay the same?
- Can we devise a soft-landing thru Interim milestones/'landing points'?
- Resounding YES please!
- Research Questions?
- Reinvent CHCH as innovation centre
  - integrated hub of higher learning
  - Embracing joined-up diversity & complexity

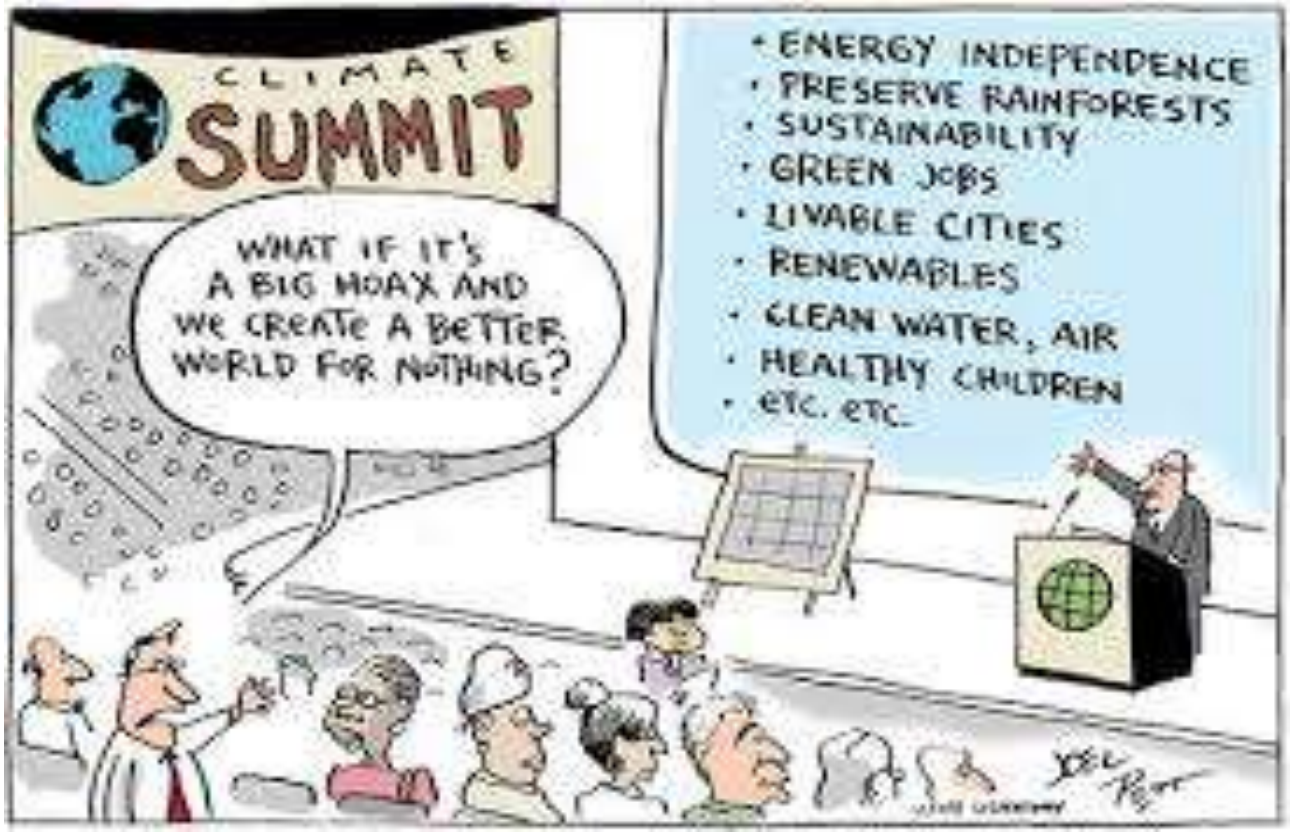


Last March, Tim Jackson put forward the idea of prosperity without growth in a report published by the United Kingdom's Sustainable Development Commission and followed up with a book of the same name released last November. The book is a best seller (ranked 1,729 on Amazon) and in it he argues convincingly that we can still prosper without adhering to the encoded mantra of expansion and growth that permeates modern market economies.

The way forward

Transition to a life-affirming global culture

Bring Uncomfortable Truths into Mainstream



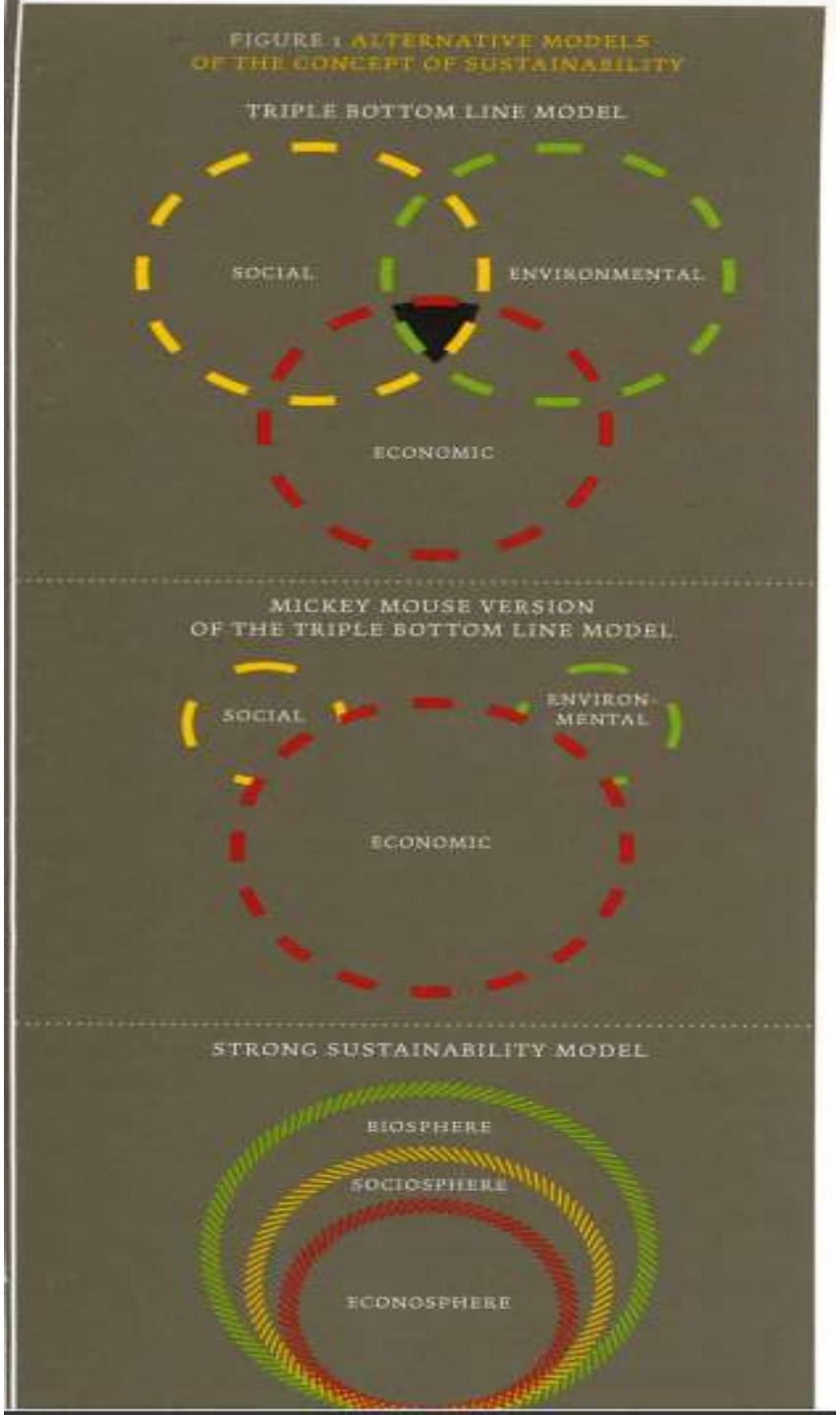
Rather (precautionary principle) …

do we have answers good-to-go if the manure hits the fan ?

The Earth is vast; it is our Home

The Great Transition Initiative - www.InspiringTransition.net

Definition of Strong Sustainability From *Sustainable Aotearoa NZ* (SANZ) Living within earth limits http://www.earthslimits.org/



Note the Hierarchy of Nested Spheres for Strong Sustainability

Definition of Strong Sustainability From *Sustainable Aotearoa NZ* (SANZ)

Living within http://www.earthslimits.org/

TION OF STRONG SUSTAINABILITY

ng sustainability is the equisite and foundation y human development, her social, economic chnological.

2 Strong sustainability means the preservation of the integrity of all ecological systems in the biosphere.

3 Ecological integrity means the ability of an ecosystem to recover from disturbance and re-establish its stability, diversity and resilience.

4 A strongly sustainable human society lives and develops as an integral part of ecosystems that have ecological integrity.

5 Ethics, values and 'world views' directly support strong sustainability becaus people know that they are integral to the ecological systems of the biosphere. Therefore, people desire the integrity of those systems.

THE THRESHOLD: AINABILITY NAVIGATION TOOL

ose of this tool is to assist perception and understanding of the full scope of bility'. We are all on a journey and this tool is intended to validate, locate, inate all initiatives toward sustainability. A useful feature of the tool is that rises 'connection' as the overarching condition required for sustainability.

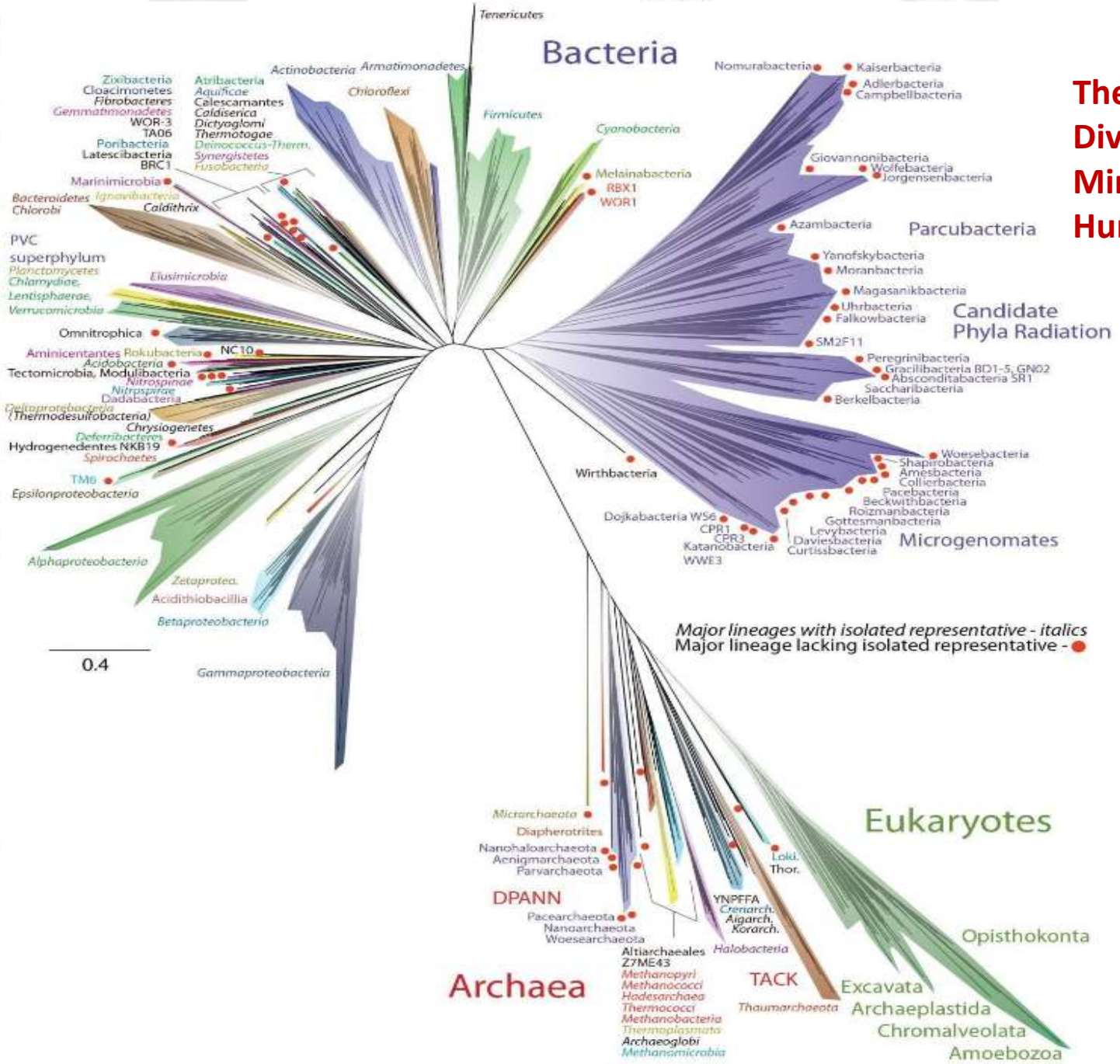
Note, time can flow in either direction. Today can be anywhere on the connection spectrum. The 'threshold' represents the achievement of such milestones as 'zero waste' and a return to atmospheric carbon dioxide levels of 350ppm. Where do your personal and professional activities lie on the spectrum?

NNECTION	TOTALLY DISCONNECTED				TOTALLY CONNECTED
AN IMPACT	MORE DAMAGING	DAMAGING	LESS DAMAGING		REJUVENATING / OPTIMAL
PARADIGM	CURRENT				NEW
PHASE	UNSUSTAINABLE	LESS SUSTAINABLE			STRONGLY SUSTAINABLE
TERISTICS	*Economic growth first and last. Straight line (growth, planning, thinking).*	*Minimise impacts: reduce, reuse, recycle. Triple-bottom-line, footprint-based, mitigate, adapt, react, modify, responsibility.*		THRESHOLD	*Eco-system-centric. Connect, re-design, enhance, circular feedback, inspire, celebrate.*

1 Ecology – environment & biodiversity

- Fundamental **ecological/science principles** – **evidence base** in post-truth era!
- John Scott & Thomas Caspari (soil scientists)
- Jean Cocteau "*Art is Science made clear*"
- **Science advocacy vs objectivity** (expert only when asked – when a crisis!? Foote, Krogman & Spence 2009)
  - Consequences of not acting or telling how it is or what we know or predict, in time; legit role of whistle blower!
- Massy – **industrial to regenerative agriculture** (Gwen Grelet)
- **Population – carrying capacity** (Thomas)!!! Elephants in the room – cross-cultural, cross-religion & cross-personality resolutions
- What this says about **immigration versus solving problems** at home
- Technical solutions result in complacency about exponential growth
  - **Nature abhors a vacuum**

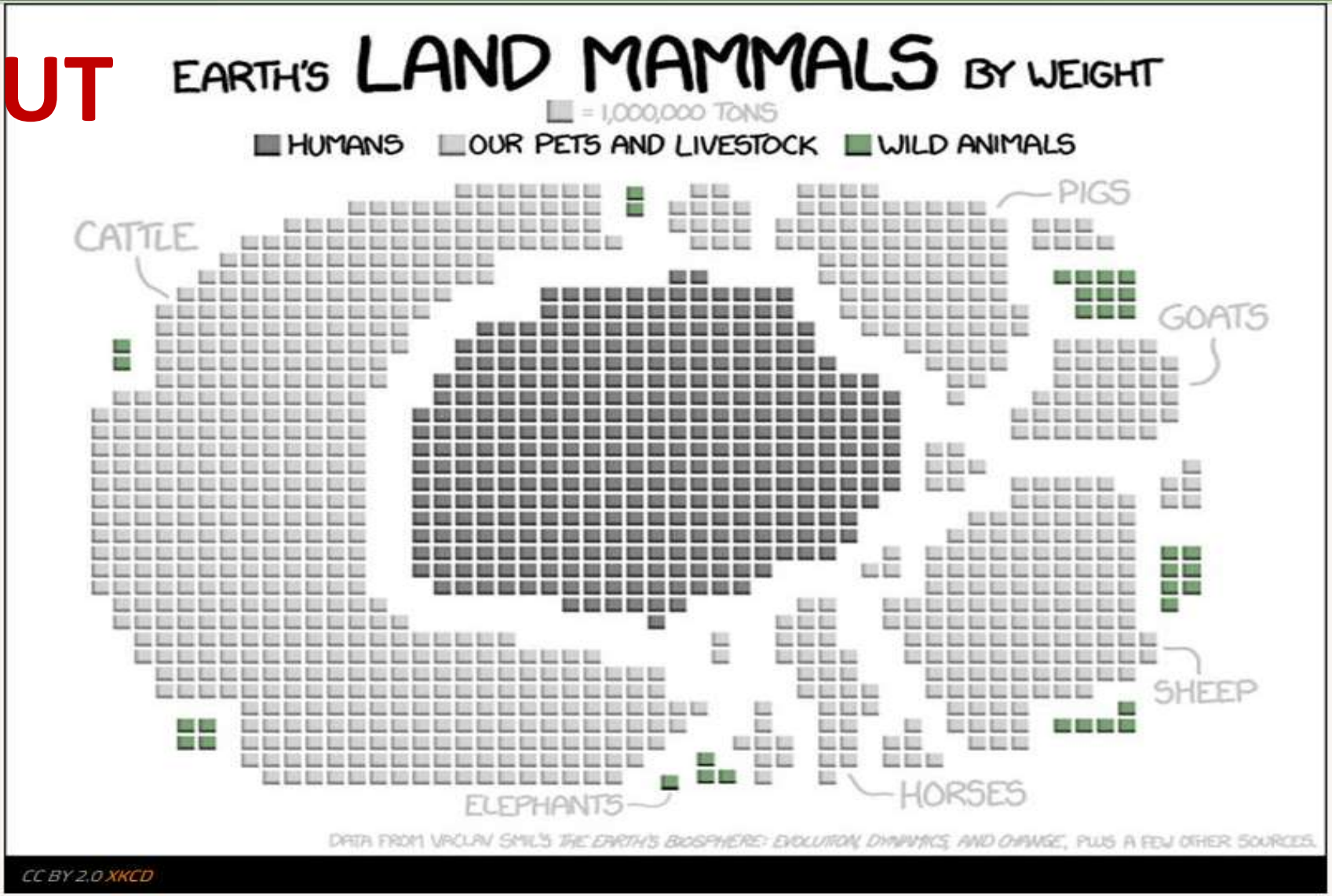
The Enormity of Life Diversity & the Minutity of Humanity, But …



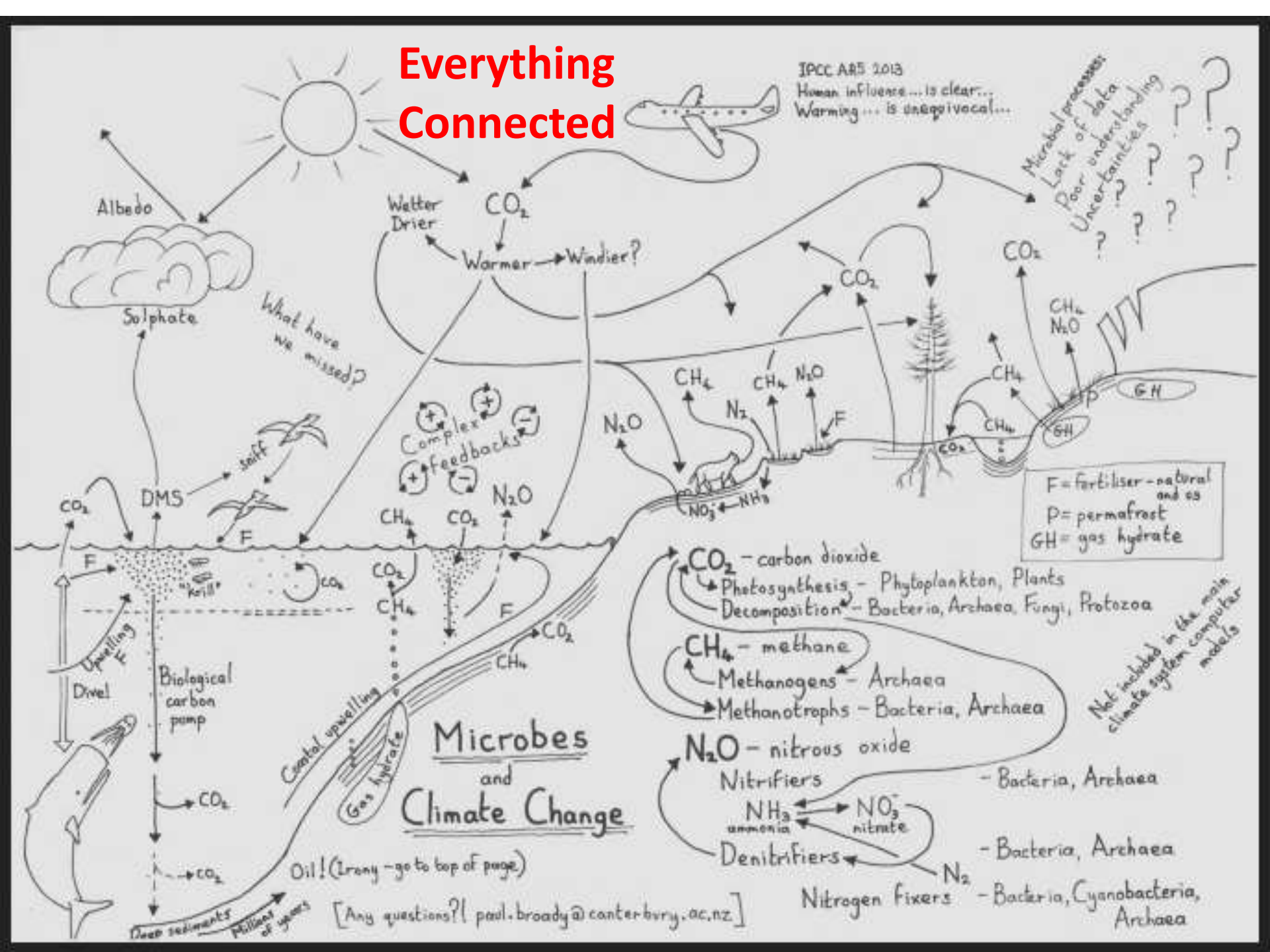
The new tree of life that researchers published on Monday. It shows that much of Earth's biodiversity is bacteria, top, half of which includes "candidate phyla radiation" that are still waiting to be discovered. Humans are in the bottom branch of eukaryotes.

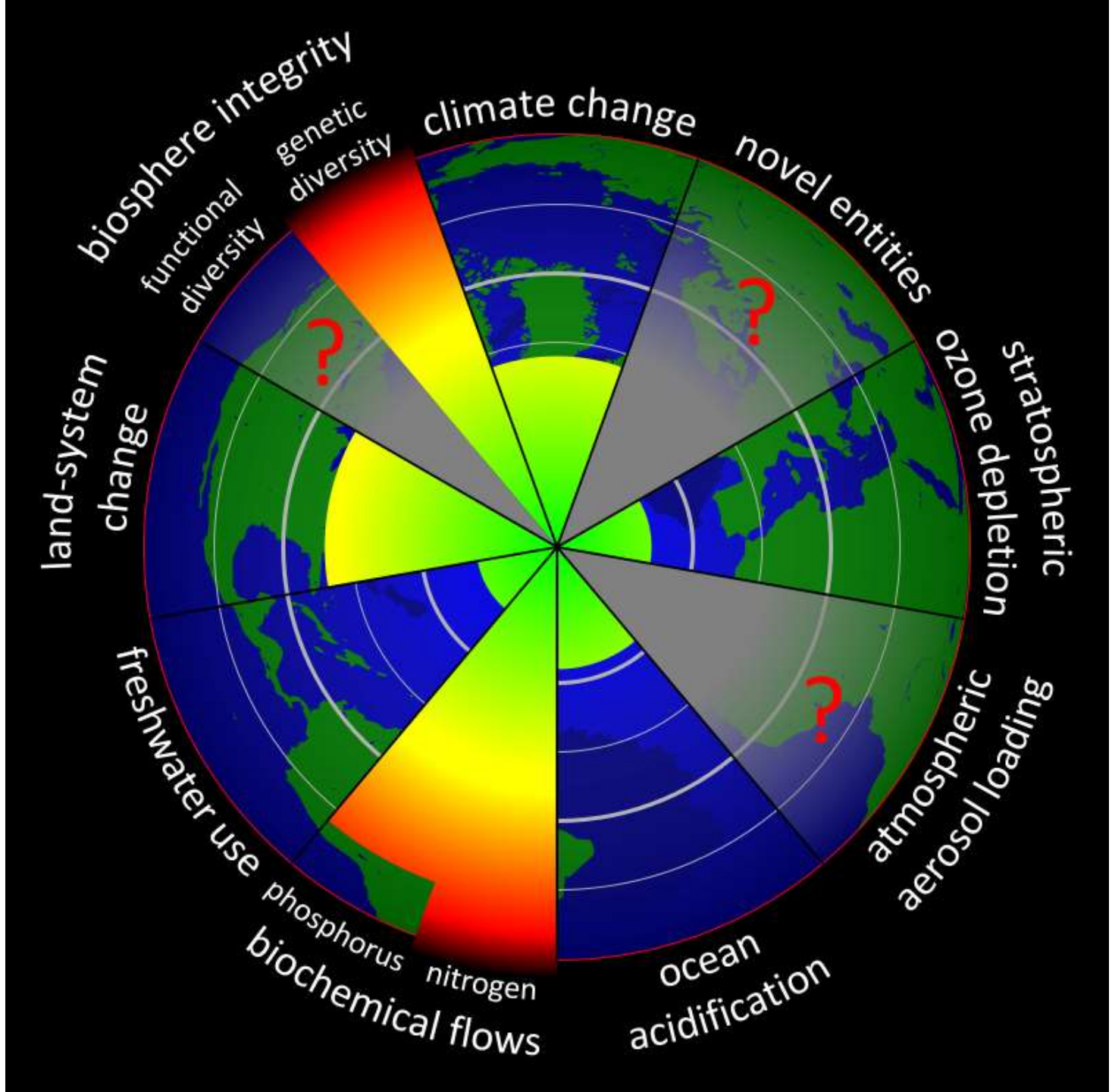
Jill Banfield/UC Berkeley, Laura Hug/University of Waterloo

BUT



Randall Munroe, a former NASA roboticist who nows draws clever geeky webcomics at XKCD, used data from Vaclav Smil's *The Earth's Biosphere: Evolution, Dynamics, and Change* ("plus a few other sources") to create a visualization of all of Earth's land mammals, which include us, by weight. It does certainly put things in perspective, especially when you compare wild land mammals to us and our livestock and pets.


Everything Connected
IPCC AR5 2013
Human influence ... is clear...
Warming ... is unequivocal...
Microbial processes: Lack of data Poor understanding Uncertainties
Albedo
Sulphate
What have we missed?
Wetter Drier
CO_2
Warmer → Wetter?
Complex feedbacks
DMS
staff
N_2O
CH_4
N_2
F
NO_3^-
NH_3
CH_4 N_2O
GH
P
F = fertiliser - natural and eg
P = permafrost
GH = gas hydrate
CO_2 – carbon dioxide
Photosynthesis – Phytoplankton, Plants
Decomposition – Bacteria, Archaea, Fungi, Protozoa
CH_4 – methane
Methanogens – Archaea
Methanotrophs – Bacteria, Archaea
N_2O – nitrous oxide
Nitrifiers – Bacteria, Archaea
NH_3 ammonia
NO_3^- nitrate
Denitrifiers – Bacteria, Archaea
N_2
Nitrogen fixers – Bacteria, Cyanobacteria, Archaea
Not included in the main climate system computer models
Krill
Upwelling
Diel
Biological carbon pump
Coastal upwelling
Gas hydrate
Deep sediments
Millions of years
Microbes and Climate Change
Oil! (Irony – go to top of page)
[Any questions?! paul.broady@canterbury.ac.nz]

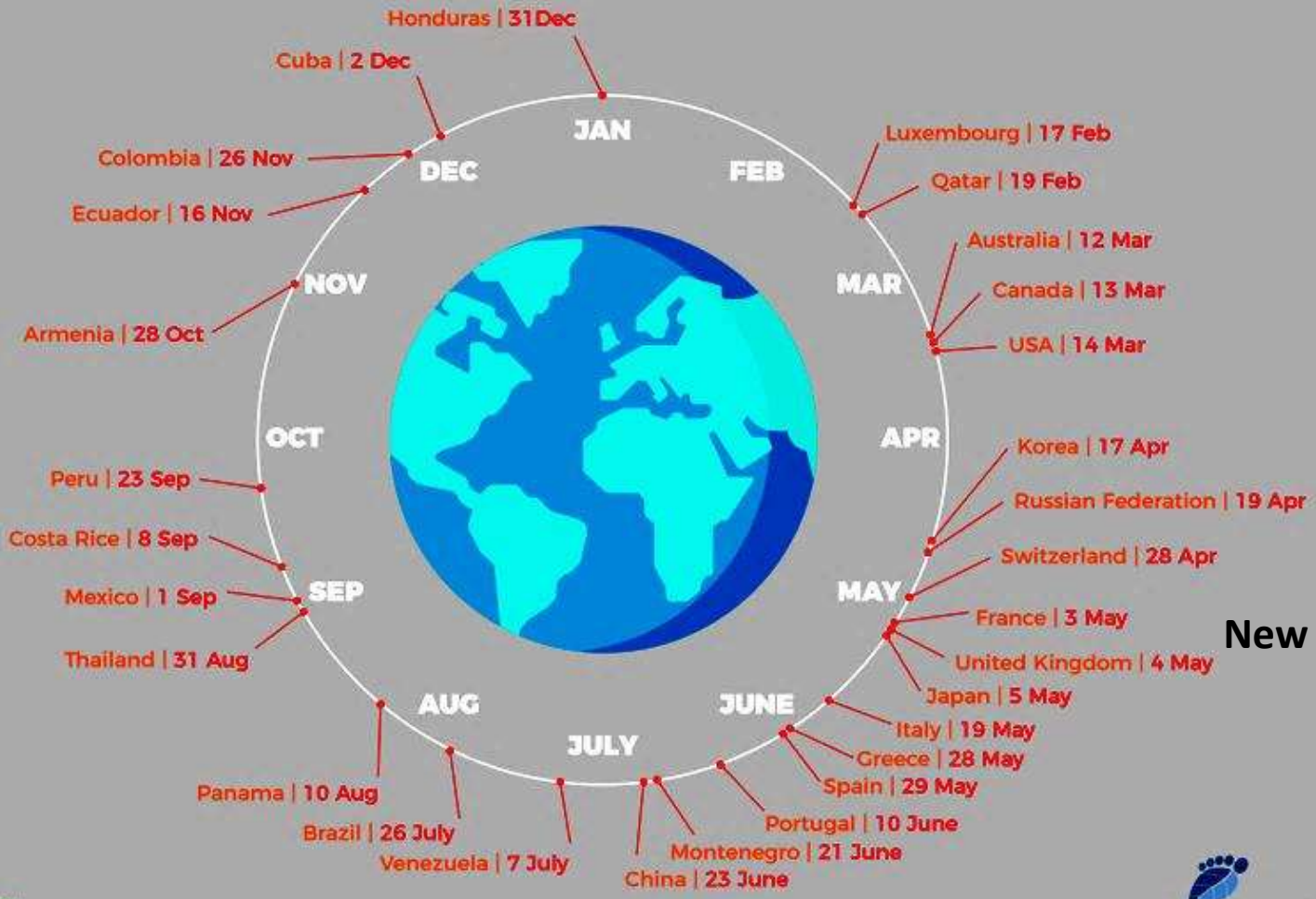


Planetary boundaries according to Rockström *et al*. 2009[1] and Steffen *et al.* 2015.[2] The green areas represent human activities that are within safe margins, the yellow areas represent human activities that may or may not have exceeded safe margins, the red areas represent human activities that have exceeded safe margins, and the gray areas with red question marks represent human activities for which safe margins have not yet been determined.

EARTH OVERSHOOT DAY

Country Overshoot Days 2017

When would Earth Overshoot Day land if the world's population lived like...



New Zealand

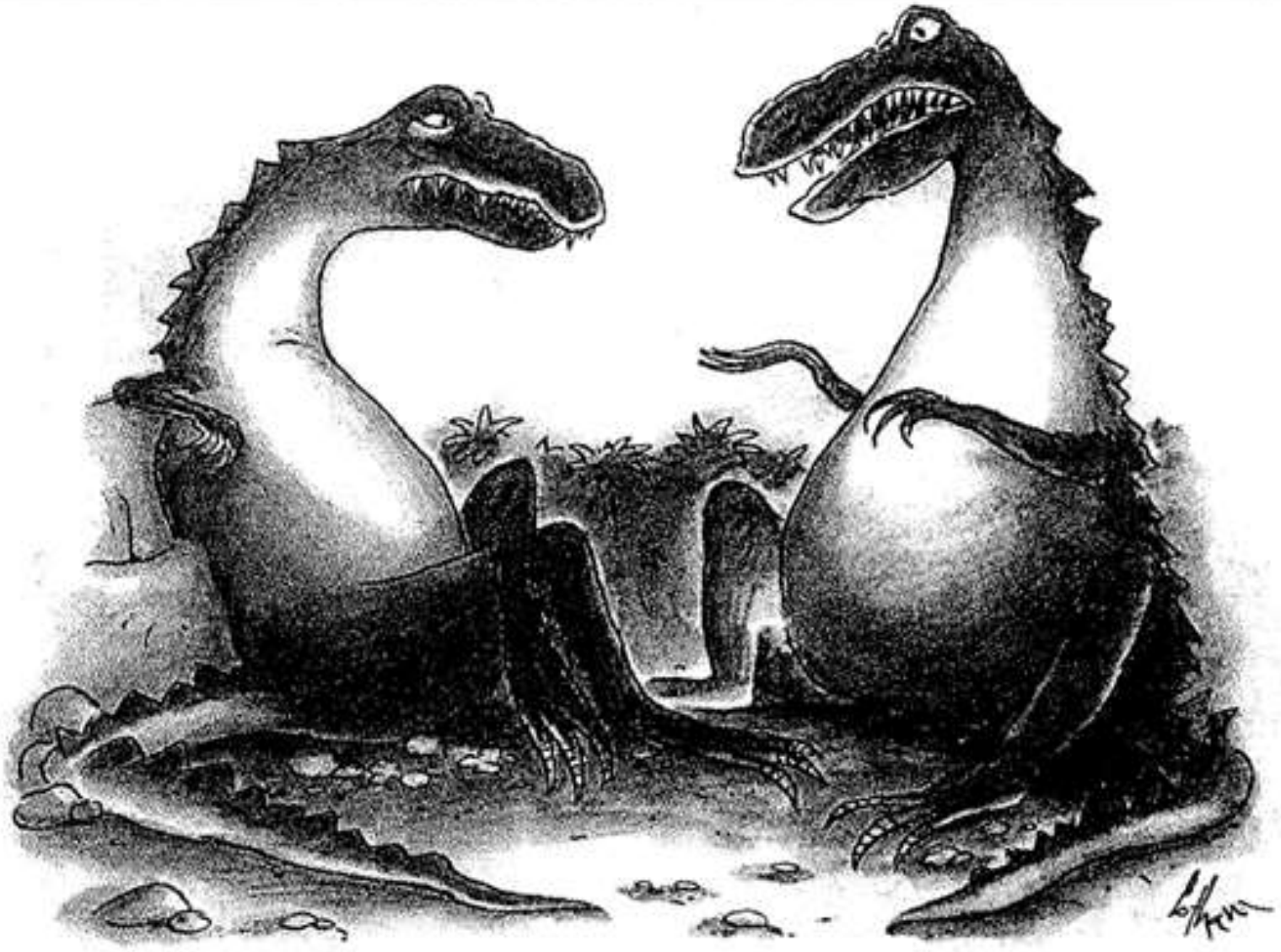
EARTH OVERSHOOT DAY

Source: Global Footprint Network National Footprint Accounts 2017

Global Footprint Network®
Advancing the Science of Sustainability

See other looming crises & 'uplifting' material in the appendix below

- Ocean acidification
- Over-fishing & plastics
- Climate mayhem, fires, floods, hurricanes, …
- Industrial toxins in food chain
- The 6th great extinction
- Pandemics
- Etc.
- Harvey Locke's organisation: Nature Needs Half



"All I'm saying is now is the time to develop the technology to deflect an asteroid."

Thomas Caspari & John Scott

The role & importance of soil to our long-term well-being

Soil functions

Soils deliver ecosystem services that enable life on Earth

2015 International Year of Soils

fao.org/soils-2015

Food and Agriculture Organization of the United Nations

with the support of

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
Federal Office for Agriculture FOAG

source: FAO, http://www.fao.org/soils-2015/en

Soil functions & ecosystem services

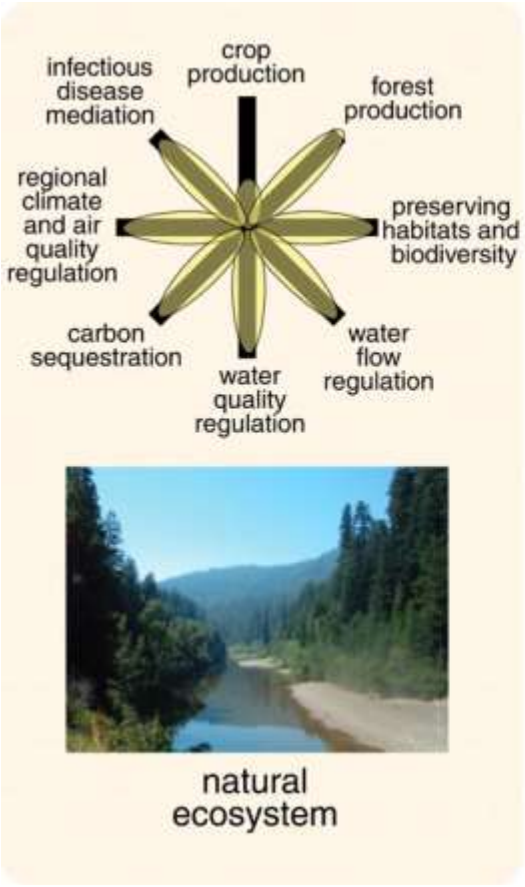
The benefits we derive of soil functions are often called “soil ecosystem services”:

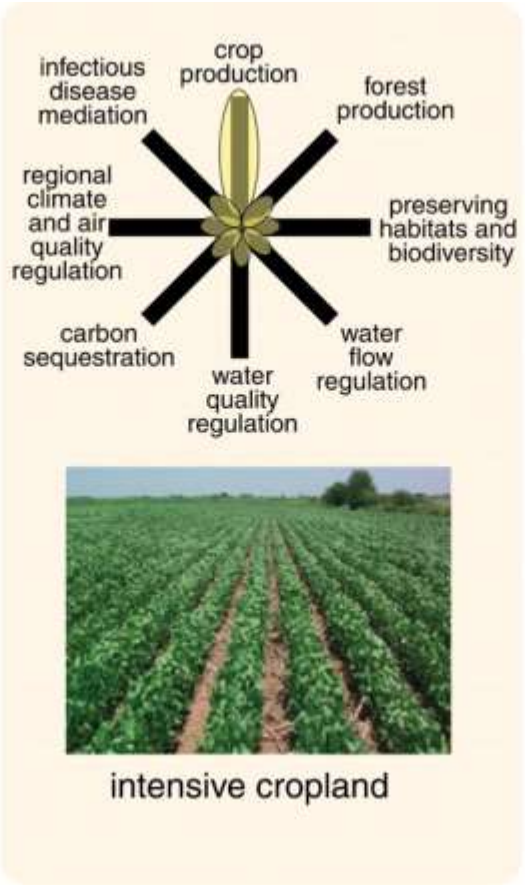
source: Gudrun Schwilch, CDE

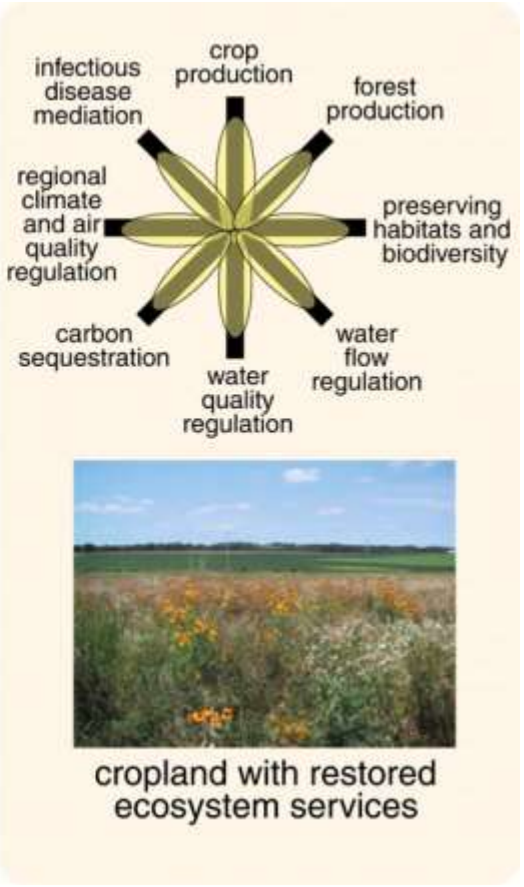
All land-based ecosystems rely on “soil”!

http://www.mfe.govt.nz/publications/environmental-reporting/new-zealand%E2%80%99s-land-glance-our-land-2018

Soil functions: Trade-offs



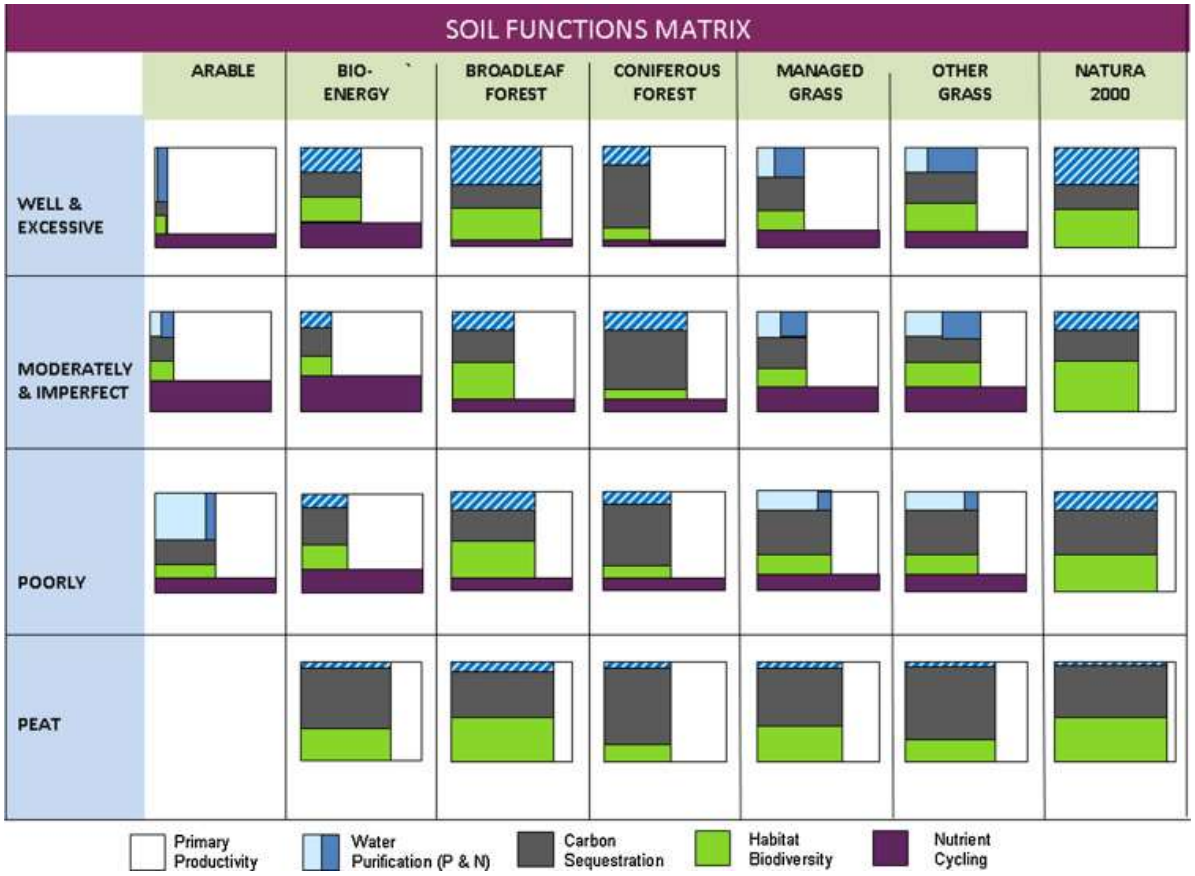




From: Foley et al. (2005)

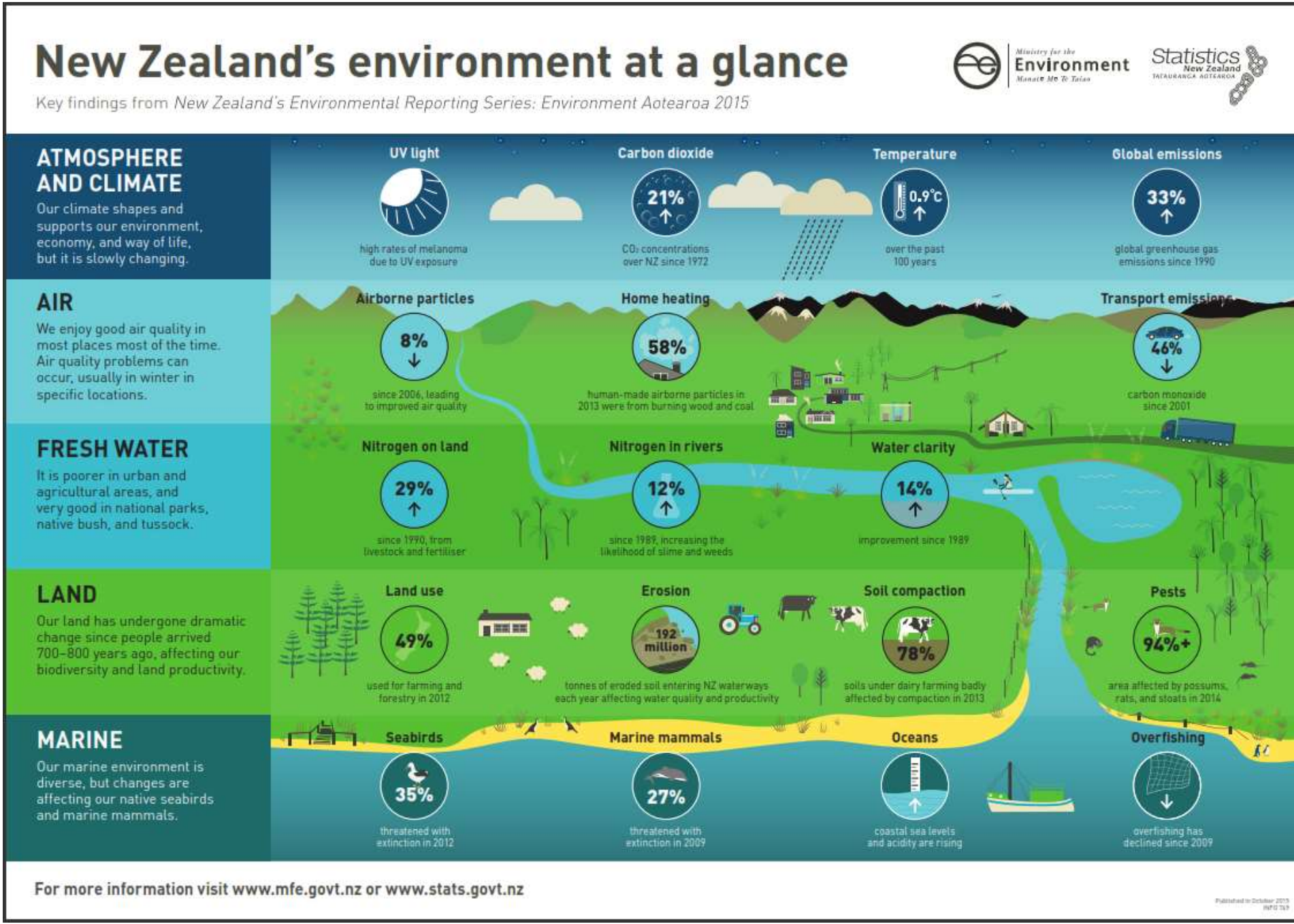
Soil functions: The challenge

Managing soil functions such that there is a balance at landscape level !!



source: Coyle et al (2016) http://dx.doi.org/10.1016/j.envsci.2015.10.012

So, How are we doing?



New Zealand's land at a glance
Our land 2018

Land is our place to stand, our tūrangawaewae, and it is what makes Aotearoa, New Zealand home. "People need nature, land and waters for life, purpose and humanity" *(Te Urewera Board, 2017).*

Primary production

(in 2018)

$35.4b

in exported goods was earned from what we produced on the land.

Tourism

(in 2018)

$14.7b

was spent by tourists who came to enjoy our natural landscapes.

Soil quality

(between 2014 and 2017)

Soil quality monitoring results showed that two out of seven indicators give reason for concern. These were phosphorus levels in soil and macroporosity – which relates to the number of big pore spaces that let air and water move through soil.

33%

of sites tested had soil phosphorus levels that were too high, which can negatively impact on water quality.

44%

of sites tested had macroporosity levels that were too low. Macroporosity is an indicator of soil compaction, which can negatively impact on water quality and the productivity of the land.

192m

tonnes of soil is lost every year from erosion. 44% of that comes from pasture.

Biodiversity

(between 2010 and 2018)

20

bird species have improved conservation status.

83%

of native birds, bats, reptiles and frogs were classified as either threatened or at risk of extinction.

7 3 1

The conservation status of seven bird species, three gecko species, and one species of ground weta is worsening.

Native land cover

(between 1996 and 2012)

71,000ha

of native forests, shrublands and tussock grasslands have been removed.

Urban land use

(between 1996 and 2012)

10%

increase in the total size of our towns and cities – we've lost some of our most productive and versatile land.

Rural land use

(between 2002 and 2018)

10%

reduction in the amount of land used for agriculture and horticulture.

42%

increase in the area of land used for dairy.

20%

decrease in the area of land used for sheep and beef farming.

Wetlands

90%

of wetland habitats have been lost since European settlement.

Coastal and lowland ecosystems (like active sand dunes and wetlands) continue to decline in extent.

Environment + Stats NZ

To find out more about Our land 2018, visit www.mfe.govt.nz or www.stats.govt.nz

Example: Land Degradation Neutrality

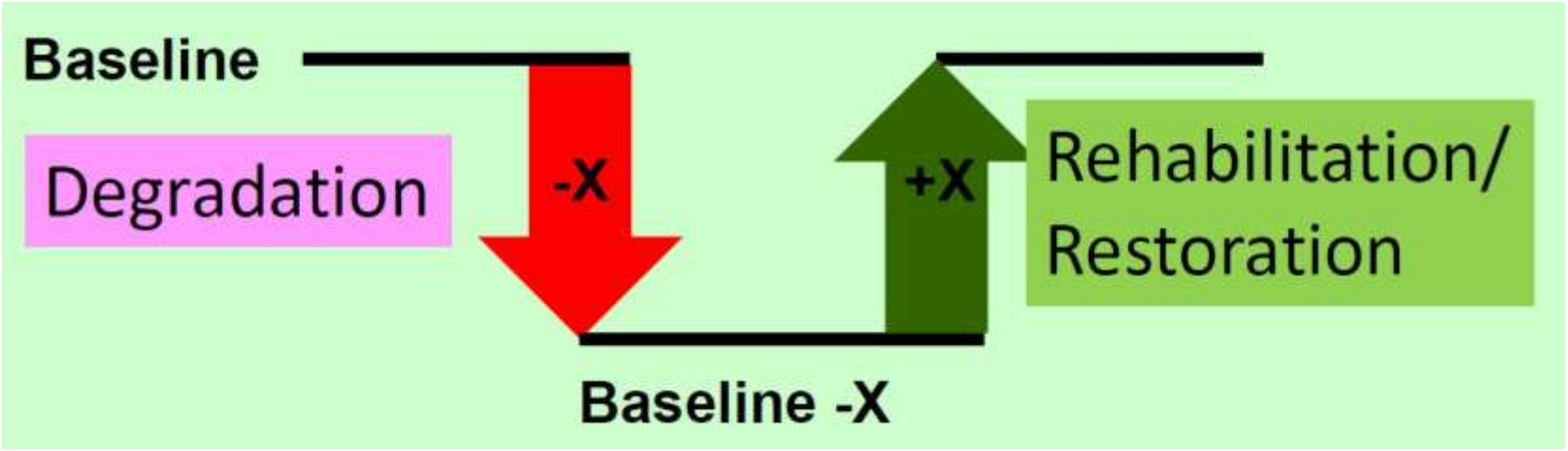
Example: Land Degradation Neutrality

Goal 15 - urges countries to “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and **halt and reverse land degradation** and halt biodiversity loss”

Target 15.3 - the target championed by UNCCD: “By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world”.

Example: Land Degradation Neutrality

LDN = “a state whereby the **amount and quality** of land resources necessary to support ecosystem functions and services and enhance food security **remain stable or increase** within specified temporal and spatial scales and ecosystems”.



Example: Land Degradation Neutrality

Suggested framework for monitoring and reporting:

Indicator 15.3.1
Proportion of land that is degraded over total land area

Sub -Indicators
UNCCD (CBD, UNFCCC)
Reporting Mechanisms

Data sources:

Official Statistics and Earth Observation

Remote sensing, e.g. MODIS NDVI → NPP, GlobeLand30m-2000

Land Use and Management Practices

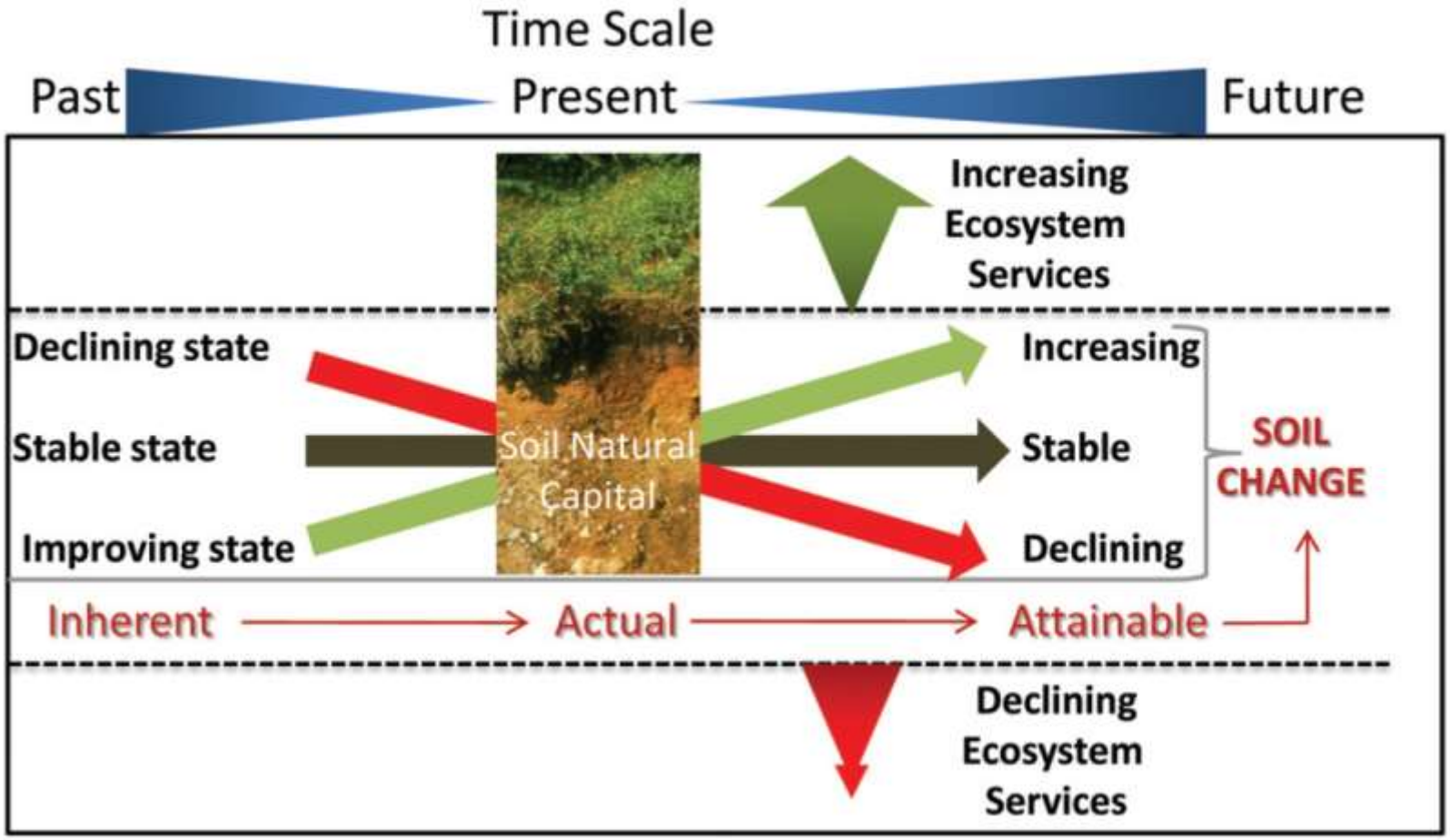
e.g. WOCAT

Surveys, Sampling and Citizen Sourcing

From local into (yourself!) to global info (e.g. ISRIC)

source: FAO, http://www.fao.org/3/a-mn997e.pdf

Sustainable land & soil management



source: Robinson et al. 2012
http://dx.doi.org/10.2136/vzj2011.0051

Gwen Grelet

Industrial to Regenerative Agriculture

Core principles of regenerative agriculture

What is Regenerative Agriculture?

February 24, 2017

"Regenerative Agriculture" describes farming and grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle.

Specifically, ***Regenerative Agriculture is a*** *holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle, and build soil health, crop resilience and nutrient density.* Regenerative agriculture improves soil health, primarily through the practices that increase soil organic matter. This not only aids in increasing soil biota diversity and health, but increases biodiversity both above and below the soil surface, while increasing both water holding capacity and sequestering carbon at greater depths, thus drawing down climate-damaging levels of atmospheric CO_2, and improving soil structure to reverse civilization-threatening human-caused soil loss. Research continues to reveal the damaging effects to soil from tillage, applications of agricultural chemicals and salt based fertilizers, and carbon mining. Regenerative Agriculture reverses this paradigm to build for the future.

Co-Authors:

Regenerative Agriculture Initiative, California State University, Chico
http://www.csuchico.edu/sustainablefuture/aginitiative/
The Carbon Underground
https://thecarbonunderground.org/

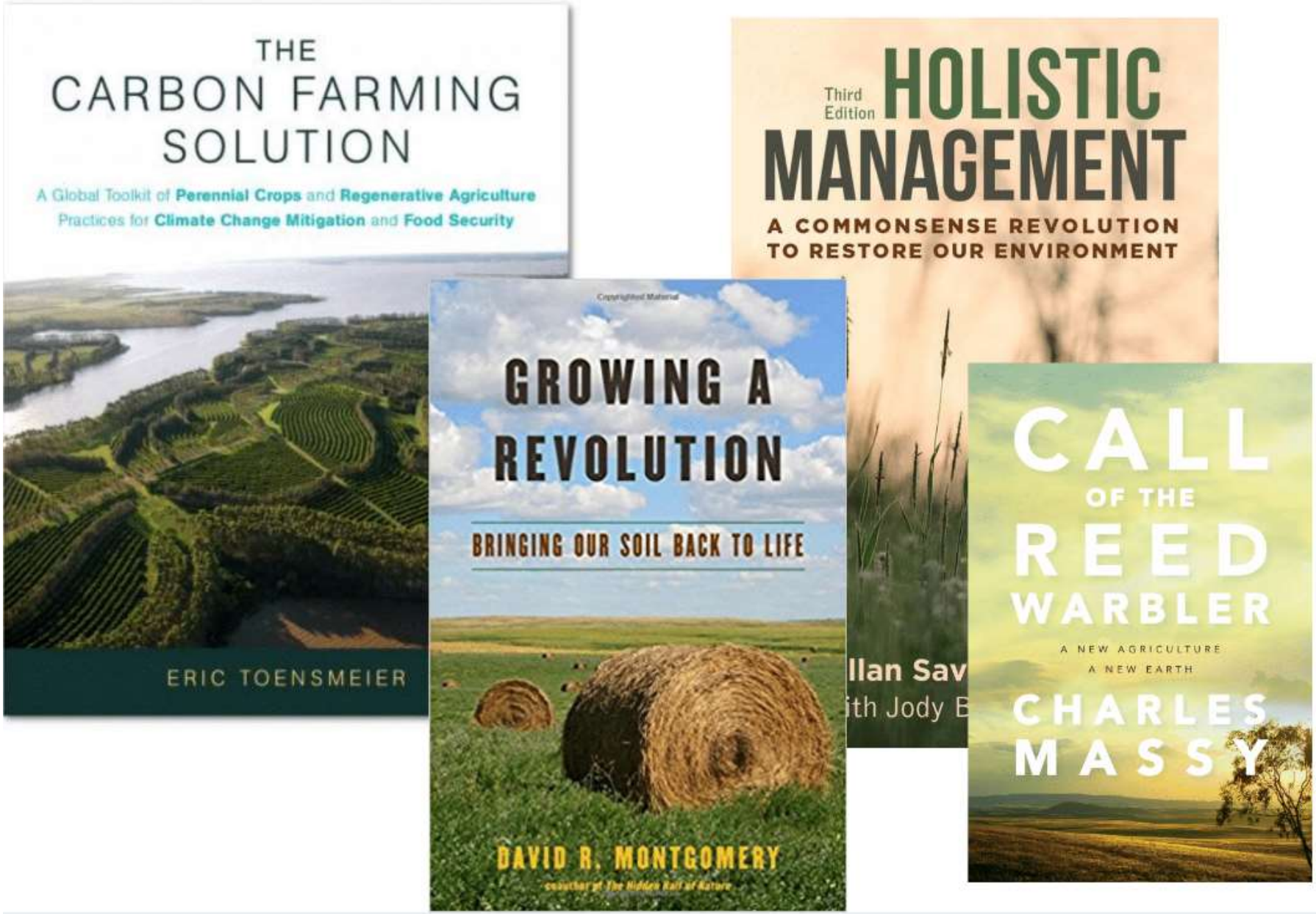
This definition will continue to evolve as research and practice inform what improves the health of soils, sequesters carbon, and builds more topsoil for future generations.

CSU Chico | INSTITUTE FOR SUSTAINABLE DEVELOPMENT | REGENERATIVE AGRICULTURE INITIATIVE

THE CARBON UNDERGROUND

- **No-till/minimum tillage.** Tillage breaks up (pulverizes) soil aggregation and fungal communities while adding excess O2 to the soil for increased respiration and CO2 emission.
- **Soil fertility is increased biologically** through application of cover crops, crop rotations, compost, and animal manures, which restore the plant/soil microbiome to promote liberation, transfer, and cycling of essential soil nutrients.
- **Building biological ecosystem diversity** begins with inoculation of soils with composts or compost extracts to restore soil microbial community population, structure and functionality restoring soil system energy (C-compounds as exudates) through full-time planting of multiple crop inter- crop plantings, multispecies cover crops, and borders planted for bee habitat and other beneficial insects.
- **Well-managed grazing practices** stimulate improved plant growth, increased soil carbon deposits, and overall pasture and grazing land productivity while greatly increasing soil fertility, insect and plant biodiversity, and soil carbon sequestration. These practices not only improve ecological health, but also the health of the animal and human consumer through improved micro-nutrients availability and better dietary omega balances.

Core principles of regenerative agriculture



Permaculture

Permaculture Flower

The permaculture journey begins with the Ethics and Design Principles and moves through the key domains required to create a sustainable culture. The spiral evolutionary path joins together these domains, initially at a personal and local level, and then proceeding to the collective and global level.

Some of the specific fields, design systems and solutions that have been associated with the wider view of permaculture are listed below.

Land & Nature Stewardship

- Bio-intensive gardening
- Forest gardening
- Seed saving
- Organic agriculture
- Biodynamics
- Natural Farming
- Keyline water harvesting
- Holistic Rangeland Management
- Natural Sequence Farming
- Agroforestry
- Nature-based forestry
- Integrated aquaculture
- Wild harvesting & hunting
- Gleaning

Building

- Passive solar design
- Natural construction materials
- Water harvesting & Waste Reuse
- Biotechture
- Earth sheltered construction
- Natural disaster resistant construction
- Owner building
- Pattern Language

Tools & Technology

- Reuse & creative recycling
- Hand Tools
- Bicycles and electric bikes
- Efficient & low pollution wood stoves
- Fuels from organic wastes
- Wood Gasification
- Bio-char from forest wastes
- Co-generation
- Micro-hydro & small scale wind
- Grid-tied renewable power generation
- Energy storage
- Transition engineering

Education & Culture

- Home Schooling
- Waldorf education
- Participatory arts and music
- Social ecology
- Action Research
- Transition culture

Health & Spiritual Well-Being

- Home birth & Breast feeding
- Complementary & Wholistic Medicine
- Yoga, Tai Chi & other body/mind/spirit disciplines
- Spirit of place, indigenous cultural revival
- Dying with dignity

Finances & Economics

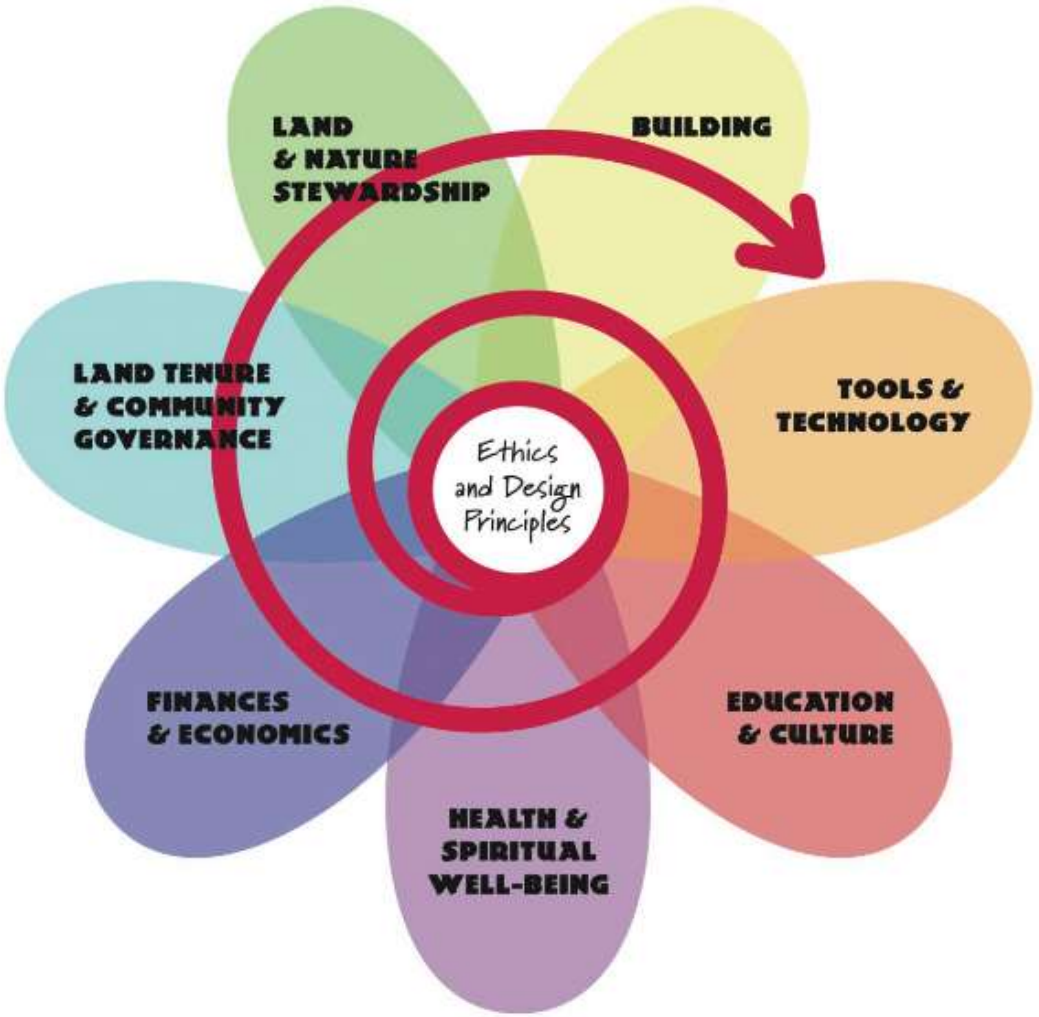
- Local and regional currencies
- Carpooling, Ride sharing & Car share
- Ethical investment & Fair Trade
- Farmers markets & Community Supported Agriculture (CSA)
- WWOOFing & similar networks
- Tradable Energy Quotas
- Life Cycle Analysis & Emergy Accounting

Land Tenure & Community Governance

- Cooperatives & Body Corporates
- Cohousing & Ecovillages
- Native Title and traditional use rights
- Open Space Technology & Consensus Decision Making

permacultureprinciples.com

HOLMGREN DESIGN SERVICES



Permaculture

KOTARE VILLAGE

A COMMUNITY LAND TRUST IN HAWKES BAY, NEW ZEALAND

About | Culture | Development Plan | Get Involved | Choose Your Section | Blog | –Q&A– | Contact | Newsletter Signup

Kotare Village is a self-reliant eco-village based on permaculture principles in rural New Zealand's Northern Hawke's Bay.

It will be home for 50 families and the Koanga Institute's Centre for Regenerative Living. We are currently looking for like-minded people who want to support a shared dream of embracing a regenerative future through independent village living, local economies and co-evolution.

Seeds | Forest Garden | Perennials | Products | Gifts | Publications | Education | Events | Membership | Business Sponsorship | Donations | My Account

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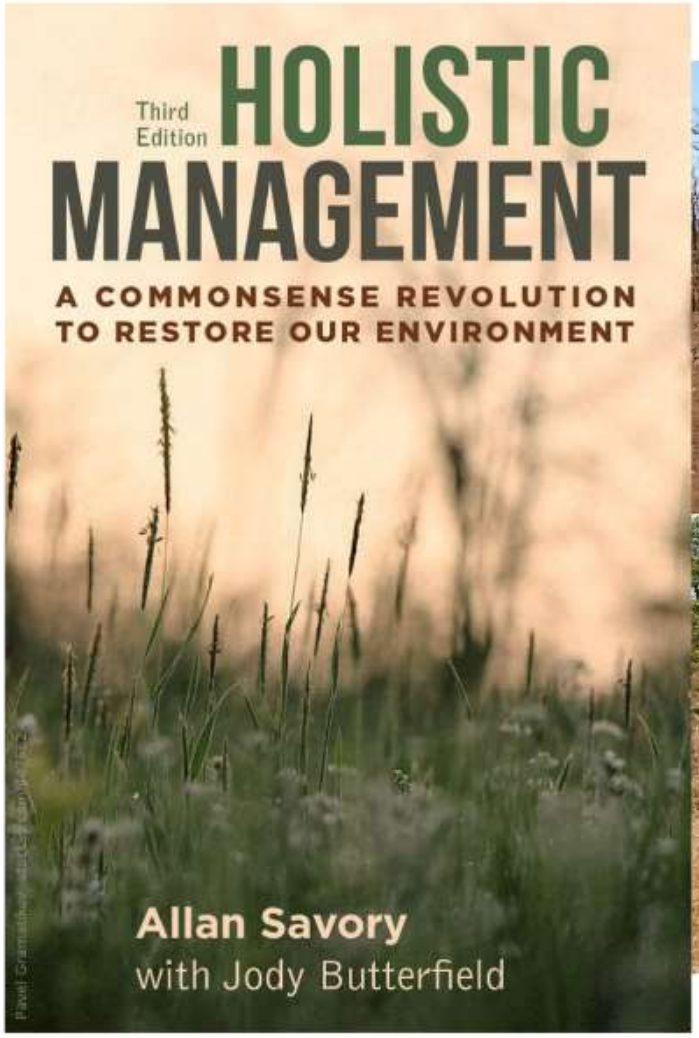
Home / Education for Regenerative Living

Education for Regenerative Living

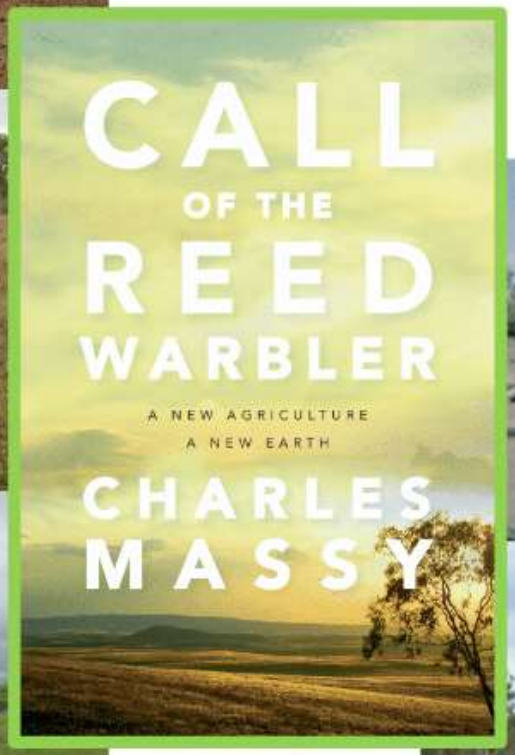
Empower yourself with the practical skills to turn your dreams of self-reliance into your reality. We use the Permaculture design process to design and teach solutions for all aspects of our lives and environment. Our guided tours, workshops, permaculture design courses, internships and apprenticeships are all great ways to create your lifestyle or career path in a regenerative way.

Permaculture Design Course 3rd to 15th February 2019

Holistic management

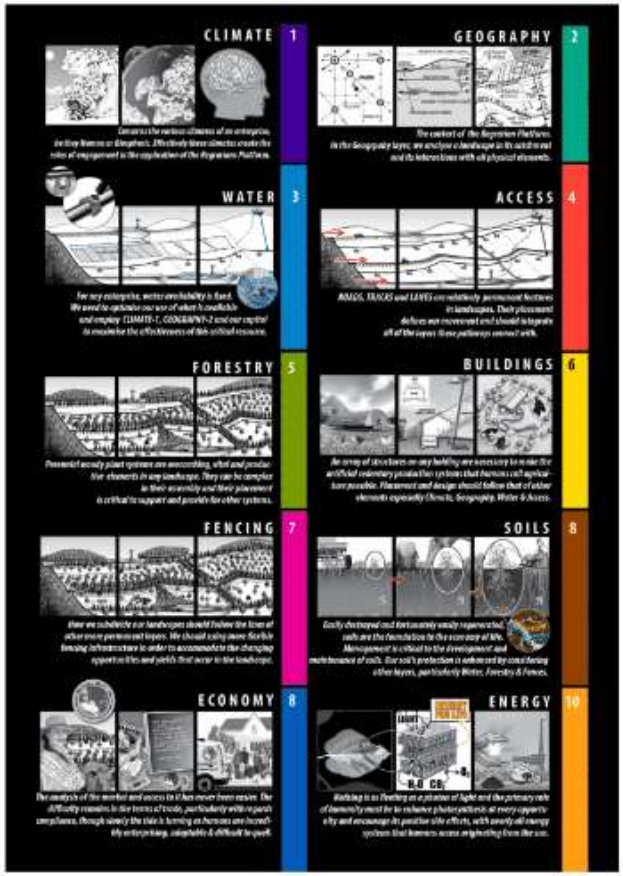


Holistic management



All photos: courtesy Charles Massy

Permaculture → holistic grazing



Mangarara (The Family Farm) is a 610 hectare/1500 acre hill country farm in Elsthorpe, Hawke's Bay. It has been stewarded by the Hart family since 1990.

The farm is a diverse mix of lakes, wetlands, peat flats, rolling and steep hills, pasture, native and exotic trees. Like a living organism, it is constantly evolving!

The evolution of this land and community has really sped up in the last 15 years, towards a regenerated, connected landscape & people.
We invite you deeper into this story below.

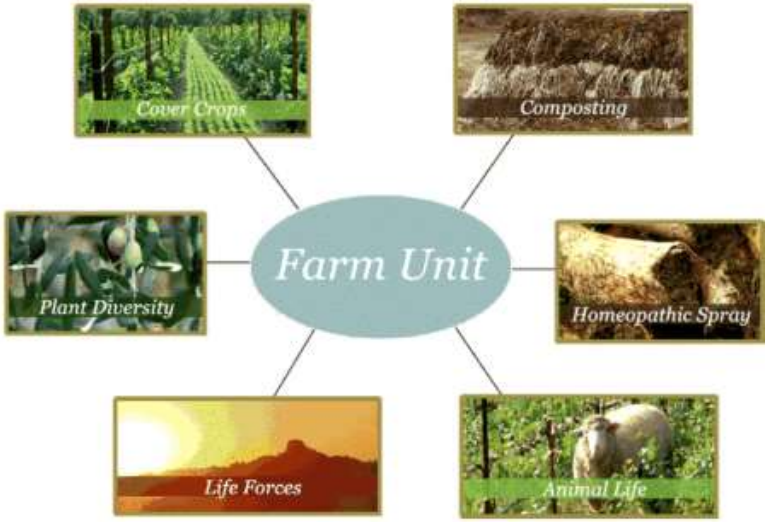
Our Vision

The Family Farm vision has four parts:

1. To produce healthy & nutrient rich food as part of a resilient & profitable model of regenerative agriculture;
2. To balance relationships between nature and production agriculture as part of ecosystem restoration, including a focus on soil health, carbon sequestration and planting native and food producing trees;
3. To utilise the farm and Eco Lodge as a source of **education, accommodation and inspiration**, allowing people to connect back to nature, food and farming; and
4. To be open and share the farm's resources, building a community model that shows what is possible when we work cooperatively with each other and nature.

REGRARIANS

Biodynamic farming



Biodynamic farming

SEKEM

ABOUT ECONOMY SOCIETAL LIFE CULTURAL LIFE ECOLOGY NEWS MEDIA CONTACT

AWARDS

Vision & Mission | History | Founders | Awards | Friends, Partners & Network | Organizational Structure | Sustainability

Worldwide Acknowledgment for an Outstanding Business Model

2015

- "Stauffermedaille" by the German State of Baden-Württemberg
- "Land for Life Award 2015" by the United Nations to Combat Desertification
- "Golden Award" by the Technical University of Graz
- "One Business Community, Equal opportunity Seal" by UN Women and World Bank

Milmore Downs
Biodynamic Agriculture

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Organic and Biodynamic Farming in North Canterbury

Biodynamic products of superior quality

Milmore Downs is a certified Demeter and BioGro farm which produces and sells whole grains, flour (different grades), flakes, kibbled grain, lentils (not this season), and lamb, mutton and beef on the hoof.

For upcoming events check our news page.

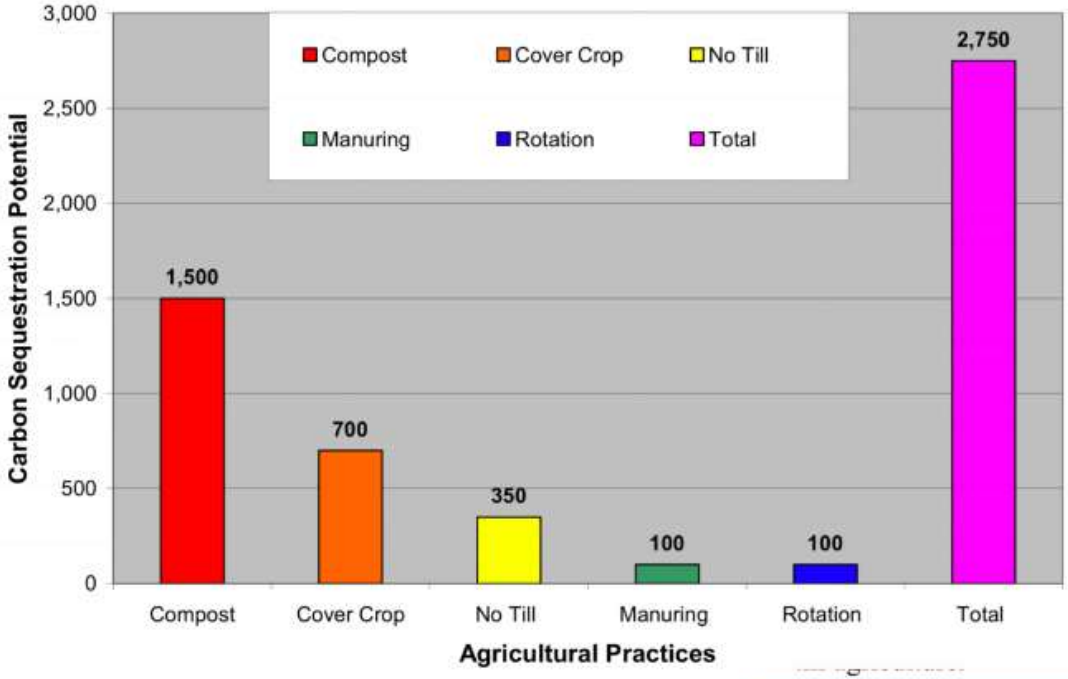
More about us

About Our Grain Products

Milmore Downs specialises in quality organic grain production. We grow, harvest and process several varieties, all of which are available for purchase from this website.

Data

Figure 6-2
Carbon Sequestration Potential of Selected Agricultural Practices
(pounds of carbon per acre per year)



ı acres are used in Pennsylvania agriculture. "No till" is used on
:e acres, but the other practices are used on less than 2% of total
fore the potential for increased soil sequestration is large. If all
% of Pennsylvania's farmlands, the Rodale Institute estimates a
tential of 20 million metric tons of carbon dioxide equivalent
ɔgnizing that 100% adoption rates are unlikely, the practical,
ration will be less. Modeling suggests that a plausible estimate for
uestration by the year 2025 is approximately 11 $MMtCO_2e$,
adoption of these agricultural practices on about two-thirds of
However, better estimations of this range merit more study. The
al Council (PEC) is collaborating with the Capital Regional
strict on an evaluation of the carbon sequestration potential in no-

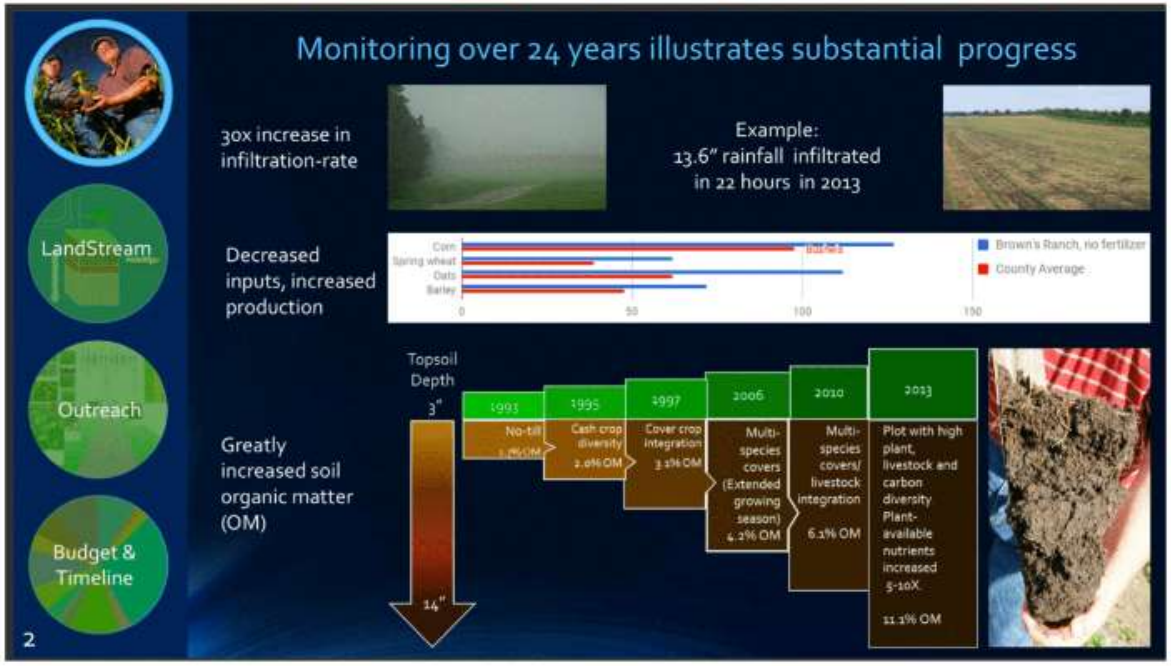
The Rodale Institute also found that after a few years yields from organic farms very nearly caught up to conventional farms.[3] The study confirmed that the income from an organic farm is greater than that from a conventional farm with only minimal price premiums for organic

[3] See D. Pimental et al, *Environmental, Energetic and Economic Comparisons of Organic and Conventional Farming Systems*, Bioscience 55(7):573-582. (a study by The Rodale Institute, Cornell University, University of Maryland, and the Eastern Region Research Center of the USDA-ARS.
See also: http://www.rodaleinstitute.org/science/.

Data


Brown's Ranch
LANDSTREAM
GROW STRONG LAND
Regeneration Quantified
A DATA-WINDOW
INTO BROWN'S RANCH
• SOIL-HEALTH
• LANDSCAPE-FUNCTION
• MANAGEMENT


Brown's Ranch
Outreach
Budget & Timeline
Monitoring infrastructure for Brown's Ranch, Bismarck, North Dakota
Soil mapping (SIS)
Mobile Flux Towers
Stream flow and quality
Field measurements
Infiltration
Plant canopy (LAI)
Stream Station
Groundwater-level wells
6


LandStream
Outreach
Budget & Timeline
Monitoring over 24 years illustrates substantial progress
30x increase in infiltration-rate
Example:
13.6" rainfall infiltrated
in 22 hours in 2013
Decreased inputs, increased production
Brown's Ranch, no fertilizer
County Average
Greatly increased soil organic matter (OM)
Topsoil Depth
3"
14"
1993
No-till
1995
Cash crop diversity
2.0% OM
1997
Cover crop integration
3.1% OM
2006
Multi-species covers (Extended growing season)
4.2% OM
2010
Multi-species covers/ livestock integration
6.1% OM
2013
Plot with high plant, livestock and carbon diversity
Plant-available nutrients increased 5-10X
11.1% OM
2

Ecological Mechanisms

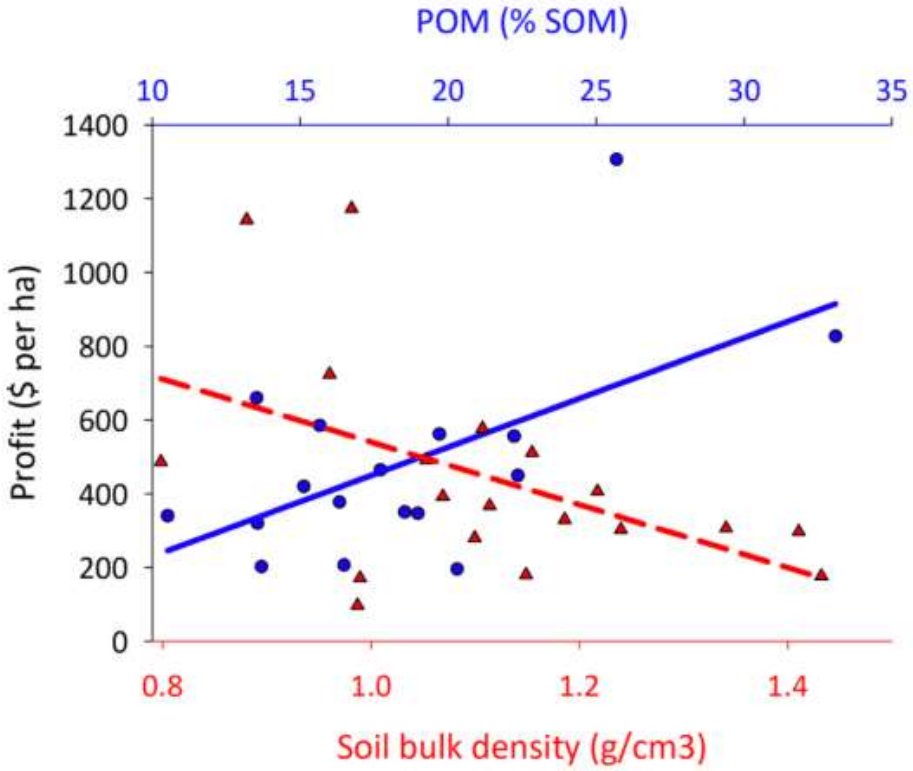


Figure 3 Corn fields with high particulate organic matter and low bulk density in the soil have greater profits. Corn fields were managed under either conventional or regenerative systems, and profit was calculated using direct costs and revenues for each field and excludes any overhead and indirect expenses. (general linear regression model; $F_{1,16} = 7.84$; $P = 0.01$; $r^2 = 0.34$; profit = 29.68[POM]–66.94; bulk density; $F_{1,19} = 5.23$; $P = 0.03$; $r^2 = 0.24$; profit = −975 [POM] + 1,593).

PeerJ

Regenerative agriculture: merging farming and natural resource conservation profitably

Claire E. LaCanne[1] and Jonathan G. Lundgren[1,2]

[1] Natural Resource Management Department, South Dakota State University, Brookings, SD, USA
[2] Ecdysis Foundation, Estelline, SD, USA

LaCanne and Lundgren (2018), *PeerJ*, DOI 10.7717/peerj.4428

Ecological Mechanisms

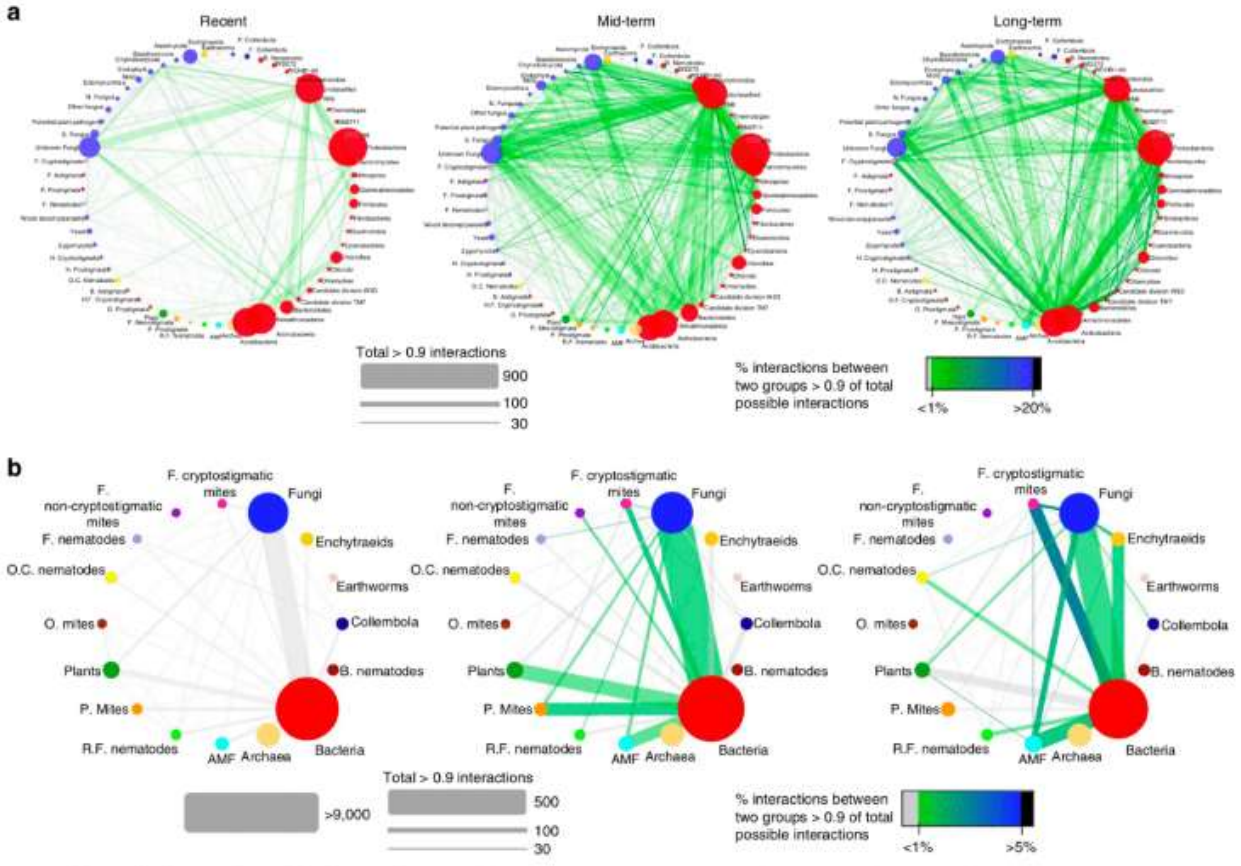


Figure 1 | Network visualization of the interaction strengths. Interaction strength between the species subgroups (**a**) and main species groups (**b**) in seminatural grasslands on recently, mid-term and long-term abandoned agricultural fields. Spearman's rank correlations of the relative abundances of all individual species combinations between two groups where calculated. The proportion of correlations >0.9 was divided by the total number of possible interactions to obtain the interaction strength between two groups of species. Line width is proportional to the absolute number of correlations >0.9. Line colour and transparency is proportional to the interaction strength, as indicated in the legend in the figure. The size of the circles is proportional to the number of species/taxa in that group. Red-filled circles are bacterial groups, blue-filled circles are fungal groups. Filled circles of other colours represent other taxa, with identities shown on the figure. B, bacterivorous; F, fungivorous; H, herbivorous; H.F, herbofungivorous; N, nematophagous; O, omnivorous; O.C., omni-carnivorous; P, predaceous; R.F., root-feeding; S., saprotrophic.

nature COMMUNICATIONS

ARTICLE

Received 16 Jul 2016 | Accepted 19 Dec 2016 | Published 8 Feb 2017 DOI: 10.1038/ncomms14349 OPEN

Soil networks become more connected and take up more carbon as nature restoration progresses

Elly Morriën[1,2,*], S Emilia Hannula[3,*], L. Basten Snoek[1,4], Nico R. Helmsing[5], Hans Zweers[3], Mattias de Hollander[3], Raquel Luján Soto[1], Marie-Lara Bouffaud[6], Marc Buée[7,8], Wim Dimmers[9], Henk Duyts[1], Stefan Geisen[1,10], Mariangela Girlanda[11,12], Rob I. Griffiths[13], Helene-Bracht Jørgensen[14], John Jensen[15], Pierre Plassart[6], Dirk Redecker[16], Rüdiger M. Schmelz[17,18], Olaf Schmidt[19,20], Bruce C. Thomson[13], Emilie Tisserant[7,8], Stephane Uroz[7,8], Anne Winding[21], Mark J. Bailey[13], Michael Bonkowski[10], Jack H. Faber[5], Francis Martin[7,8], Philippe Lemanceau[6], Wietse de Boer[3,22], Johannes A. van Veen[3,23] & Wim H. van der Putten[1,4]

Scaling up?

POLYFACE
THE FARM OF MANY FACES

ABOUT NEWS FARM TOURS SPEAKING EDUCATION FOOD SALES CONTACT SHOP

Polyface Guiding Principles

TRANSPARENCY: Anyone is welcome to visit the farm anytime. No trade secrets, no locked doors, every corner is camera-accessible.

GRASS-BASED: Pastured livestock and poultry, moved frequently to new "salad bars," offer landscape healing and nutritional superiority.

INDIVIDUALITY: Plants and animals should be provided a habitat that allows them to express their physiological distinctiveness. Respecting and honoring the pigness of the pig is a foundation for societal health.

COMMUNITY: We do not ship food. We should all seek food closer to home, in our foodshed, our own bioregion. This means enjoying seasonality and reacquainting ourselves with our home kitchens.

NATURE'S TEMPLATE: Mimicking natural patterns on a commercial domestic scale insures moral and ethical boundaries to human cleverness. Cows are herbivores, not omnivores; that is why we've never fed them dead cows like the United States Department of Agriculture encouraged (the alleged cause of mad cows).

EARTHWORMS: We're really in the earthworm enhancement business. Stimulating soil biota is our first priority. Soil health creates healthy food.

1. NO SALES TARGETS

Setting sales or marketing targets makes a business look at its employees differently, its products differently, and its customers differently. It's kind of like a church that sets membership goals: the message is no longer as important as getting sign-ups. ... Read more

2. NO TRADEMARKS OR PATENTS

This idea comes directly from community building and transparency. I have personally invented several concepts and terms: salad bar beef, pastured poultry, eggmobiles, pigaerators. Nothing makes me happier than when people use these words and duplicate the concepts. I hope ... Read more

3. CLEARLY DEFINED MARKET BOUNDARY

No difference really exists between an empire and an aspiring empire. A one salary sole proprietorship that aspires to be an empire will have the same attitude as the business that already has an empire. The bigger an outfit becomes ... Read more

4. INCENTIVISED WORK FORCE

We do everything possible to not have employees. I don't mean we're against help, or against teams. But I'm a fan of bonuses and commissions. I don't even believe in child allowances—nobody should get paid for breathing. Most farms going ... Read more

5. NO INITIAL PUBLIC OFFERINGS (IPOs)

While this may sound like sacrilege and we all know how growing businesses are starved for cash, consider how many have lost the edge of their good qualities after suddenly becoming flush with cash. I'll be honest that I haven't ... Read more

6. NO ADVERTISING

Amazingly, even the largest companies in the world still receive more than 50 percent of their business by word-of-mouth recommendation. That's quite astounding when you think about $1 million 30-second Super Bowl ads. At Polyface, we've built our customer base ... Read more

7. STAY WITHIN THE ECOLOGICAL CARRYING CAPACITY

Numerous people have encouraged Polyface to become the Tyson of pastured poultry. But one of the distinguishing characteristics of an environmentally friendly farm compared to one that doesn't care about the environment is how it handles the waste stream. In ... Read more

8. PEOPLE ANSWER THE PHONE

This may seem nitpicky, but how many of you love talking to a robot? After being on the phone with a robot and starting over the fifth time, I can't help but wonder if it wouldn't be more efficient to ... Read more

9. STAY SEASONAL

At Polyface, we only raise meat chickens in the summer because that's when they can be out on pasture. We work in the woods in the winter because that's when the wood is better, since the sap is down. And ... Read more

10. QUALITY MUST ALWAYS GO UP

Finally, as we grow, we must never compromise quality. Plenty of great small business grow up to be ho-hum big businesses. Whatever growth occurs, it can never happen at the expense of quality. With clear conscience, I can honestly say ... Read more

Visioning

- Facilitated discussion (Nick Kirk)
- Ecological/biophysical/resource goals
- Floor discussion reported on white board
- & written up on post-it notes

Landing points – Back-casting; defining & designing transitions to fit people's comfort zone; Research opportunities

Facilitated Discussion

Floor Discussion reported on White Board and written on post-it notes

OUTCOMES – FIRST NIGHT (ECOLOGY) WHITEBOARD NOTES (black type is directly from board, green is CDM supplementary comment)

- HEALTHY PROCEDURE OUTCOMES/SOS
- DIVERSE LANDSCAPES
- HUMAN ECOLOGICAL FOOTPRINT – and associated domestic animals
- REWILDING OF FERTILE Landcare Research CROP VS ANIMAL PRODUCTION
- GREENING CITIES – JUNGLE – CROPS + BIODIVERSITY
- POPULATION – limits/carrying capacity
- PLANET WILL HAVE TO SUPPORT 10-11 BILLION PEOPLE
- PROBLEM IN CONSUMPTION
- VEGAN/VEGETARIAN VS REDUCEVARIAN
- SELF SUFFICIENT – BASIC NEEDS
- NZ CAN FEED ITSELF – but maybe no surplus for export, to pay for imports?
- RESPECT FOR OTHER LIVING CREATURES – LANGUAGE OF seeing everything as a "RESOURCE" for consumption or to make money from – ENDEMIC/INDIGENOUS
- EARTH other word for soil
- REGENERATIVE AGRICULTURE – REGENERATING soils, productive capacity, water
- RATIONAL MIND vs ORGANIC MIND
- ALTERNATIVE WORLD VIEWS: INDIGENOUS peoples
- URBAN SPRAWL ONTO TOP QUALITY (VERSATILE) soils
- KNOWLEDGE/WISDOM
- TRADING LIVING DENSITY FOR PERSONAL SPACE

- [continued over]

continued

- LOCAL WORKING + LIVING/SHARING RESOURCES vs individual resources
- COMMUNITY OWNED resources/utilities
- NATIONAL + LOCAL 100 YEAR PLANS, GOVERNMENT
- EDUCATION = CONNECTING TO PRODUCTION – TRANSPARENT RESOURCE USE OF PRODUCTS – SHARE
- EFFECTS OF ELECTRICITY/RADIATION
- (CHRISTCHURCH) INNER CITY – GREEN ZONE – GROWING
- GRASS ROOTs ACTIONS: POWER STRUCTURES DO THEY HAVE A LIMITED TOLERANCE TO COMMUNITY EMPOWERMENT? AND WHAT ACTION WILL THEY TAKE TO MAINTAIN POWER?
- DEVELOPMENT OF COLLECTIVE WILL TO CHANGE
- DON'T LET A GOOD CRISIS GO TO WASTE – IS THIS THE BIG ONE
- WE ARE A CRISIS MANAGEMENT SPECIES
- PEOPLE ONLY TAKE NOTICE OF PETROL ONCE ABOVE 10$/l AND BAD WEATHER EVENTS
- NO ONE LISTENS TO SCIENTISTS; IS it THEIR MESSAGING?
- RAISING ECOLOGICAL LITERACY OF PUBLIC
- CRI/HEALTH SCIENTISTS (not) ALLOWED TO SPEAK/WRITE WITHOUT APPROVAL REQUIRED (cf MIKE JOY)
- RETURN TO HUMANISM – RESPECT EACH OTHER
- CHARTER RIGHTS vs DUTIES
- ENABLE FUTURE GENERATIONS + NATURE/OTHER VOICES TO BE HEARD
- SOCIAL EQUITY
- POWER
- TREATY OF WAITANGI
- BASIC BUSINESS PARADIGM

Landing points - Research opportunities - designing transitions to fit people's comfort zone

- Reuse Repair Recycle
- Transition towns; Transitions/Stepping stones/empowerment/hope/resources
- Practical tools - impact (C footprint) of changing different things in life
- Practical models (Edward Mitchell) – demonstrations; role models; political allies and champions
- Biophilic Cities - http://biophiliccities.org/wp-content/uploads/2018/04/Coffman-Preprint.pdf
- Veganism???
- **Harvey Locke & EO Wilson proposed 50% of planet should be wild?**
- Too many pets – 1 large dog (and 5-9 cats) equivalent to an SUV
- Joined-up thinking; ecology, history & culture in design (legibility)
- Sustainable Aotearoa – Strong Sustainability - https://www.facebook.com/SANZ-Sustainable-Aotearoa-New-Zealand-1462909530621690/
- Small is beautiful
- What can the west cut back on; what is reasonable carrying capacity that allows us to share with each other and with the other creatures on the planet? What are implications for population and migration
- What technologies are there for regeneration and life-affirming global culture; relationship to kaitiakitanga
- Ecological Literacy - Messaging
  - Understanding biodiversity, material cycling, decomposition, energy flows, foodwebs, succession, trends, capacity, limits, human dominance and impact
  - Biomimicry – going with the flow, copying nature
  - The role of biodiversity in place-making and well-being (a sense of history and identity)
  - Medical Professionals are generally accepted as promoting preventative measures to maintain public health; ecology now has to advocate for the health of the planet – the stakes are high

The 9 planetary boundaries

To keep Earth hospitable, we need to live within 9 specific limits. Here's how we're doing in 2015.

2015 !

	BOUNDARY	WHERE WE ARE TODAY
1. Climate change	Atmospheric concentrations of carbon dioxide at no more than 350 ppm	Carbon dioxide levels are at 400 ppm and climbing
2. Lost biodiversity as species become extinct	Maintain 90% of biodiversity	Biodiversity has dropped to 84% in parts of the world such as Africa
3. The addition of phosphorus, nitrogen (and other elements) to the world's crops and ecosystems	Worldwide use per year of about 11 teragrams (Tg) of phosphorus and 62 Tg of nitrogen	Up to about 22 Tg per year of phosphorus and 150 Tg of nitrogen
4. Deforestation and other land use changes	Maintain 75% of the planet's original forests	Down to 62%
5. Emission of aerosols (microscopic particles) into the atmosphere that affect climate and living organisms	Global boundary unknown, but regional effects (such as on the South Asian Monsoon) occur when Aerosol Optical Depth (AOD) is more than 0.25	Up to 0.30 AOD over South Asia, but probably well inside (or below) the boundary over most of the globe
6. Stratospheric ozone depletion	Less than 5% below pre-industrial level of about 290 Dobson Units (DU)	Still safely inside the boundary except over Antarctica during spring, when levels drop to 200 DU
7. Ocean acidification	When the oceans become acidic enough that the minerals sea creatures need to make shells, such as aragonite, begin to dissolve	Still within the boundary, which won't be crossed if we can stay within the climate boundary of 350ppm of CO2 in the atmosphere
8. Freshwater use	Can use up to 4000km³ of freshwater a year	We use around 2600 km³ of freshwater per year
9. Dumping of organic pollutants, radioactive materials, nanomaterials, micro-plastics, and other novel or man-made substances into the world's environment	Unknown	Unknown

"For the first time, we have a framework for growth, for eradicating poverty and hunger, and for improving health," Johan Rockström

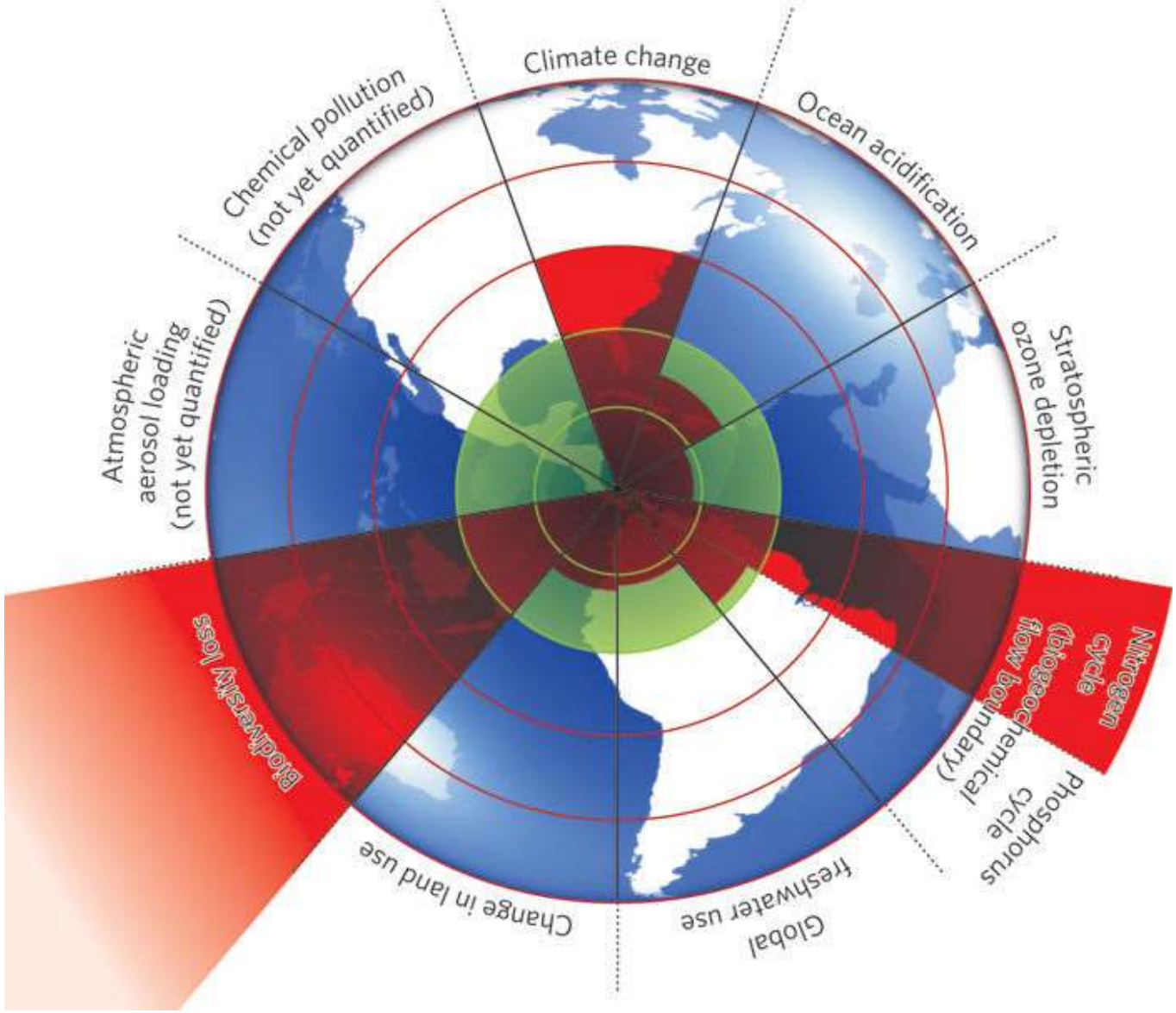
We're already close to points of no return, Rockström and many others believe. "What scares me absolutely the most is that we may have crossed a tipping point in the loss of the West Antarctic ice sheet," he says.

Time to throw up our hands in despair? Not at all, says Rockström. "Ours is a positive – not a doomsday – message," he insists. The beauty of the planetary boundary analysis is that it charts a path to keeping the planet "safe" for humanity, he believes. For instance, nations can slash their carbon emissions to

Some argue that humans are clever enough to thrive even if the Earth does lurch away from the stability of the Holocene. But why take the risk?

?

This particular criticism is a fundamental misreading, supporters say. "The planetary boundary research liberates us from limits to growth in a decisive way," Rockström explains. "It says, 'here is a safe operating space where we can have unlimited growth.'" True, the existence of the climate boundary means that developed nations must slash their carbon emissions to near zero in just a few decades. "But there is nothing to hinder solar and wind power and higher efficiency," Rockström says. "The world economy can grow even in a decarbonized space."



The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

If you did go vegan, your ecological footprint would shrink

Protein

You need 45 to 55 grams of protein a day, which you can get from…

1122g ❮ 1 large pork chop (175g)

❯ **3.5m²**

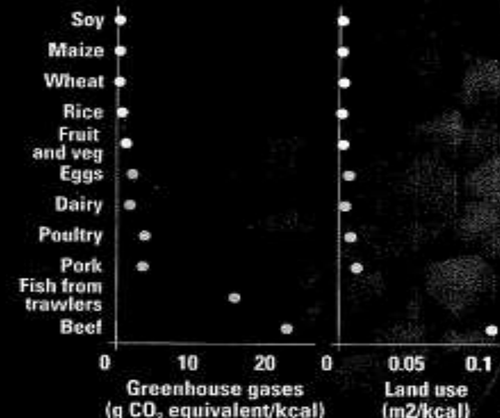
Greenhouse gases — or — Land use

30g ❮ 1 cup of cooked tofu (250g)

❯ **0.6m²**

Greener veg

Vegan calories have a much smaller environmental impact than those from meat, fish, dairy and eggs

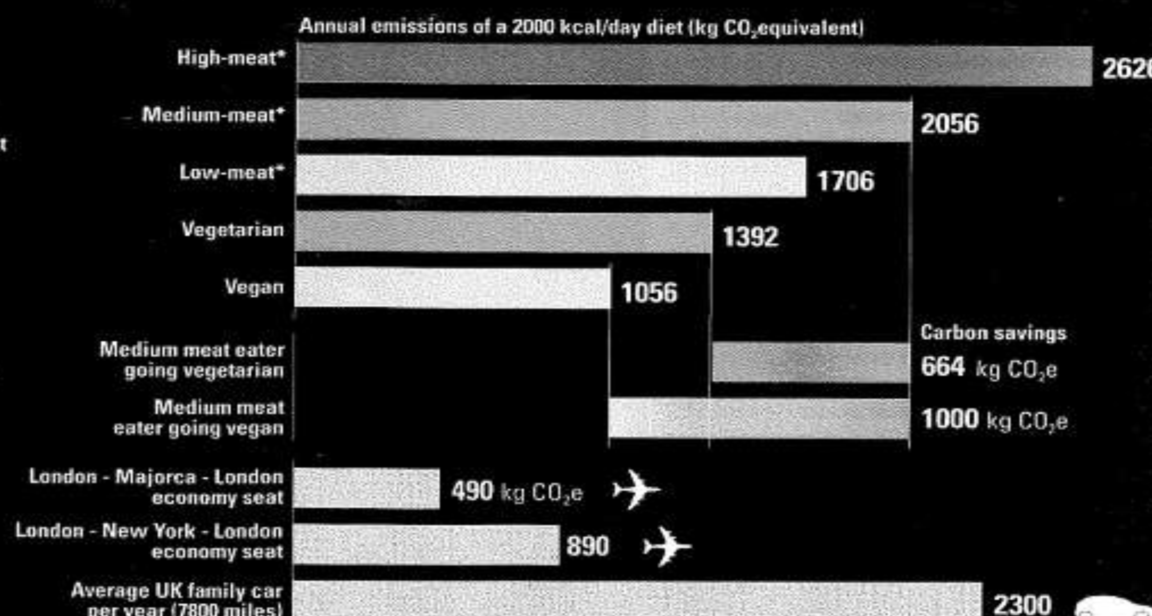


Your choice

Most adults in the UK eat 110 grams of meat a day, making them high meat eaters. The carbon footprint of their diet is more than twice that of a vegan

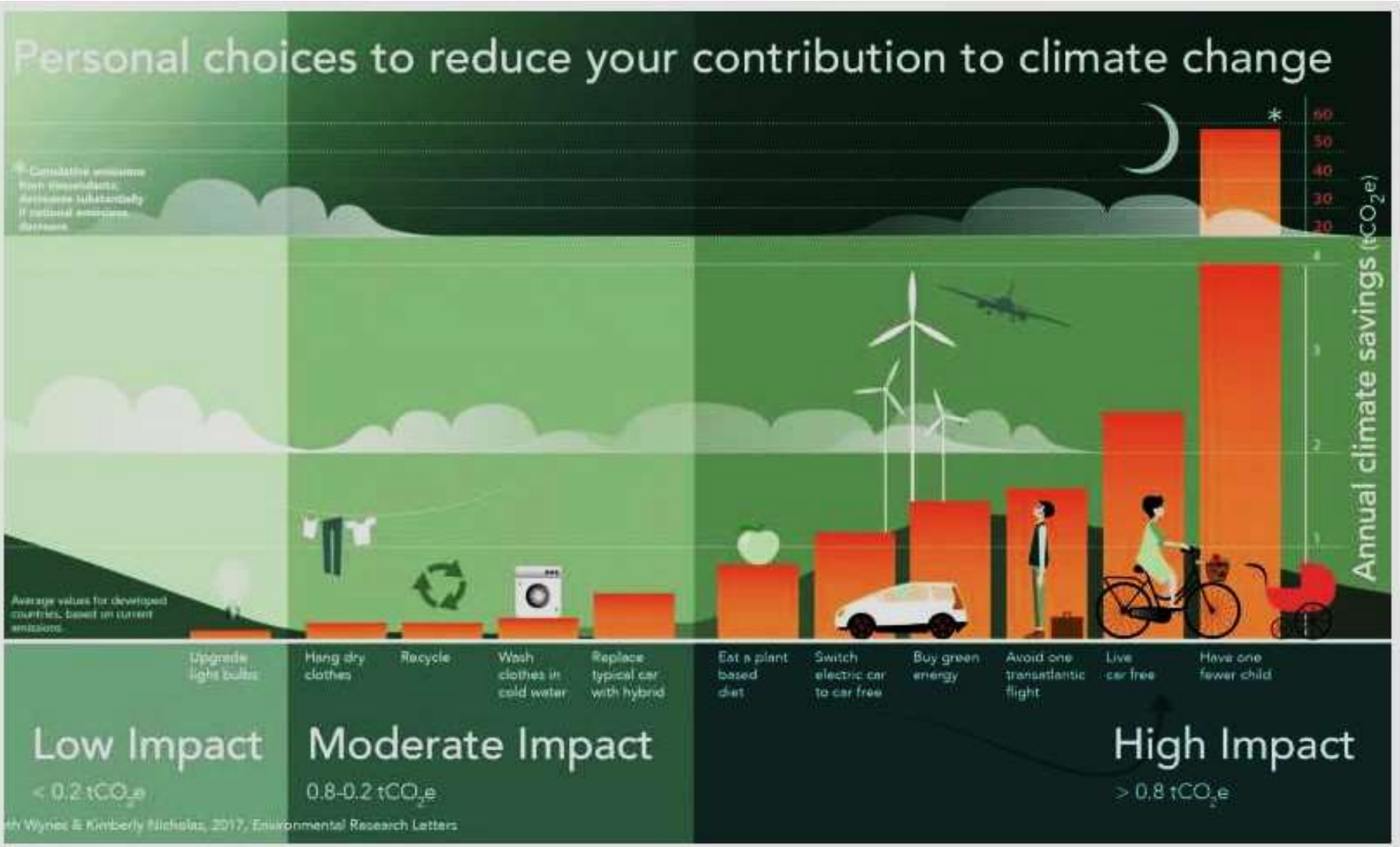
A medium meat eater who decides to go vegan would cut their diet's carbon footprint by an extra 50 per cent compared with going vegetarian

Alternatively, you could just choose not to take that holiday in Majorca this summer



*High meat ≥100g/day *Medium meat = 50-99g/day *Low meat ≤ 50g/day

Source: DOI: 10.1007/s10584-014-1169-1



This infographic shows climate choices. Credit: Seth Wynes/Kimberly Nicholas, *Environmental Research Letters*, 2017

Personally effective ways to reduce Carbon Footprint

Jacinda Ardern's intricately-interlocked ministry is in place. The BIMs have been delivered. One will likely open a door to a wide new space Ardern will want to drive into.
https://www.odt.co.nz/opinion/opportunity-ardern-over-wellbeing

A BIM is officials' ''briefing to the incoming minister''. In 2014 ministers heavily redacted many, which reflected badly on officials' supposed party-political independence. Earlier this year officials briefed ministers on Winston Peters' superannuation.

Thus, some officials fear the new ministers will be more wary of them than after previous changes of government. More on that in a future column. Of high potential long-term interest in this crop of BIMs is what the Treasury is telling Grant Robertson about ''wellbeing economics'', a way of assessing overall wellbeing devised by Amartya Sen and developed here by Lincoln University's Paul Dalziel.

For eight decades ministers have obsessed about gross domestic product (GDP), the output of market goods and services - ''stuff''. GDP builds or runs down financial and physical capital.

Comprehensive prosperity - what makes for a good life, or wellbeing - is much more than ''stuff''. It includes many domains of life and encompasses at least three more ''capitals'': natural, social and human.

While New Zealand is down the OECD pack in GDP per capita, when measured on those wider domains, as people mostly do in assessing their personal prosperity, we come out near or at the top of the world.

To stay up there the stocks of those other capitals and the flows of wellbeing benefits from them need to grow.

In 2015 the Treasury's chief economist, Girol Karacaoglu, injected wellbeing into its ''living standards framework''. Now head of Victoria University's School of Government, Karacaoglu has appointed leading economist and former Reserve Bank chairman Arthur Grimes to a chair in wellbeing economics.

The Treasury featured wellbeing prominently in its latest long-term fiscal statement last November. Now it aims to have a first stab at valuing natural, social and human capital in its four-yearly investment statement next March. This is not straightforward.

Unlike physical and financial capital, measuring the capital value of and benefits from natural resources is very difficult - and some greens think putting a dollar figure on them diminishes their intrinsic value.

Social capital can include the likes of trust, the rule of law, co-operation and connections and institutions. Human capital can include skills, competencies and physical and mental health status. (The Treasury has been mulling a ''health working group'' to address gaps left by Jonathan Coleman. Departments' external science advisers laid the basis for the mental health programme earlier this year.)

Measurement gets even more difficult when it is recognised that wellbeing can include the likes of security and safety, freedom, community, work-life balance and life satisfaction.

To do the measurements will probably need recourse to proxies - but, then, the Reserve Bank's inflation target is a proxy for money supply, which was Milton Friedman's original focus.

In short, getting a grip on those other capitals will likely take a long time.

But put it in the context of a new, younger government.

First, it turns on its head the Bill English formula that when the economy - making and selling goods and services - does well there is money to tend the environment and social ills - many, ironically, caused or worsened by a tight GDP focus.

Second, Ardern and Robertson are aware of the Treasury's work and the Greens have long pushed ''ecological economics'', which focuses on changes in natural capital.

Wellbeing economics fits the new ministers' notion that the economy, while a big part of life, is a subset and servant of society and dependent on natural resources. It fits Ardern's aim to widen social policy targets far beyond English's and embed them in the Public Finance Act.

In that context, the Treasury wellbeing initiative has echoes of its early 1980s importation of Friedmanite market economics which laid the basis for the post-1984, radical deregulation of the economy (and much else) by David Lange's Labour government.

Echoes are not songsheets. Ardern and Robertson and even Shaw present more as reformers than revolutionaries.

But wellbeing economics is not a tweak of the present settings. If it works, it would be a deep change of policy approach, from social sticking plasters to holistic treatment.

So if, as senior ministers intend, Ardern's Government heads down the wellbeing track and does so with a measured tread that doesn't frighten too many horses at any one point and so stays in office, we might by the mid-2020s be looking back on a major policy transformation.

Most key ministers are of a new, well-past-baby-boom generation and New Zealand has a history of big policy shifts after long periods of stasis or modest change.

This conceivably could be another, if wellbeing economics can be made to work. That's Ardern's biggest opportunity.

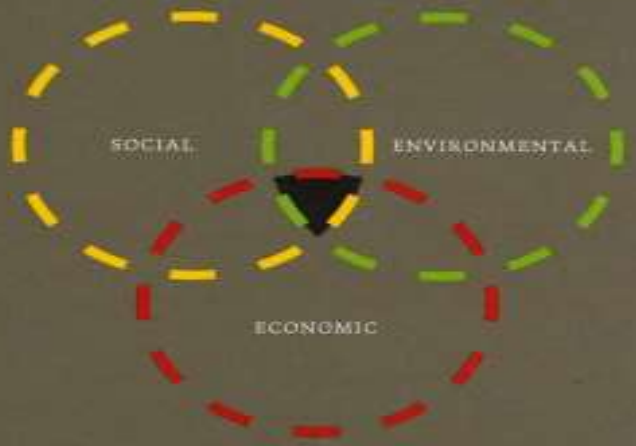
-Colin James is a leading social and political commentator. ColinJames@synapsis.co.nz

Preservation Progress vs Needs

- Action is urgently need, say scientists. This point was acknowledged in 2010 at a major international conference in Japan, where **governments agreed to establish a network of reserves and protected seas that would, by 2020, cover 17% of Earth's land surface and 10% of our oceans**.
- "With more than two years to go, we **now have about 15% of land protected and about 7% of oceans**," said one of the London conference's organisers, Mike Hoffman, of the Zoological Society of London.
- Harvey Locke, whose organisation, Nature Needs Half, takes a far bolder approach and campaigns for the **preservation of fully 50% of our planet for wildlife by 2050**.
- "That may seem a lot – if you think the world is a just a place for humans to exploit," Locke told the *Observer*. "But if you recognise the world as one that we share with wildlife, letting it have half of the Earth does not seem that much."
- The idea is supported by E O Wilson, the distinguished Harvard biologist, in his most recent book, *Half Earth*.
- "London, for example, is a surprisingly green city," he said. "You would only need to plant on a relatively small amount of extra land to make half its surface green. That would have important ecological effects, but it would also have an **important symbolic effect and help raise awareness** of the issues we face."
- Citizens of greener cities would be far more likely to engage with nature concerns and would be far more **likely to extend their awareness to wildlife elsewhere** in the world – to narwhals or turtles or to other threatened species, said Raven-Ellison.

FIGURE 1 ALTERNATIVE MODELS OF THE CONCEPT OF SUSTAINABILITY

TRIPLE BOTTOM LINE MODEL



MICKEY MOUSE VERSION OF THE TRIPLE BOTTOM LINE MODEL

STRONG SUSTAINABILITY MODEL

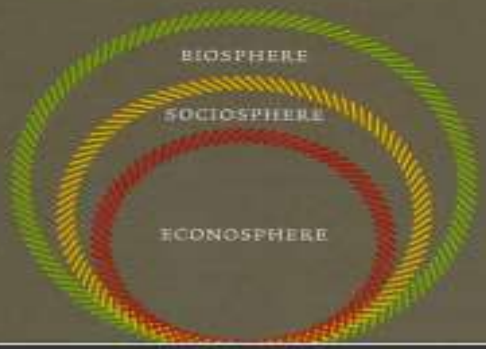
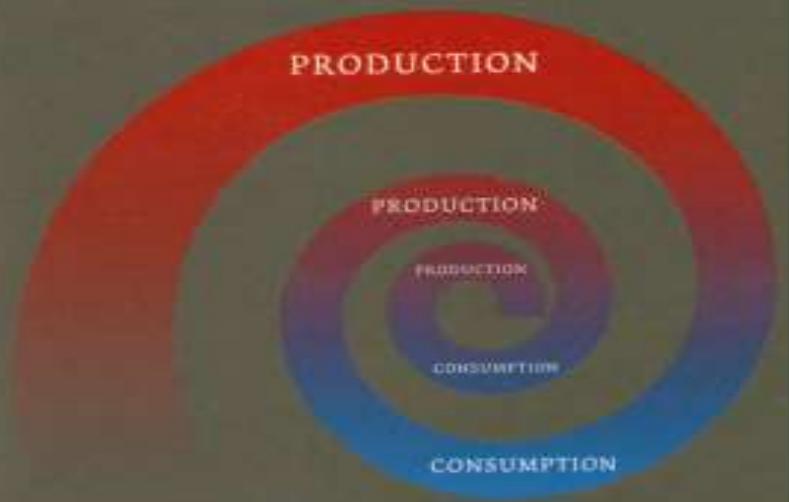
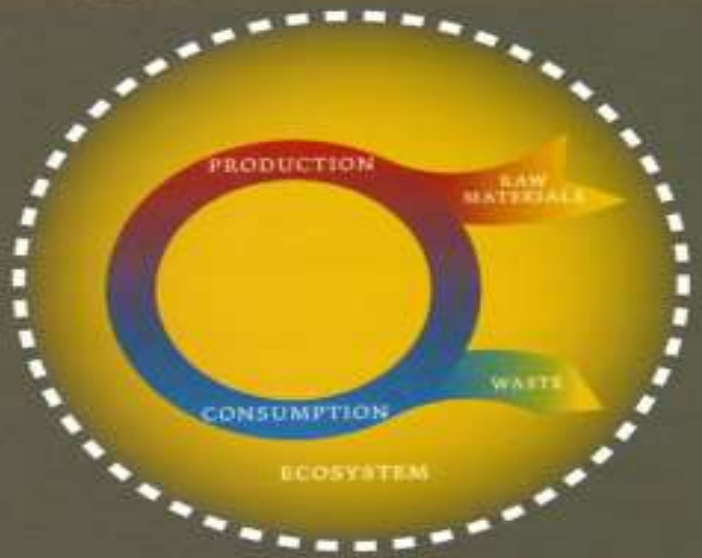


FIGURE 2 COMPARISON OF STANDARD (GROWTH) AND STEADY STATE ECONOMIES (HERMAN DALY)

STANDARD (GROWTH) ECONOMY DIAGRAM



STEADY STATE ECONOMY DIAGRAM



Appendices & Reference Materials

Note the “looming disasters” sections are so-called ‘kitchen table’ conversation modules from ***The Great Transitions Initiative***

Looming Disasters

Why citizen responsibility is essential

The Earth is vast
It is our Home

The Great Transition Initiative
www.InspiringTransition.net

This is a **Great Transition Initiative** communication tool (**Kitchen Table Conversations modules)** to quickly bring people to a sense that humanity is in an existential emergency through global warming, toxins in the food chain, threat of nuclear war… and, profoundly, citizen ignorance. Andrew Gaines - www.InspiringTransition.net

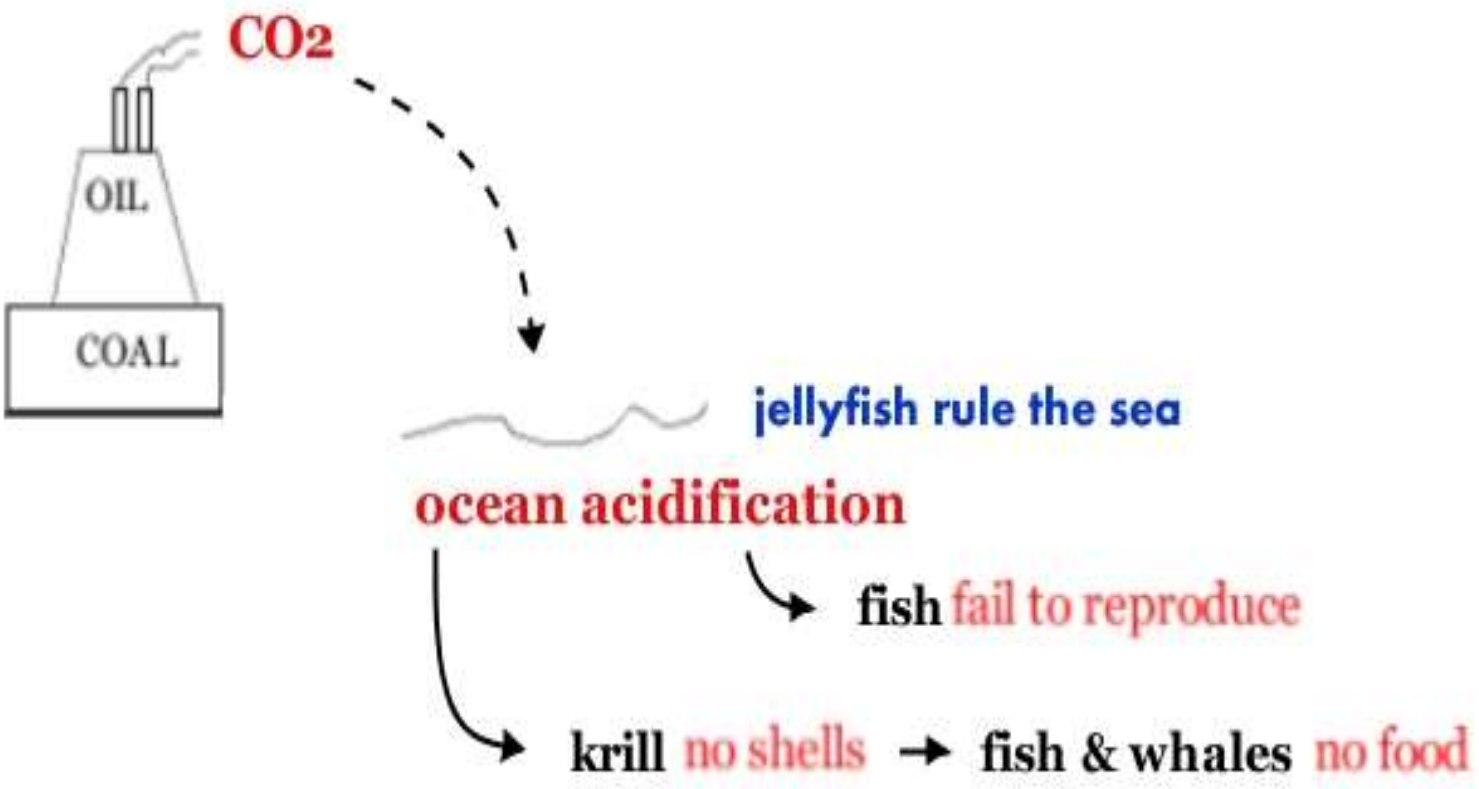
Looming Disasters

- This is a **Great Transition Initiative** communication tool to quickly bring people to a sense that humanity is in an existential emergency through global warming, toxins in the food chain, threat of nuclear war… and, profoundly, citizen ignorance.
- Each page presents a variety of threats. They are meant be shown and discussed with people one by one. The point is not to 'present information'. The point is to make people acutely aware of the realities of humankind's current trajectory, with a view to moving people to get off their ass and become citizen activists.
- So use as many – or as few – of the pages as makes sense to you. The order is not fixed.
- This is not meant to be a complete catalogue of adverse environmental and social trends. Its purpose is simply to wake people up to '*Hey – get a lot of stuff is going on, we had better do something about it.*' The rest of the **Kitchen Table Conversations modules** are a natural follow-on.
- Science writer Julian Cribb's *Surviving the 21st Century* is far more in-depth. It powerfully presents the case that indeed we are in an **existential emergency** with a vanishingly short time frame to turn things around. I encourage you to read it, and to encourage people you talk with to read it.

- Andrew Gaines
  The Great Transition Initiative
  www.InspiringTransition.net

Ocean acidification, …

Carbon dioxide from burning fossil fuel makes the oceans more acid. When the pH gets too acid, large fish failed to reproduce, and the tiny microorganisms of the bottom of the food chain fail to form their shells properly. Currently the ocean is 30% more acidic than its was, and we are on track to lose the entire oceanic food chain. Jellyfish, including poisonous ones, will take over the sea, and the millions of people who depend on seafood for their primary diet will starve.



… overfishing & plastics

- **Overfishing**
- Bluefin tuna stocks are down by 90% from former levels. Some fisheries, such as the North Atlantic cod fisheries, have collapsed. Others are well-managed, and some are precarious.
- **Plastics**
- There are massive garbage dumps of plastics in the ocean. They get in to sea life and birds. Fine plastic particles get into the food chain – and into us.

Climate mayhem: fires, floods, hurricanes … & blizzards

Heatwaves and humidity could make some Australian cities virtually 'uninhabitable'

- Centuries-old heatwave records have been shattered all over Australia as cities from Hobart to Sydney have been hit by prolonged stretches of temperature far above normal. Coming 55°C temperatures will make some Australia cities uninhabitable.

Across the planet we have

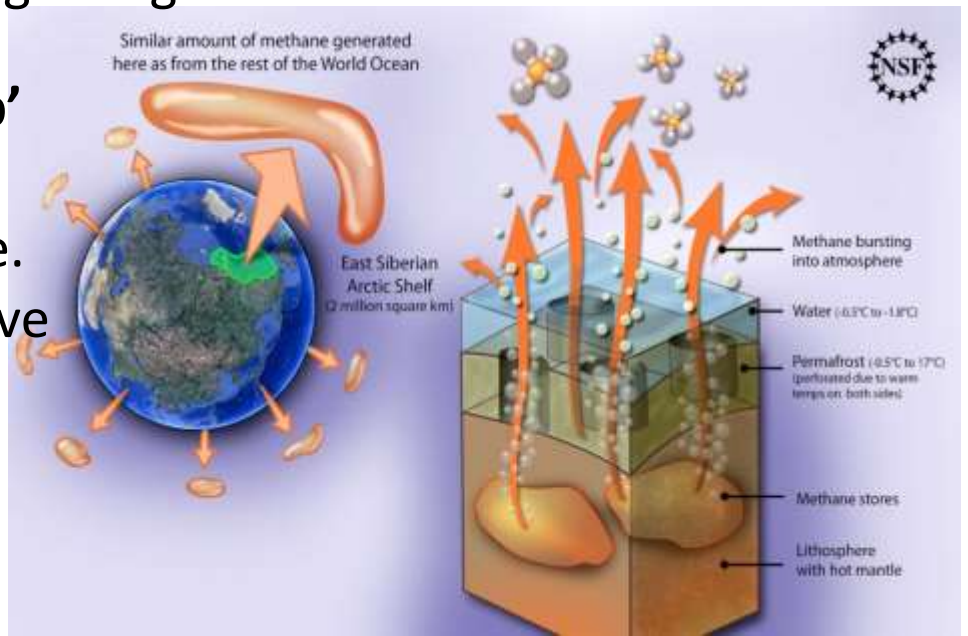
- … increasing severity of forest fires, droughts and hurricanes − and this is only the beginning as the planet continues to heat up.

Some scientists fear a 'methane burp'

- … with 50 million tons of methane

suddenly ejected into the atmosphere.

The protective permafrost over massive methane/ice deposits is thawing.



Industrial toxins in our food chain

Toxins are in our food

- … our water, the air we breathe, the furnishings and materials of our homes, vehicles, schools and workplaces, in wildlife, the oceans, in our bodies and even, now, in our genes. Medical evidence that toxins are damaging human intelligence, gender, reproduction and health is mounting.
- Researchers have discovered toxic man-made substances at the peak of Everest, where fresh snow is too polluted to drink, and in the ocean deeps, where squid over a thousand fathoms down have been found to be contaminated with cancer-causing chemicals from domestic furnishings. Heavily polluted waters now underlie the world's great cities, and are used for domestic water supplies.
- The average person nowadays is a walking contamination site: citizens of advanced societies typically carry several hundred industrial chemicals in their body tissues, blood or bones. Some of these are known carcinogens; many others have not yet been tested.
- But we do know that cancer rates are going up, and occurring in more young people than ever before.

The sixth great extinction

As we humans convert more of the Earth's surface to our use

- … we reduce the land available to other species so much that they die. They simply do not have enough to live on. And of course pesticides and actively hunting animals makes it worse.
- On current trends, by 2026 all the large mammals in the wild will be gone… unless we make drastic changes.

Pollinators

- You may be aware that the loss of bees is a worldwide phenomenon. And it's not just bees. Birds, bats, beetles, moths, butterflies and other creatures that carry the pollen necessary for fertilizing over three quarters of the world's main food crops and 90% of wild flowering plants are declining. Pesticides are a primary cause, with habitat loss and climate change as additional factors.
- *New study suggests insect populations have declined by 75% over 3 decades* October, 2017

When our life support system goes, we go [danger of Pandemics]

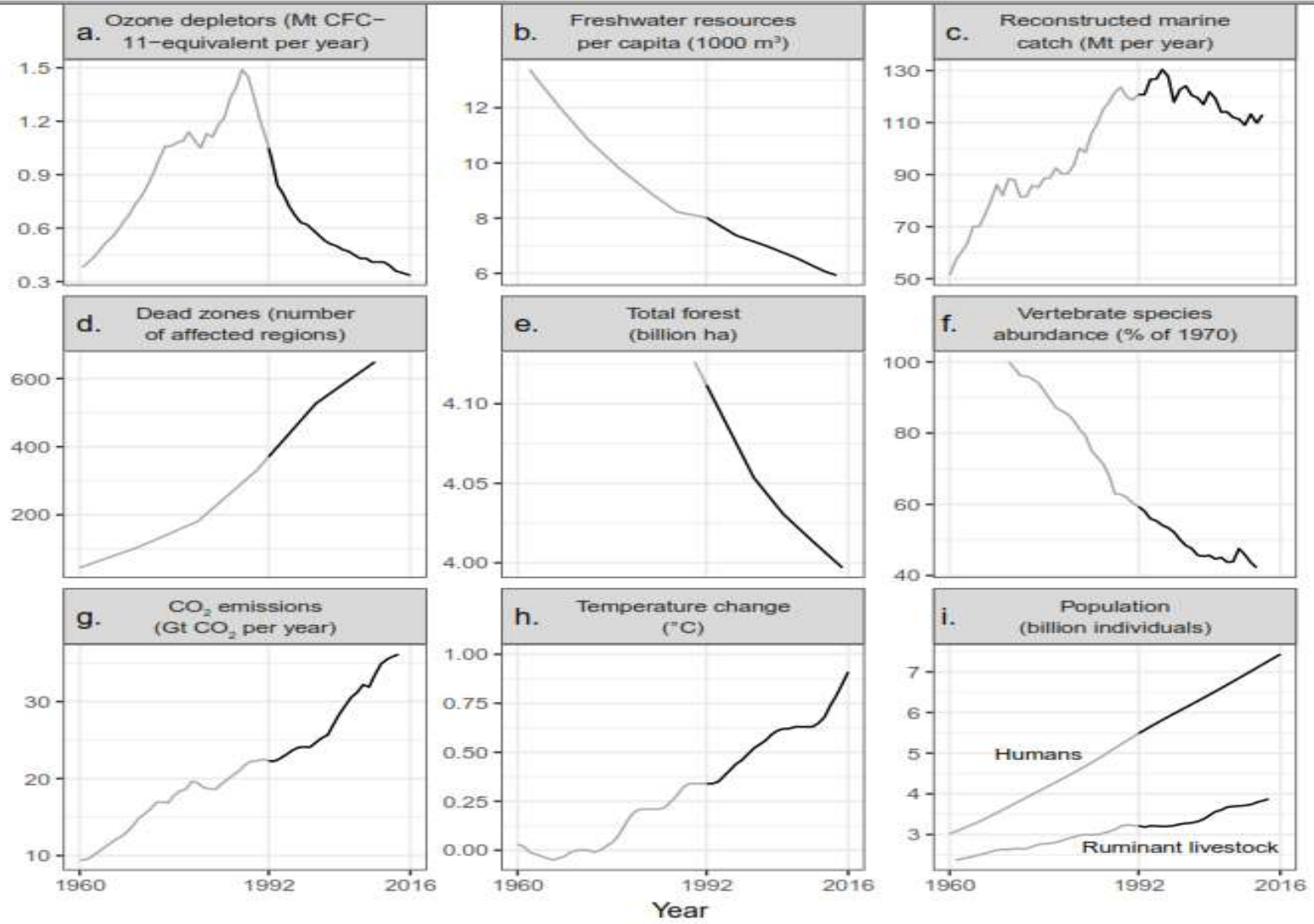
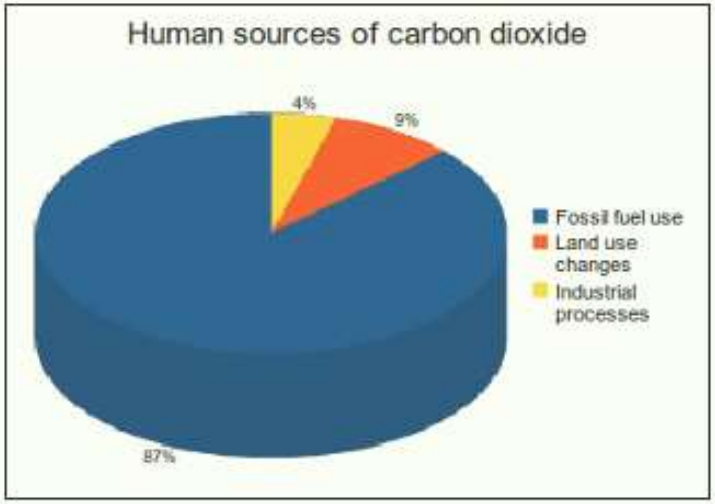
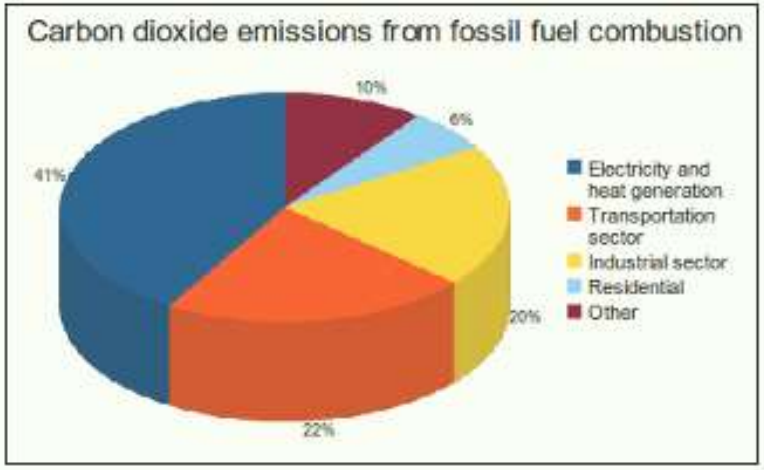


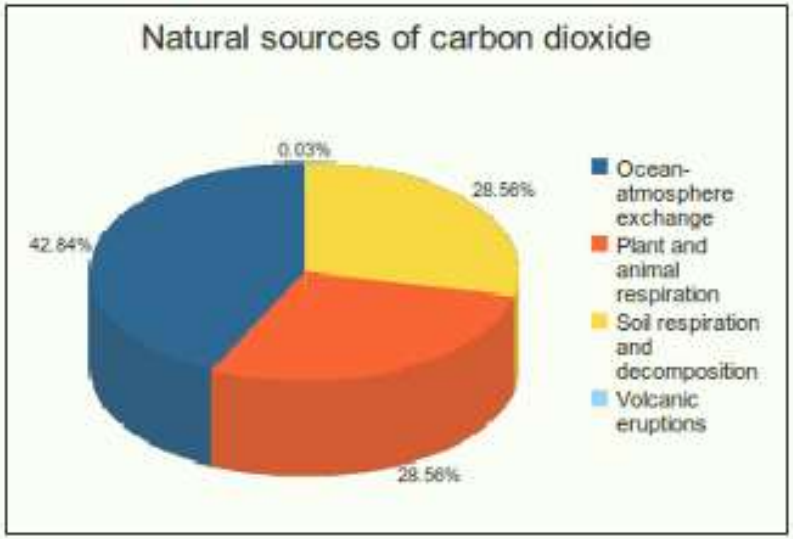
Figure 1. Trends over time for environmental issues identified in the 1992 scientists' warning to humanity. The years before and after the 1992 scientists' warning are shown as gray and black lines, respectively. Panel (a) shows emissions of halogen source gases, which deplete stratospheric ozone, assuming a constant natural emission rate of 0.11 Mt CFC-11-equivalent per year. In panel (c), marine catch has been going down since the mid-1990s, but at the same time, fishing effort has been going up (supplemental file S1). The vertebrate abundance index in panel (f) has been adjusted for taxonomic and geographic bias but incorporates relatively little data from developing countries, where there are the fewest studies; between 1970 and 2012, vertebrates declined by 58 percent, with freshwater, marine, and terrestrial populations declining by 81, 36, and 35 percent, respectively (file S1). Five-year means are shown in panel (h). In panel (i), ruminant livestock consist of domestic cattle, sheep, goats, and buffaloes. Note that y-axes do not start at zero, and it is important to inspect the data range when interpreting each graph. Percentage change, since 1992, for the variables in each panel are as follows: (a) −68.1%; (b) −26.1%; (c) −6.4%; (d) +75.3%; (e) −2.8%; (f) −28.9%; (g) +62.1%; (h) +167.6%; and (i) humans: +35.5%, ruminant livestock: +20.5%. Additional descriptions of the variables and trends, as well as sources for figure 1, are included in file S1.



Source: Le Quéré, C. et al. (2013). The global carbon budget 1959-2011.



Source: CO2 Emissions from Fuel Combustion (2012), International Energy Agency.



Source: IPCC Fourth Assessment Report: Climate Change 2007, Intergovernmental Panel on Climate Change.

New Zealand: 2nd May

- A country's overshoot day is the date on which Earth Overshoot Day would fall if all of humanity consumed like the people in this country.
- E.g., Switzerland, using the latest data available (for 2013):
  - The Ecological Footprint in Switzerland is 5.28 gha per person
  - Global biocapacity is 1.71 gha per person.
- Therefore, it would take (5.28/ 1.71) = 3.1 Earths if everyone lived like the Swiss, OR
- we can determine Switzerland's overshoot day as 365 * (1.71/ 5.28) = 118th day in the year. The 118th day is the 28th of April, the Swiss overshoot day (in 2013).

Elephants in the Room
we just can't avoid

- Carrying capacity at what material standard of living
- Reduction due to climate change, SLR, loss of soil
- Engaging with the world on humane solutions
- Immigration & birth rates
- Property rights – equity, planning
- Growth economics -> steady state economics
- Is technology, driverless cars, AI & IOT more than a partial answer
- Exploring non/less- material values – place-making/identity, inclusiveness, ecological literacy
- Psychological needs created by hormones & adrenalin

References

- https://cotap.org/reduce-carbon-footprint/
- http://www.monbiot.com/ : Wikipedia **George Joshua Richard Monbiot** (born 27 January 1963) is a British writer known for his environmental, political activism. He writes a weekly column for *The Guardian*, and is the author of a number of books, including *Captive State: The Corporate Takeover of Britain* (2000) and *Feral: Searching for Enchantment on the Frontiers of Rewilding* (2013). He is the founder of The Land is Ours, a peaceful campaign for the right of access to the countryside and its resources in the United Kingdom.[2]
- http://unsdsn.org/about-us/people/jeffrey-sachs/
  http://lalithanandagunaratne.blogspot.com.au/2018/03/the-illusion-of-self.html
- https://www.project-syndicate.org/commentary/us-progress-sustainable-development-goals-by-jeffrey-d-sachs-2017-11?barrier=accessreg
- http://www.radionz.co.nz/national/programmes/sunday/audio/2018640732/economist-ann-pettifor-the-public-are-not-stupid
- https://www.facebook.com/ScienceChannel/videos/10155935187758387/ (global temp from 1880)
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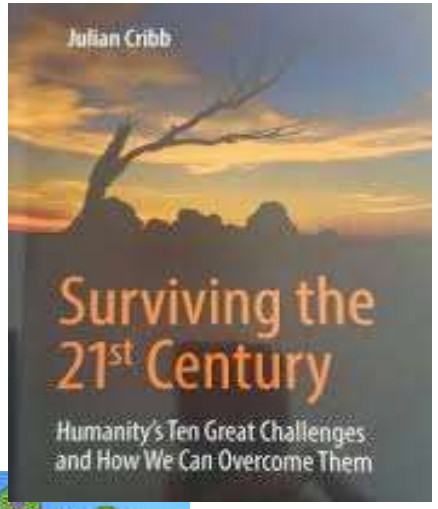
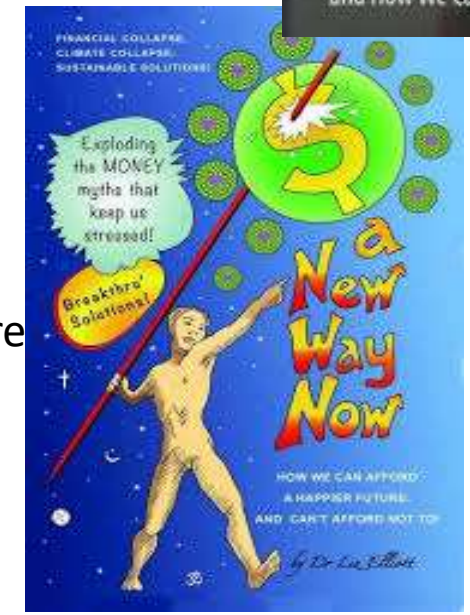
- Daly, H. 2015. Economics for a full world. GTI
- Kotlikoff, L. Fiscal Gap Economist
- Circles of Sustainability (economics, ecology, politics, Culture)
- Harris, Max. 2017. The New Zealand Project.
- Lesley Head *Hope & Grief in the Anthropocene*
- Sam Harris – *The Moral Landscape* (the pivotal role of science)
- David Deutsch – *The Beginning of Infinity*

These two books orient us as to why we need to change at emergency speed, and highlight what would be involved in a life affirming global culture.



Surviving the 21st Century by Julian Cribb
This book draws on massive research to bring us face-to-face with the all-too-real possibility of the extinction of the human species within a shockingly short time frame. Humanity is in an existential emergency.



A New Way Now by Liz Elliott
This is one of the best descriptions of a positive future available. It integrates deep insights into economics, environmental issues and social well-being.

Other Materials

- GTI (The Great Transition Initiative) - http://www.inspiringtransition.net/
- OVTRK – SOC http://onevoicetereokotahi.blogspot.com.au/p/about-one-voice-te-reo-kotahi.html
- https://democracycollaborative.org/
- Sue Bradford (Economic & Social Research Aotearoa) - https://www.esra.nz/ ; http://hdl.handle.net/10292/7435 (Sue Bradford's thesis)
- Alan Mark et al. 'Wise Response' - http://wiseresponse.org.nz/
- Ecostore
- Living the Change
- A manifesto – series of steps to take us from now to the future
- Science is a self-correcting/error-correcting system
- Native bush keeps asthma at bay - study https://www.radionz.co.nz/news/national/356841/native-bush-keeps-asthma-at-bay-study

The Great Transition Initiative

- … is a vehicle for inspiring **thousands of groups to act as citizen educators** championing **a life-affirming global culture**
- http://www.inspiringtransition.net/

The Earth Charter is probably the best and most comprehensive currently-available set of basic values to provide an ethical foundation for a 21st Century mindset.

"*We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace.*"

www.earthcharter.org

SkySong City

thx Diana Shand