

Kestävä ruokaketju

- ruokaketjun kulttuurisen, sosiaalisen, taloudellisen sekä ympäristöllisen kestävyysmerkitseminen sekä ruokaketjun eri vaiheiden alueellisen merkityksen näkökulmasta.

Sirpa Kurppa, prof.

Luonnonvarakeskus,

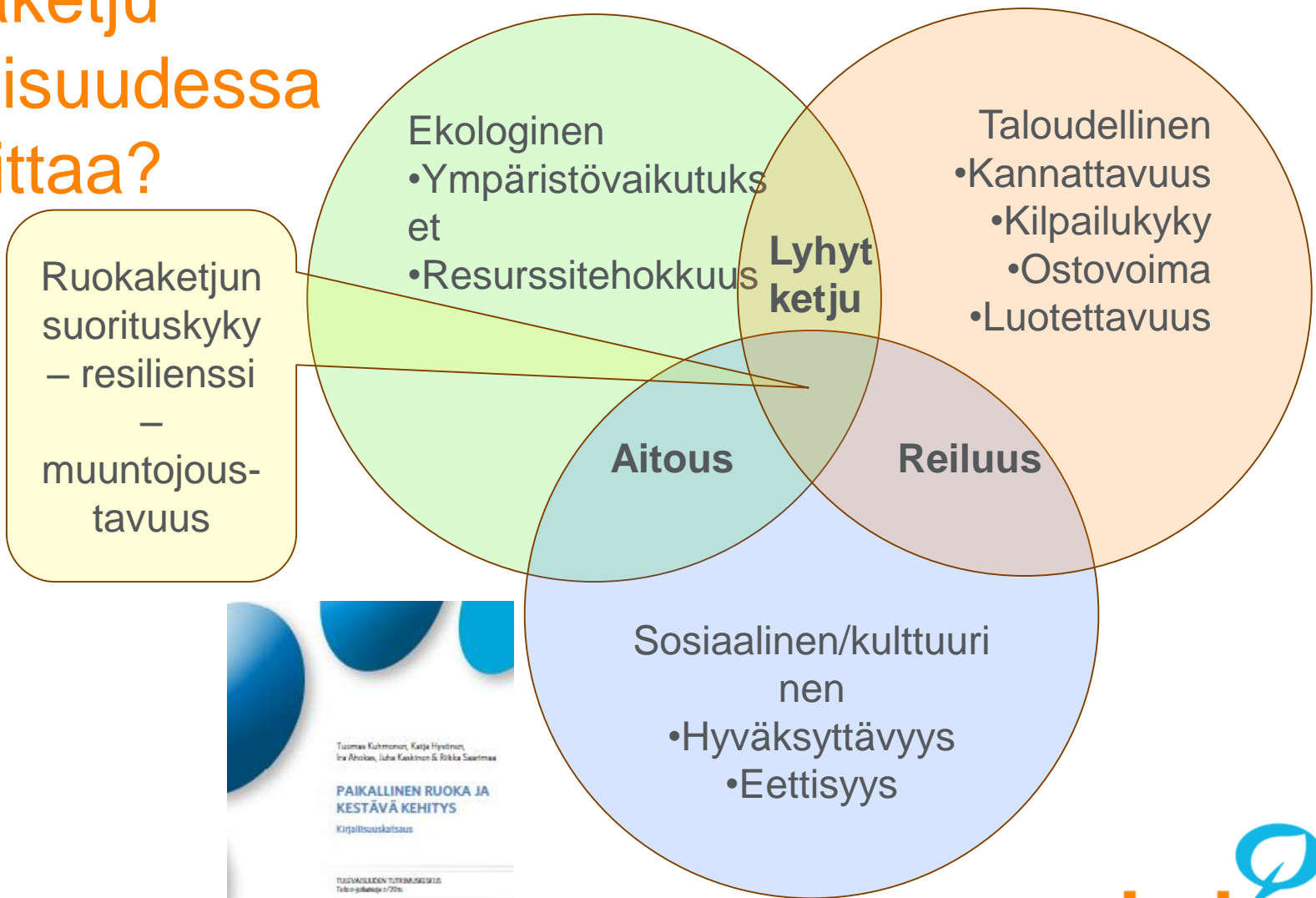
Uudet liiketoimintamahdollisuudet

Kiertotalouden ratkaisut

Teolliset symbioosit

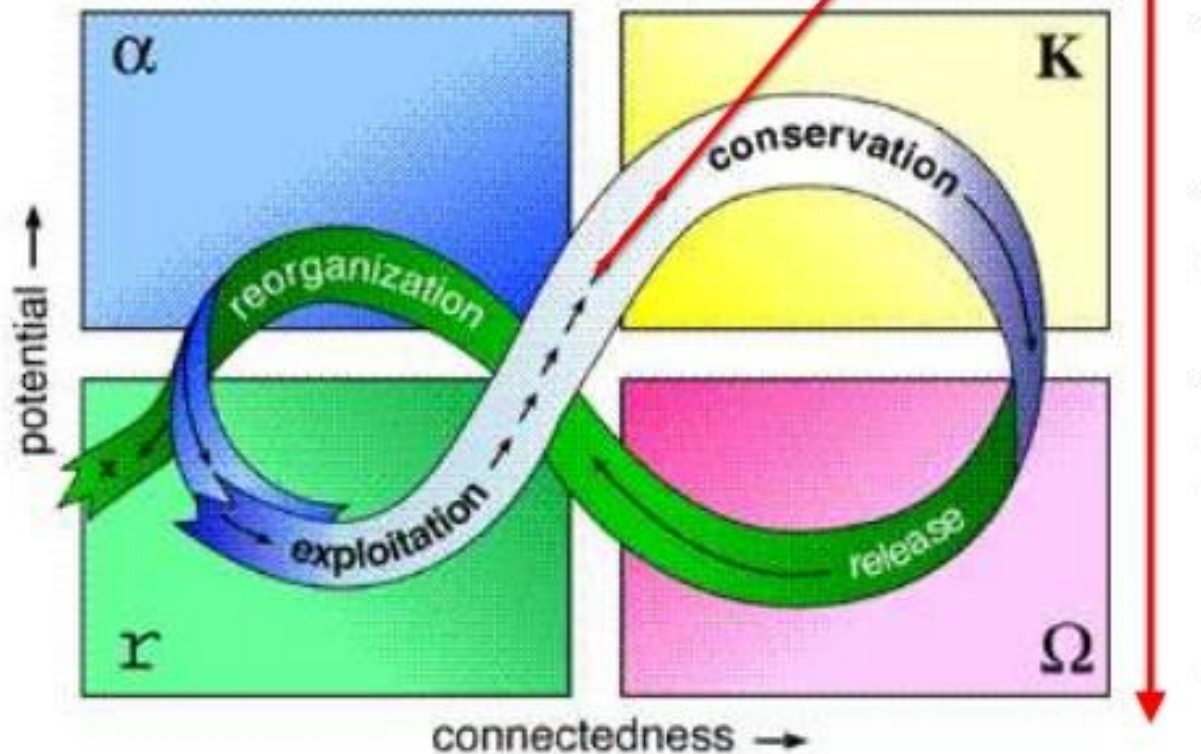
sirpa.kurppa@luke.fi

Mitä kestävä ruokaketju todellisuudessa tarkoittaa?



Adaptive Cycles of Complex Adaptive Systems

We are stuck here in accumulative self-reinforcing self-multiplying feedback loops (r to K) with little renewal of the system



There is no Invisible Hand (Adam Smith)
 There is no Creative Destruction (Schumpeter)
 The system accumulates risk and fragility
 Release is increasingly violent and long to get over

Panarchy - Gunderson & Holling 2002

Yritystoiminnassa/yhteiskunnassa

r

- Kevyt infrastruktuuri
- Vähäinen materiaallinen investointi
- Vähäiset pääomat
- Joustava liiketoimintamalli
- Pien- niche yrittäjyys

K

- Vakiintuva, kasvava infra
- Kasvavat kiinteät investoinnit
- Kasvava pääomitus
- Kasvava t monopolit
- Vakiintunut asiakaskunta
- Kasvava polkuriippuvuus

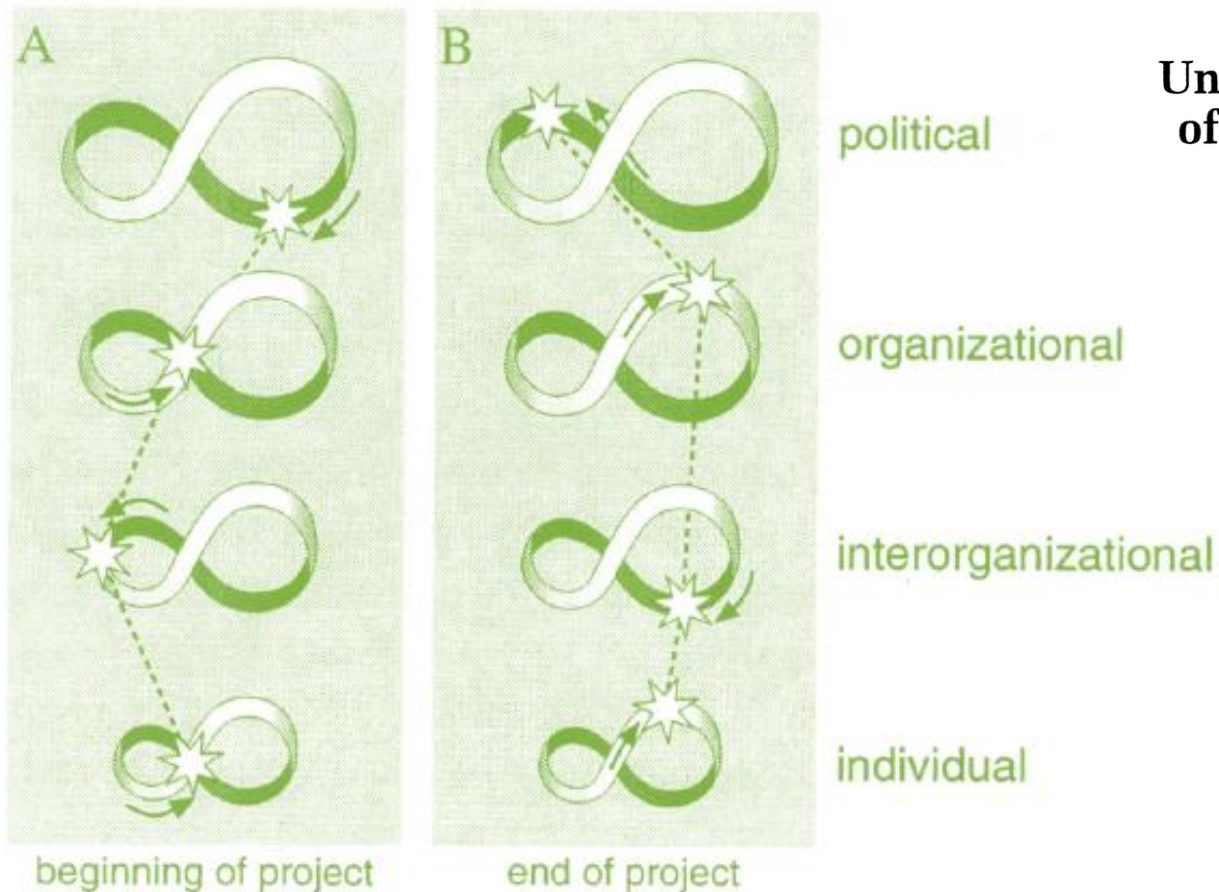
alfa

- Vahvasti argumentoiva yrittäjä
- Vakuuttavuuden rakentaja
- Houkuttelevuuden rakentaja
- ”Myyjän markkinat” -strategia

omega

- Uusyrittäjyys
- Ehdotteleva/suostutteleva str.
- Reaktiivinen yrittäjyys
- Aktiivinen viestintä
- Hintajoustopot
- Luottamusta virittävä

Kullakin yhteiskunnan toimijalla on oma etsikkoaikansa!



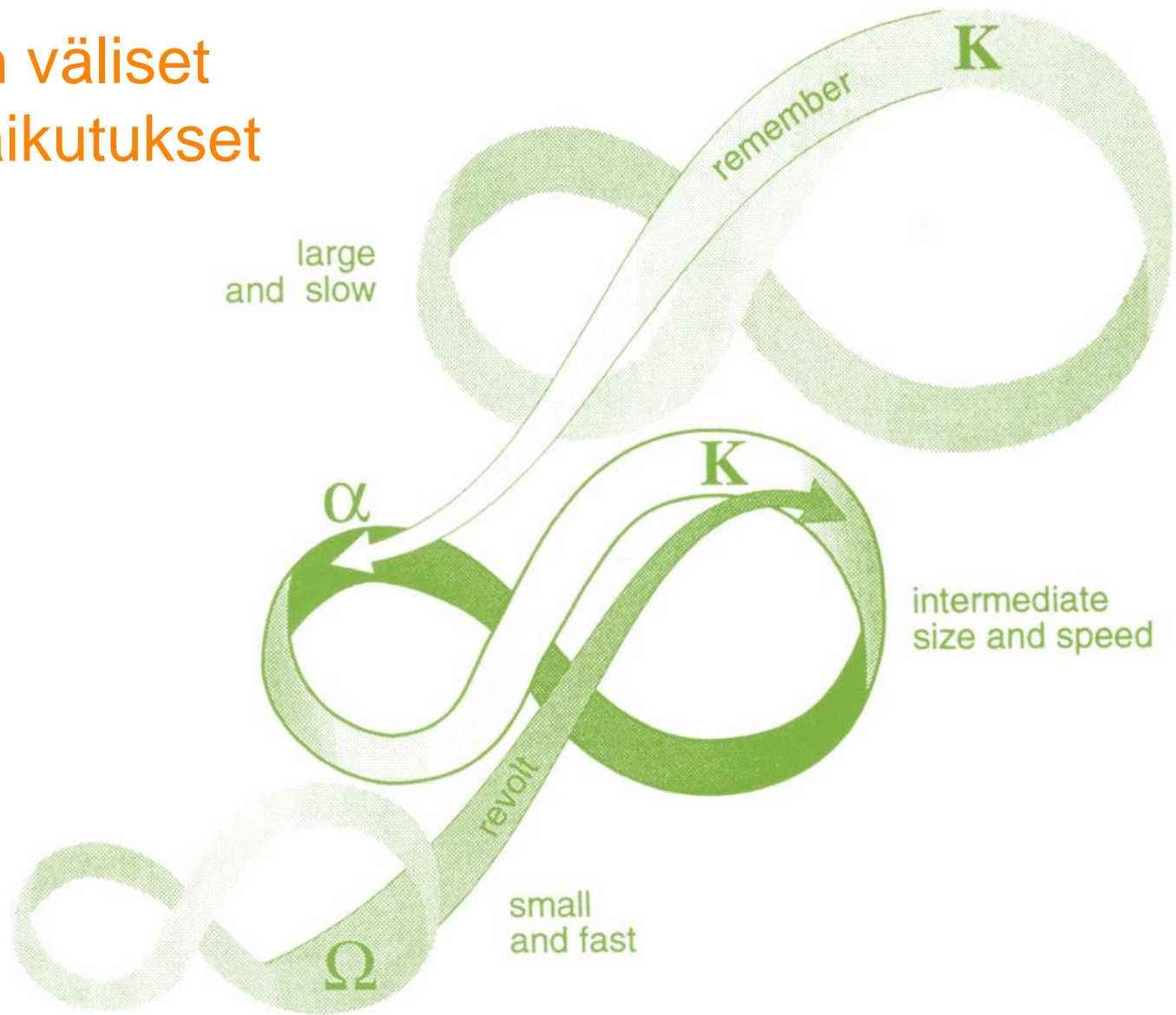
Understanding the Complexity of Economic, Ecological, and Social Systems

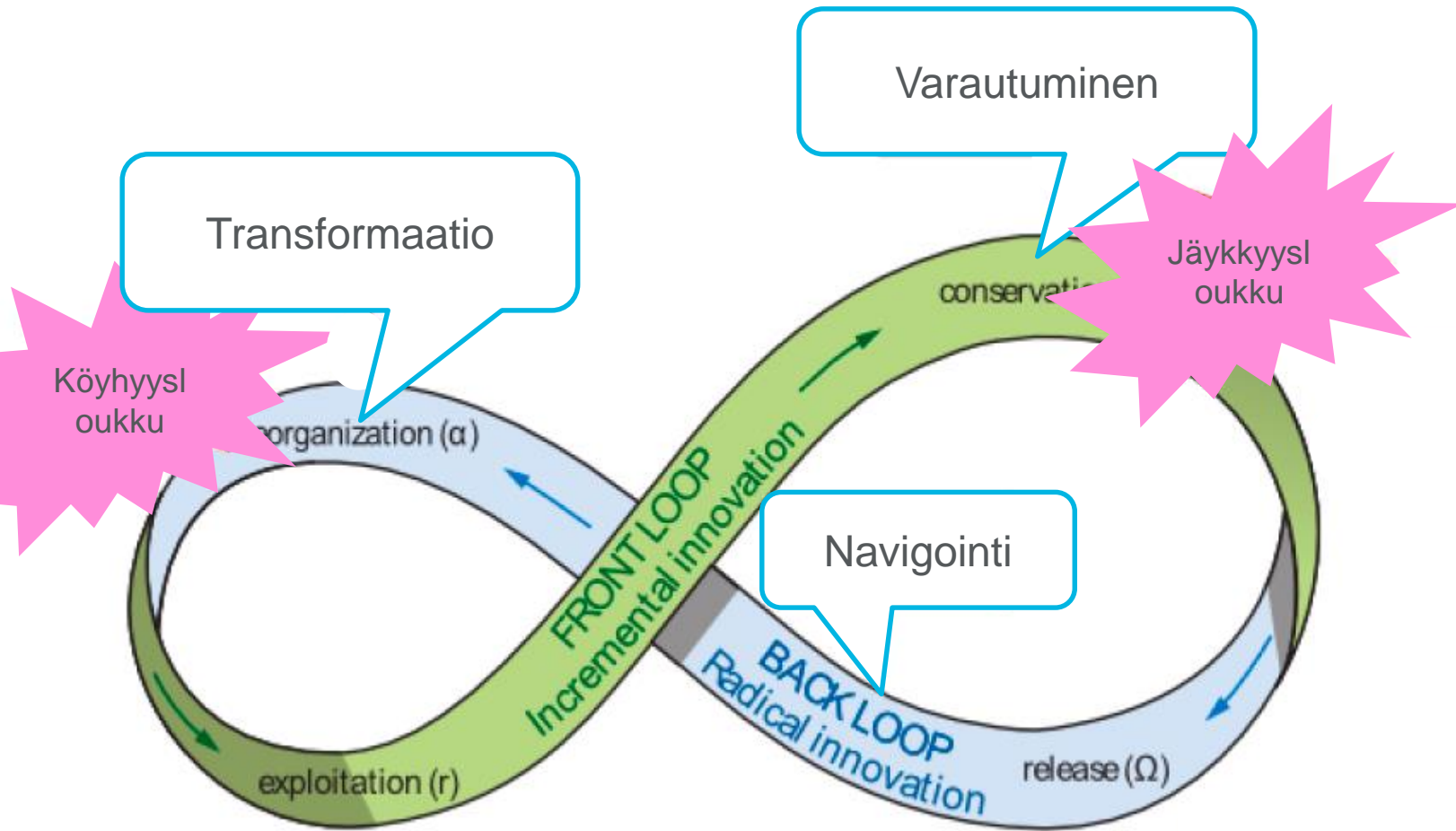
C. S. Holling

Department of Zoology, University of Florida, Gainesville, Florida 32611, USA

Ecosystems (2001) 4: 390–405
DOI: 10.1007/s10021-001-0101-5

Ketjujen väliset vuorovaikutukset





<http://www.theburningplatform.com/2013/09/>

Resilienssi - muuntojoustavuus

In the 1970's and 1980's, resilience was adapted by the ecological and psychological communities to describe somewhat different phenomena.

- **In psychology**, the term was used to describe groups that did not change behavior in spite of adversity (e.g., Werner).
- **In ecology**, the term was used to describe ecosystems that continued to function more or less the same in spite of adversity (most notably Holling).

Resilienssi - muuntojoustavuus

Harward Business Review Definition of RESILIENCE

Business resilience is the ability an organization has to quickly adapt to disruptions while maintaining continuous business operations and safeguarding people, assets and overall brand equity. Business resilience goes a step beyond disaster recovery by offering post-disaster strategies to avoid costly downtime, shore up vulnerabilities and maintain business operations in the face of additional, unexpected breaches

WHAT'S THE BIGGEST DRAIN ON RESILIENCE AT WORK?

Survey responses from 835 British employees.



SOURCE "TOUGH AT THE TOP," BY SARAH BOND AND GILLIAN SHAPIRO

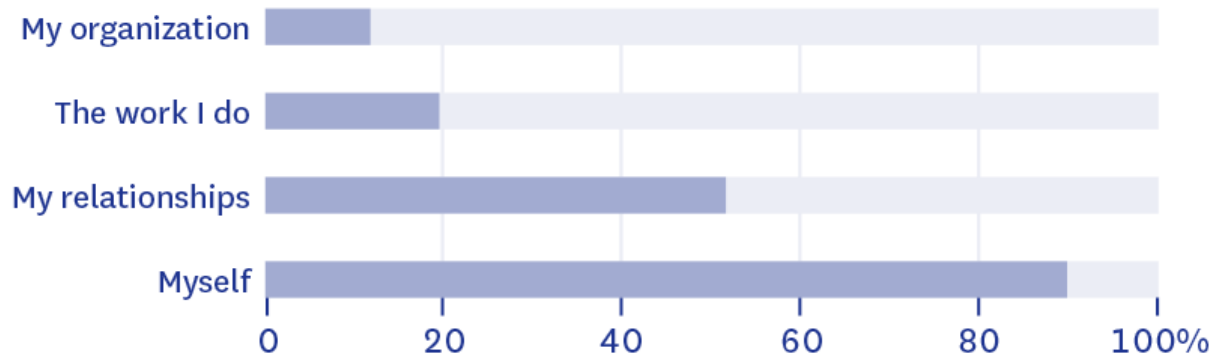
HBR.ORG

Resilienssi - muuntojoustavuus

Harward Business Review Definition of RESILIENCE

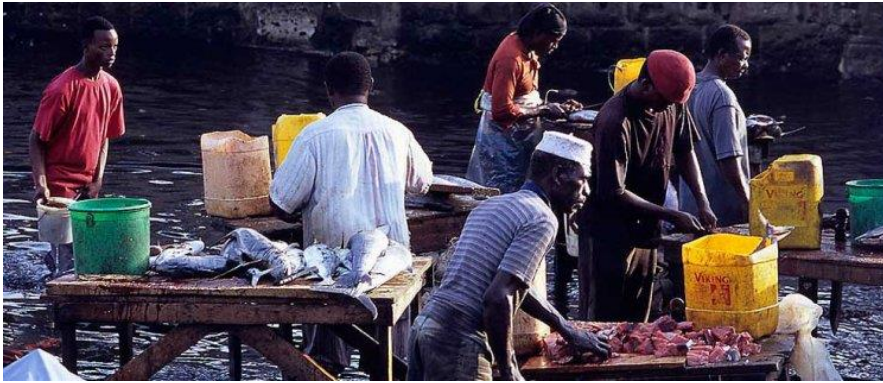
WHERE DO YOU GET YOUR RESILIENCE FROM?

Survey responses from 835 British employees.



SOURCE "TOUGH AT THE TOP," BY SARAH BOND AND GILLIAN SHAPIRO

HBR.ORG



<http://www.resiliencescale.com/>
Montana

Stockholm Resilience Centre advances research on the governance of social-ecological systems with a special emphasis on resilience - the ability to deal with change and continue to develop.

<http://www.stockholmresilience.org/>

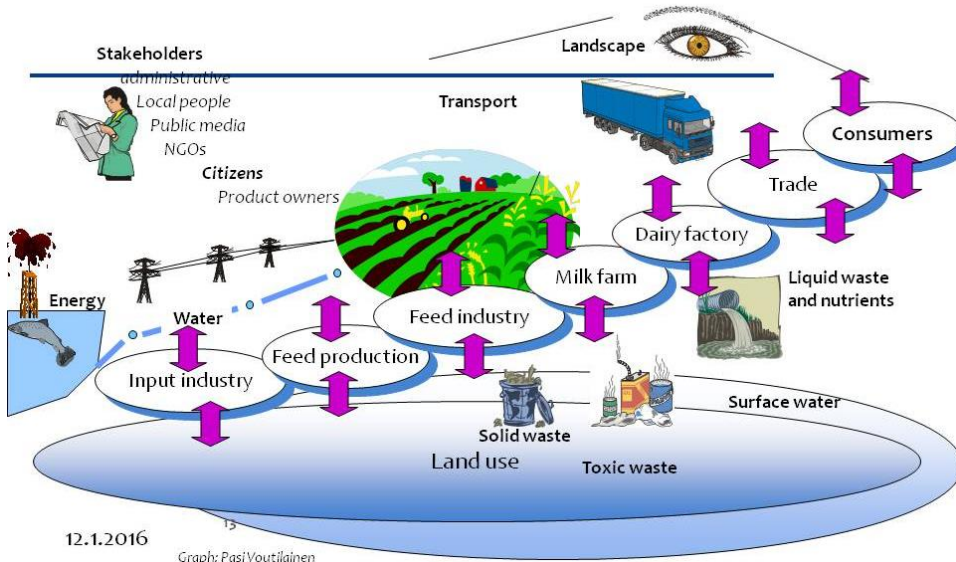


<http://www.resiliencei.com/>

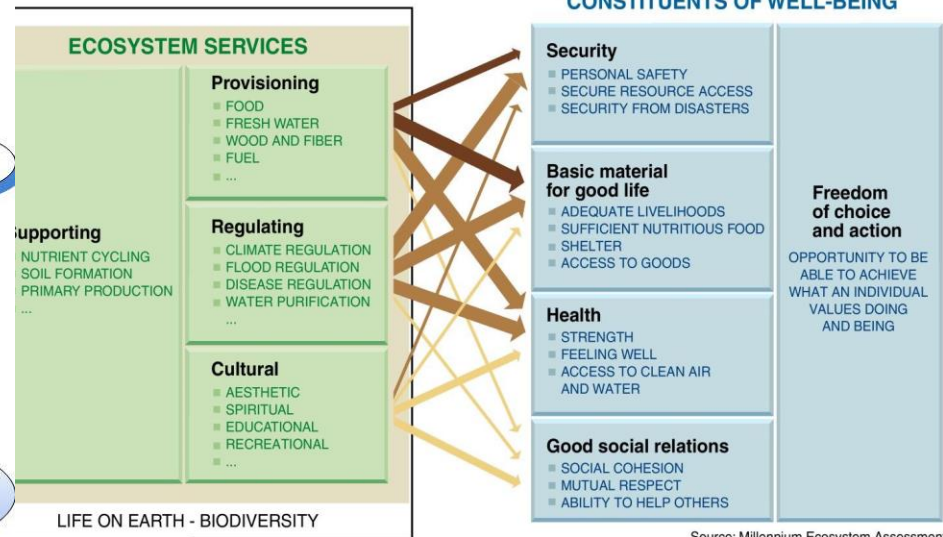


Ruokaketju – ruokajärjestelmä - globaali järjestelmä

Elinkaarinäkökulma



Ekososiaaliloudellinen järjestelmä



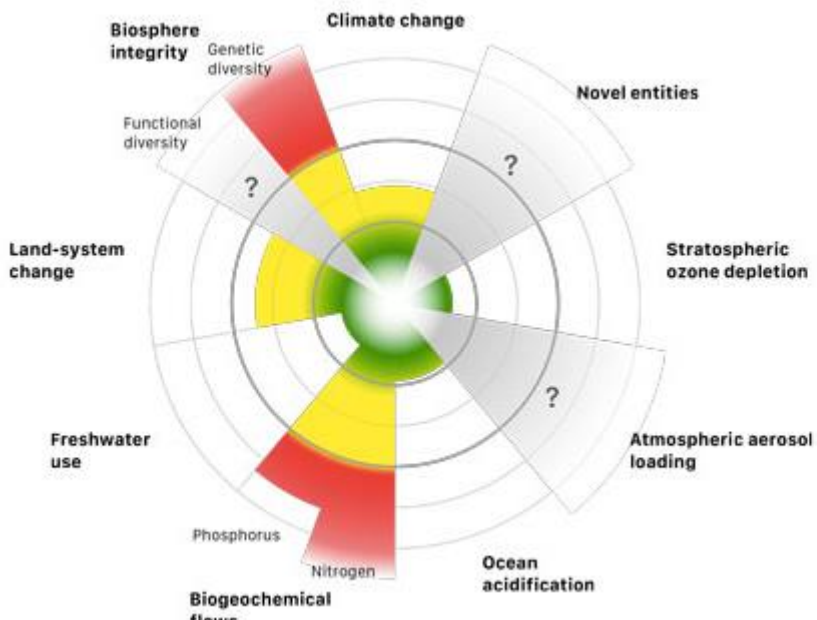
Source: Millennium Ecosystem Assessment

V'S COLOR
 al for mediation by
 socioeconomic factors

ARROW'S WIDTH
 Intensity of linkages between ecosystem
 services and human well-being

Low
 Medium
 High

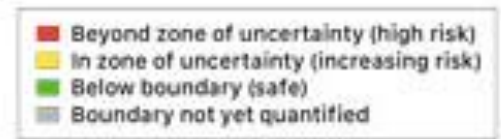
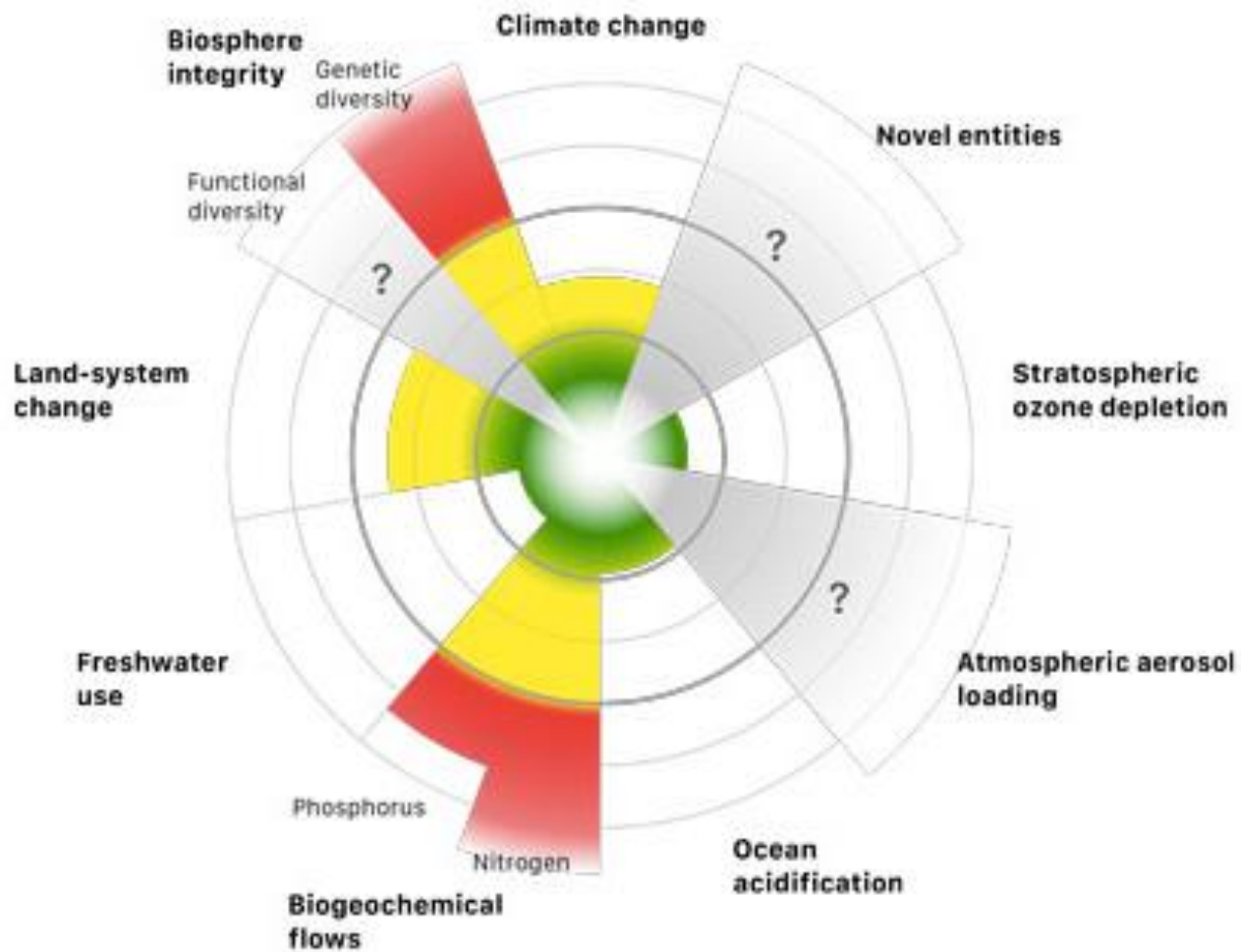
Weak
 Medium
 Strong

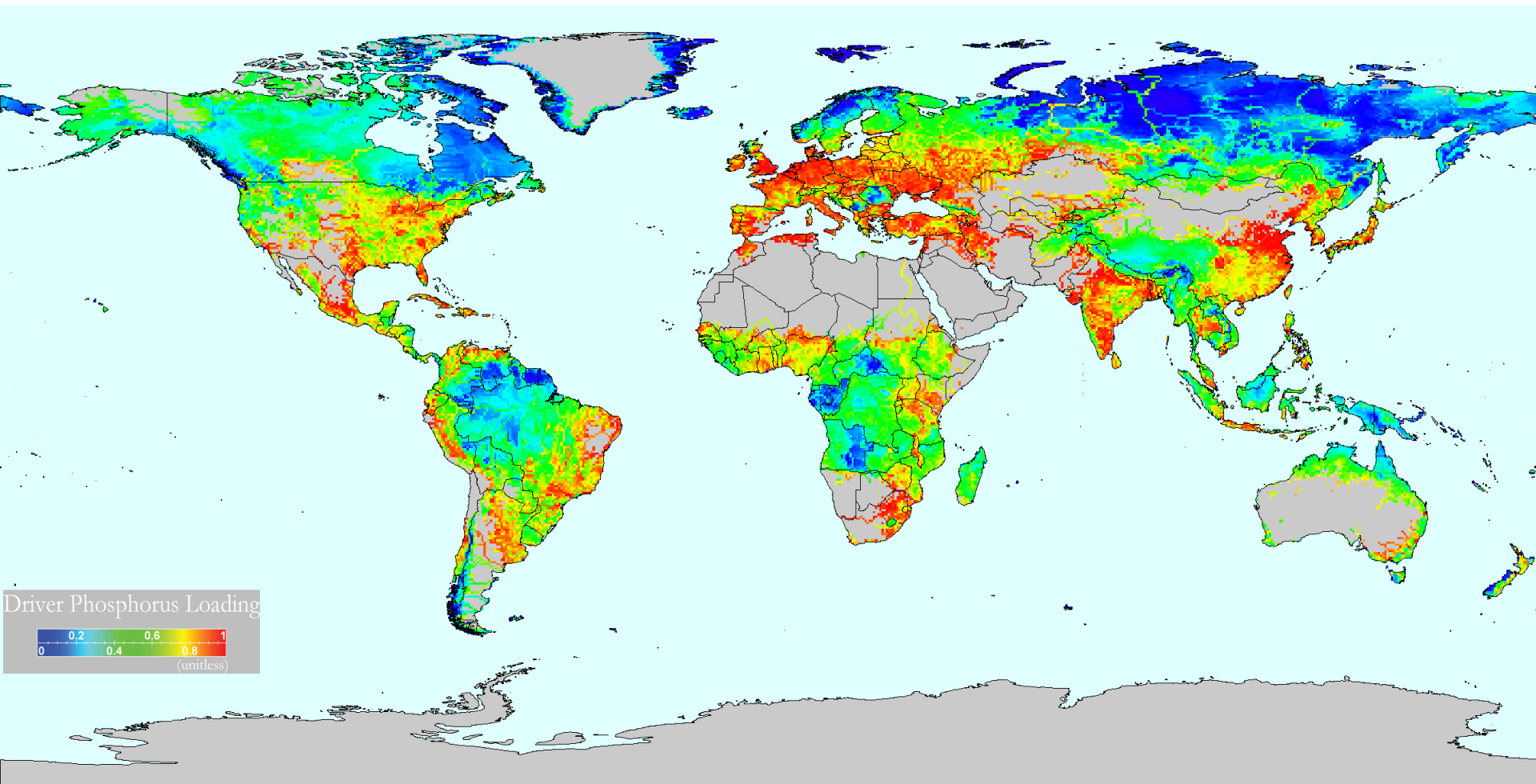


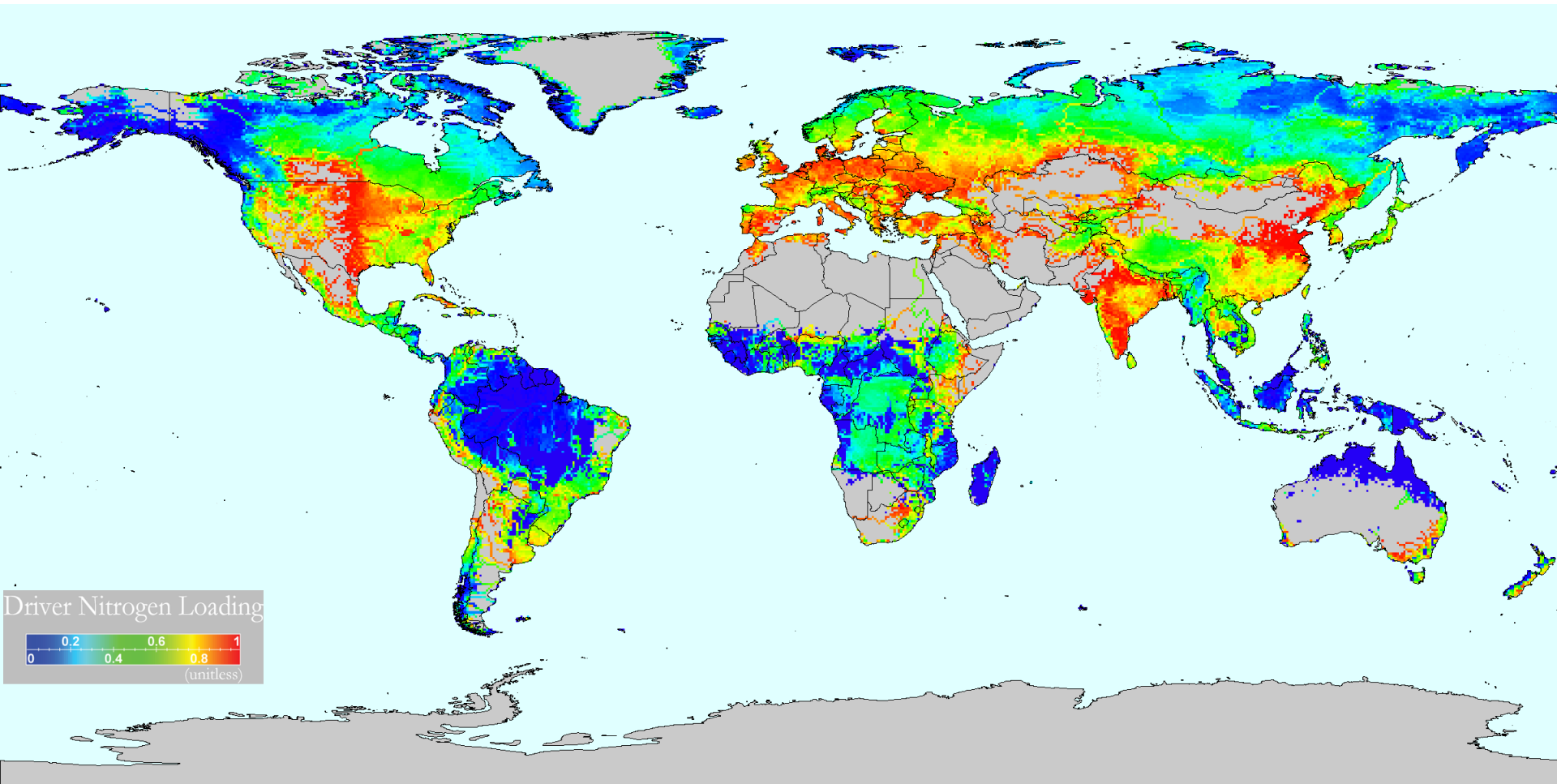
Planetaarinen ympäristö järjestelmä

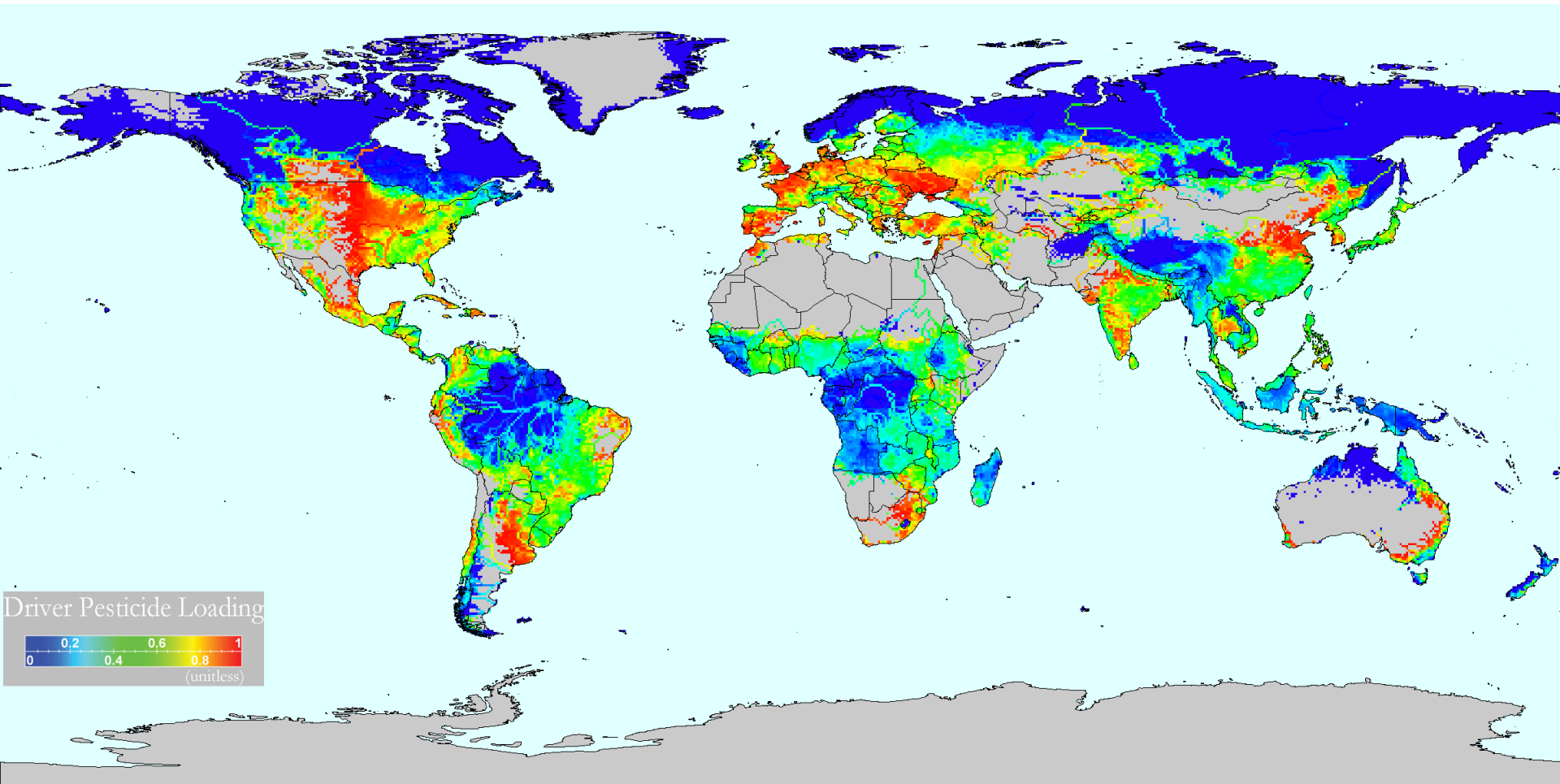
Luonnonvarakeskus



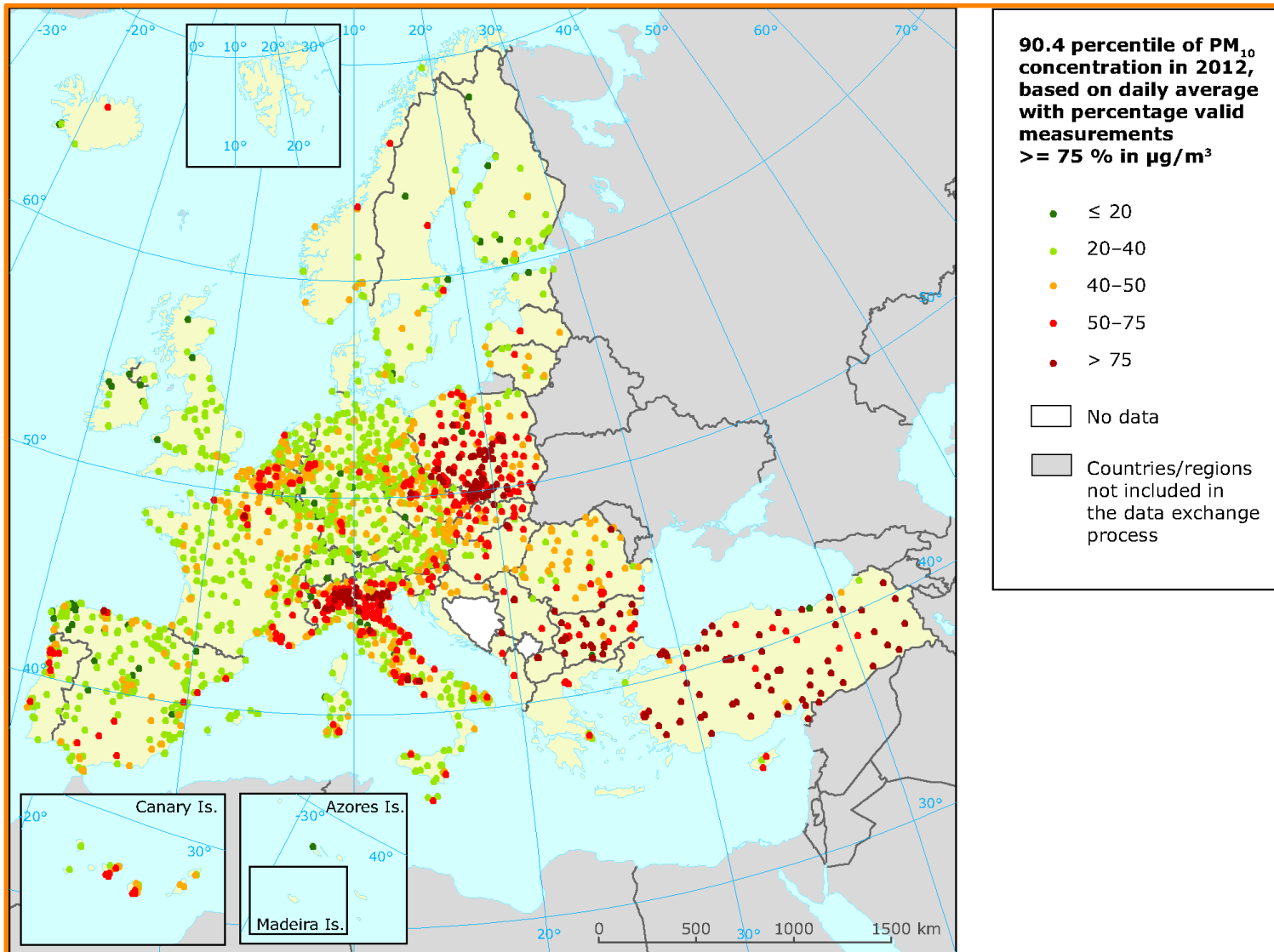




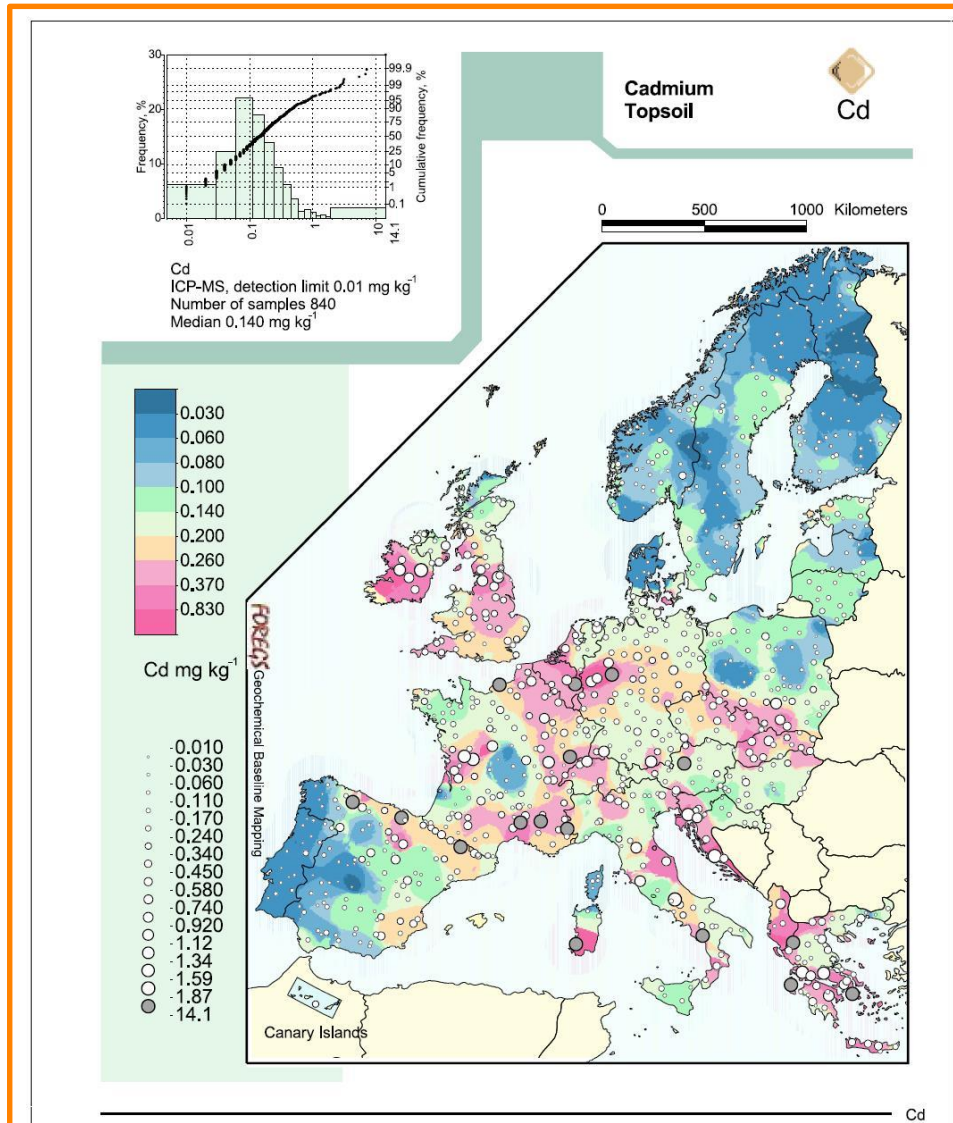




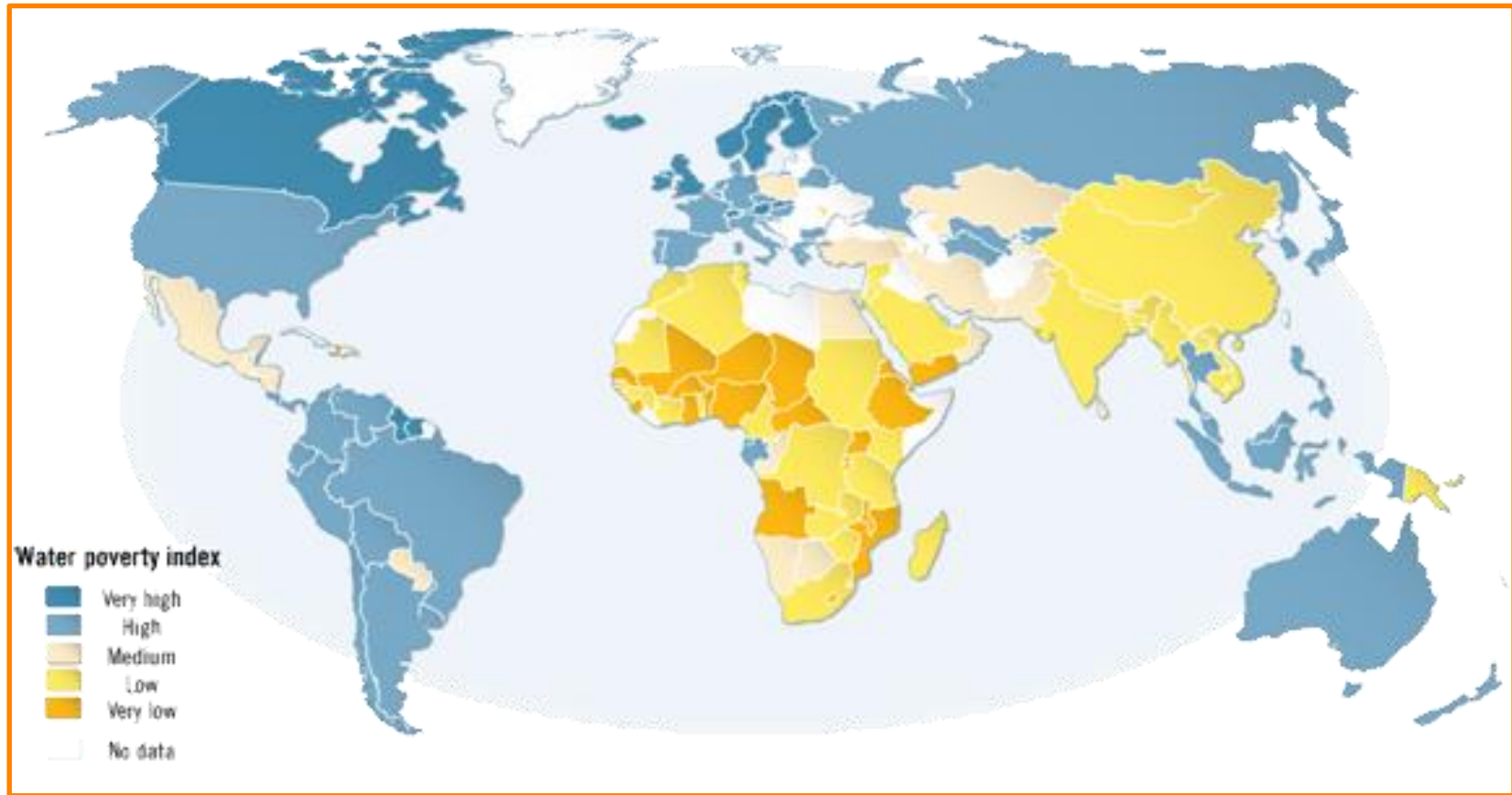
Ilma



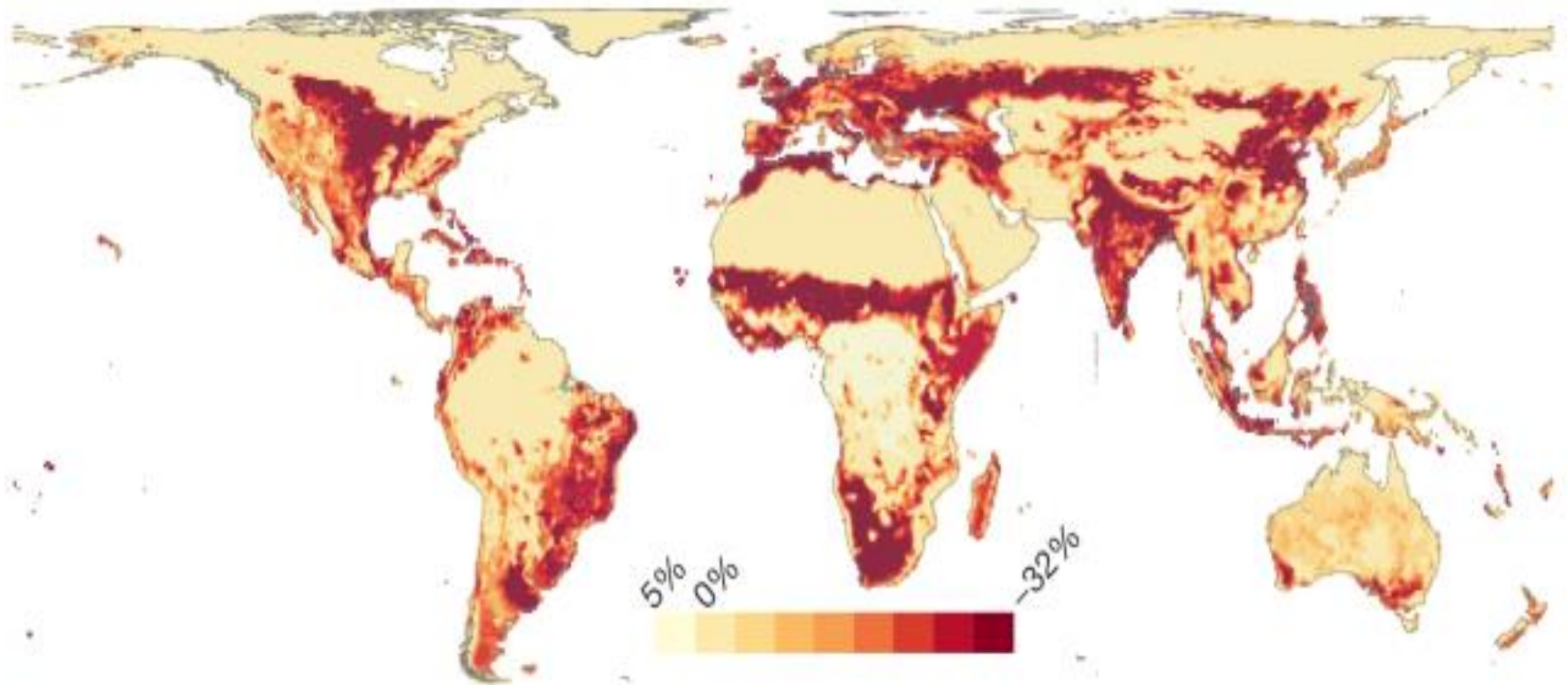
Maaperä



Vesi

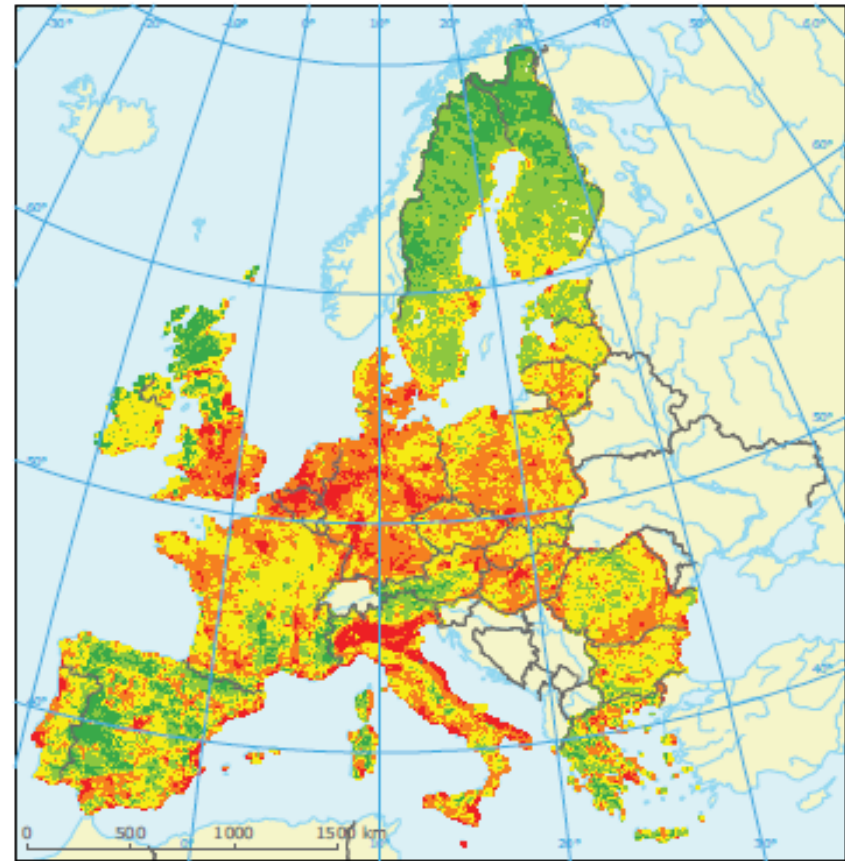


Estimated change in local species diversity caused by human land use changes since 1500 A.D.

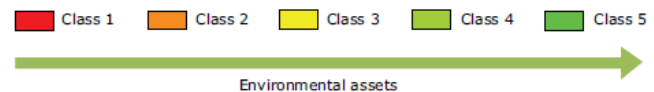


Vihreä infrastruktuuri

- **Vihreä infrastruktuuri** on strategisesti suunniteltu verkosto, jossa on luonnontilassa olevia alueita, osaksi luonnontilassa olevia alueita ja muita ympäristöön liittyviä tekijöitä ja joka on suunniteltu tuottamaan useita erilaisia ekosysteemipalveluja ja jota hoidetaan tässä tarkoituksessa.
- Prosentuaalisessa tarkastelussa Suomen, Ruotsin, Norjan ja Irlannin vihreän infrastruktuurin kattavuus on arvioitu olevan yli 85 % maapinta-alasta.
- **Vihreä infrastruktuuri – käsite tarjoaa Suomelle erinomaisen mahdollisuuden kehittää kestävästä ruoantuotantoon kiertotalouden ja hiilineutraaliuden tavoitteiden mukaisesti.**



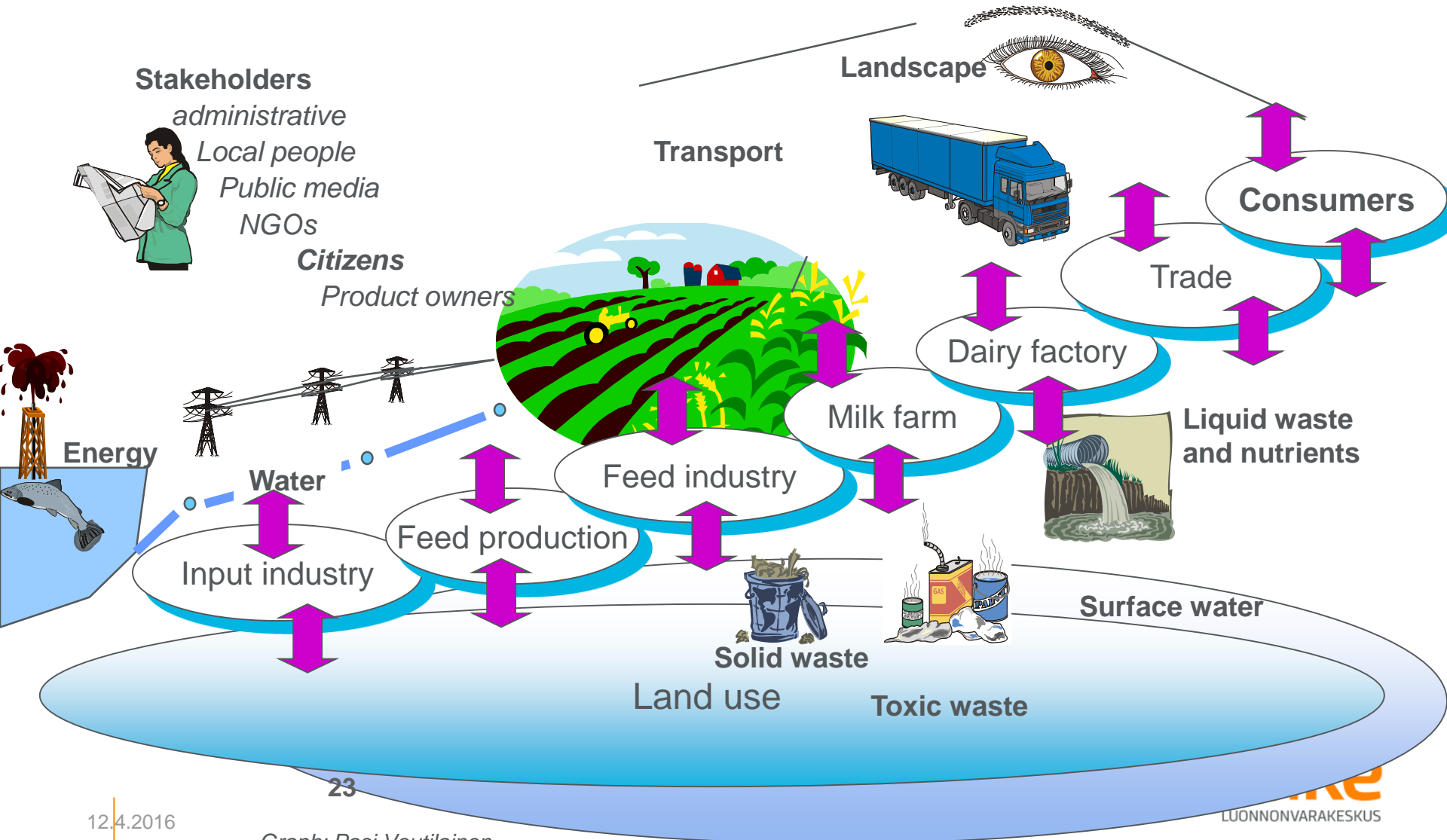
Example of aggregation of data to administrative boundaries



Note: Regional characterisation (raw data, 10 x 10 km grid)

Source: EEA/ETC-LUSI, 2010.

Elinkaarinäkökuorma

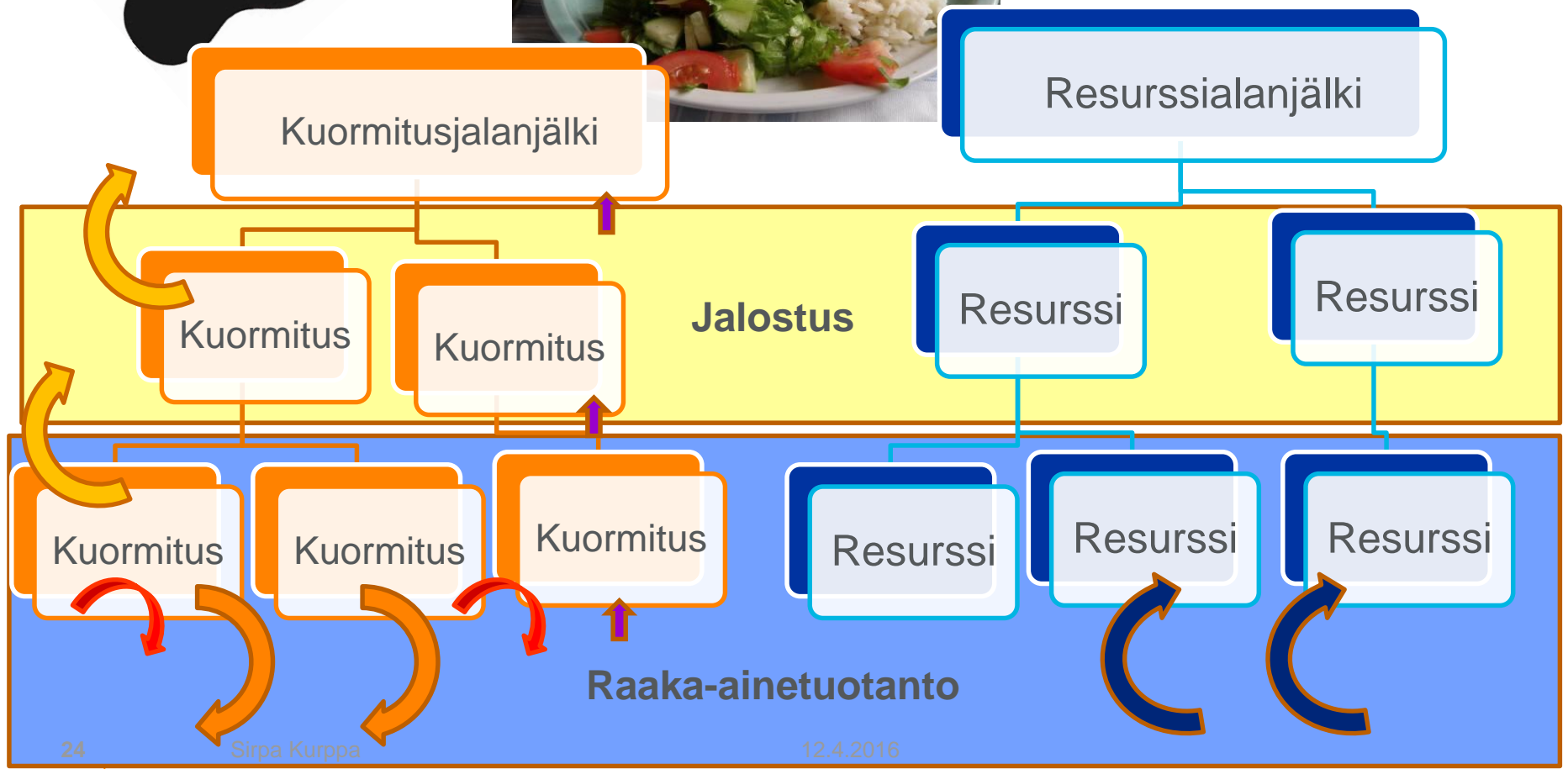


Ruokajärjestelmä - Elinkaarisen mittauksen näkökulmat

- Hiilijalanjälki
- Vesistökuormitus
- Ekotoksinen jalanjälki
- Humaanitoksiset jäämät



Vesijalanjälki
Ravinnejalanjälki



Yksikköprosessiajattelu

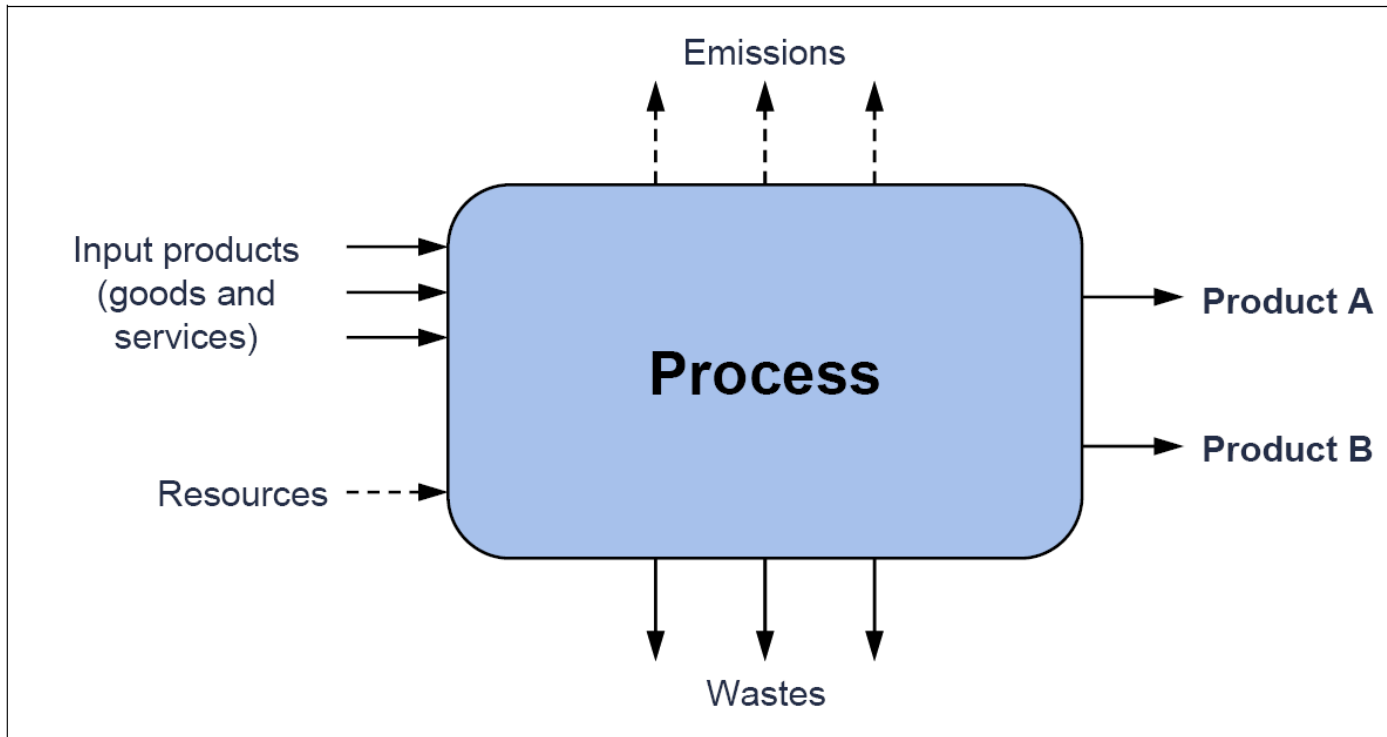
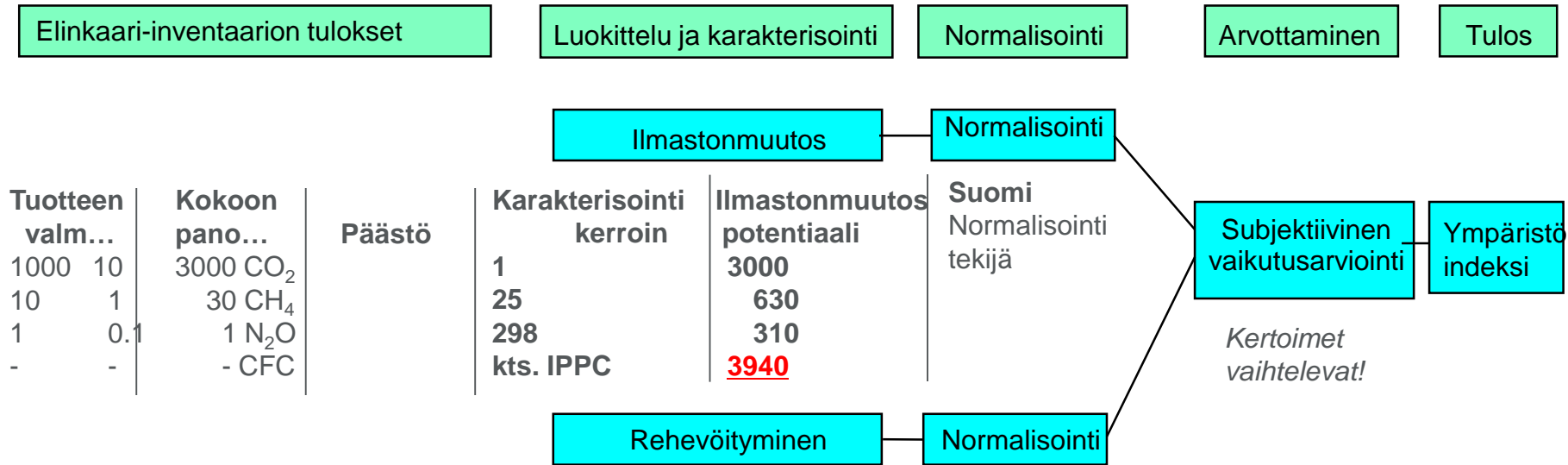


Figure 6 Multifunctional process with several input products and resources consumed and various wastes and emissions generated as well as providing the two co-products 1 and 2.

Vaikutusarviointi

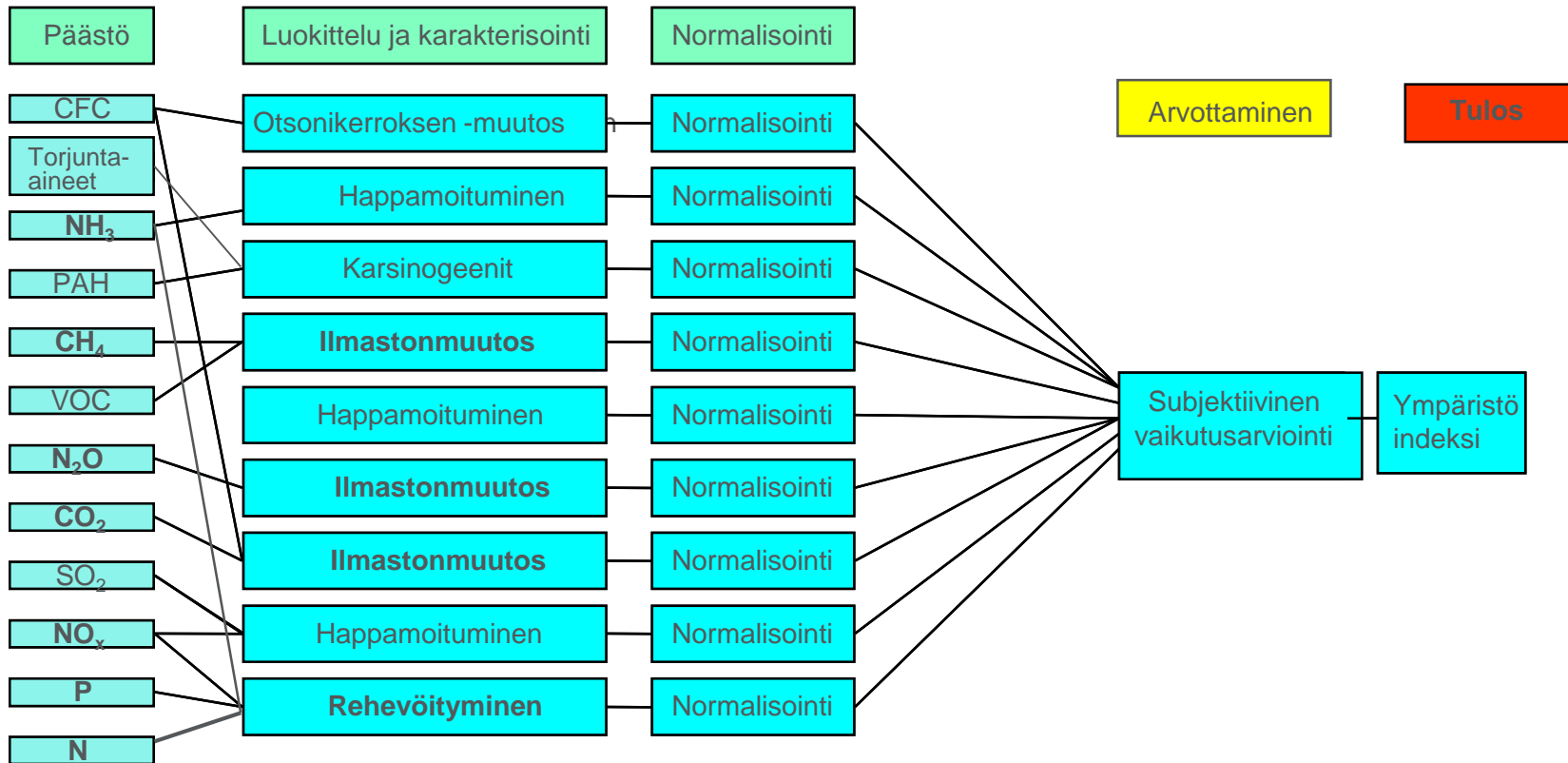


Vastaavat vaikutusluokkakohtaiset potentiaalit lasketaan kaikkien luokkien osalta. Normalisoimalla nähdään mikä on tuotteen osuus esim. Suomen kokonaispäästöistä. Arvottaminen on subjektiivista mutta sekin antaa näkökulmaa eri tekijöiden merkitykselle.

Kaikki vaiheet inventaarion tuloksista lopulliseen pisteytykseen asti kertovat omalla tavallaan eri tekijöiden merkityksestä! Arvottamisen on oltava läpinäkyvää! Osallistamalla arvottamiseen yrityksen henkilöstö saa lisätietoa tuotteen ympäristönäkökohdista.

Tieteellinen osa-alue (ISO-standardit)			Subjekttiivinen osa-alue
Tuotteen elinkaaren aikainen ympäristökuormitus	Päästöt luokitellaan vaikutusten mukaisesti ja lasketaan vaikutuspotentiaali luokkien sisällä (ekvivalenttiarvot)	Kokonaisekvivalenttimäärät suhteutetaan vaikutusluokkakohtaisesti maantieteellisesti ja ajallisesti rajattuihin perusarvoihin	Eri vaikutusluokkien keskinäinen merkittävyys arvotetaan esim. asiantuntijapaneelin avulla

Vaikutusarviointi



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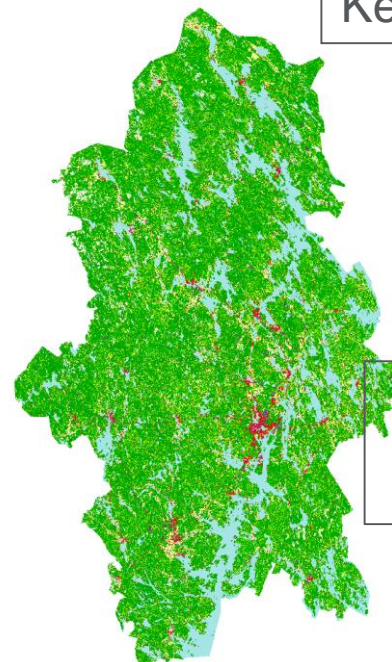
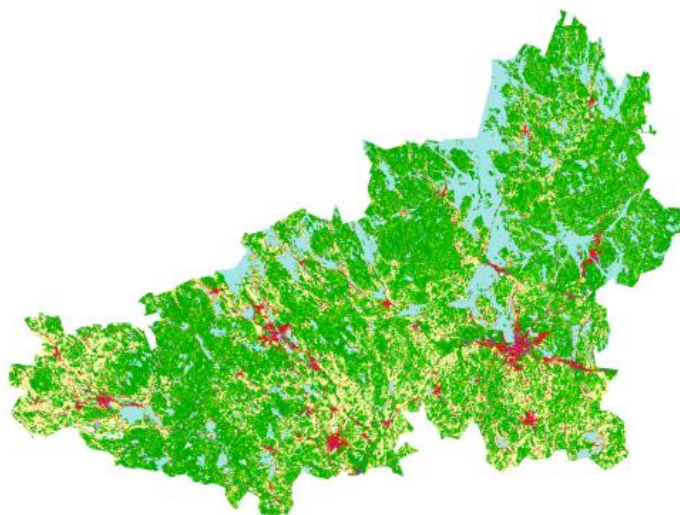
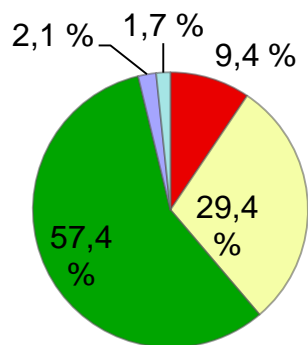


Ympäristö – mistä lähtökohdista tasapainoisuutta rakennetaan?

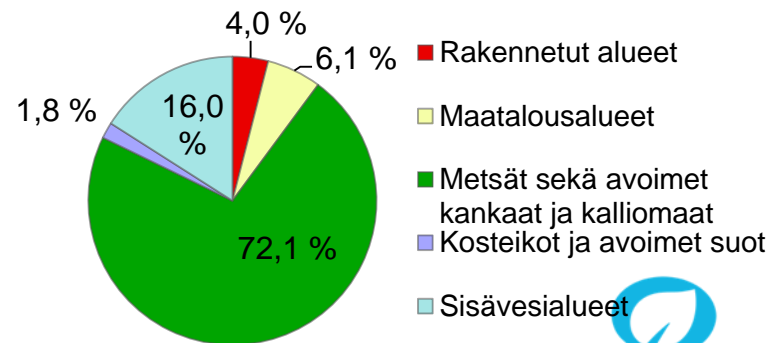
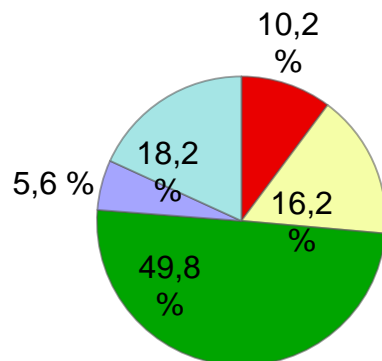
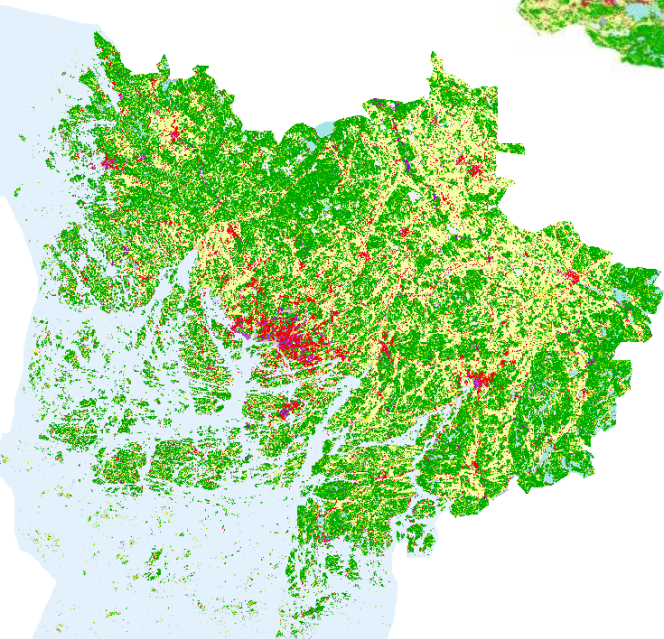
Kanta-Häme ja Päijät-Häme

Keski-Suomi

Varsinais-Suomi



Corine 2006
luokitus,
Tarkkuus 25 x 25
m



- Rakennetut alueet
- Maatalousalueet
- Metsät sekä avoimet kankaat ja kalliomaat
- Kosteikot ja avoimet suot
- Sisävesialueet

Elinkaarinen ympäristövaikutusten kohdistusajattelu

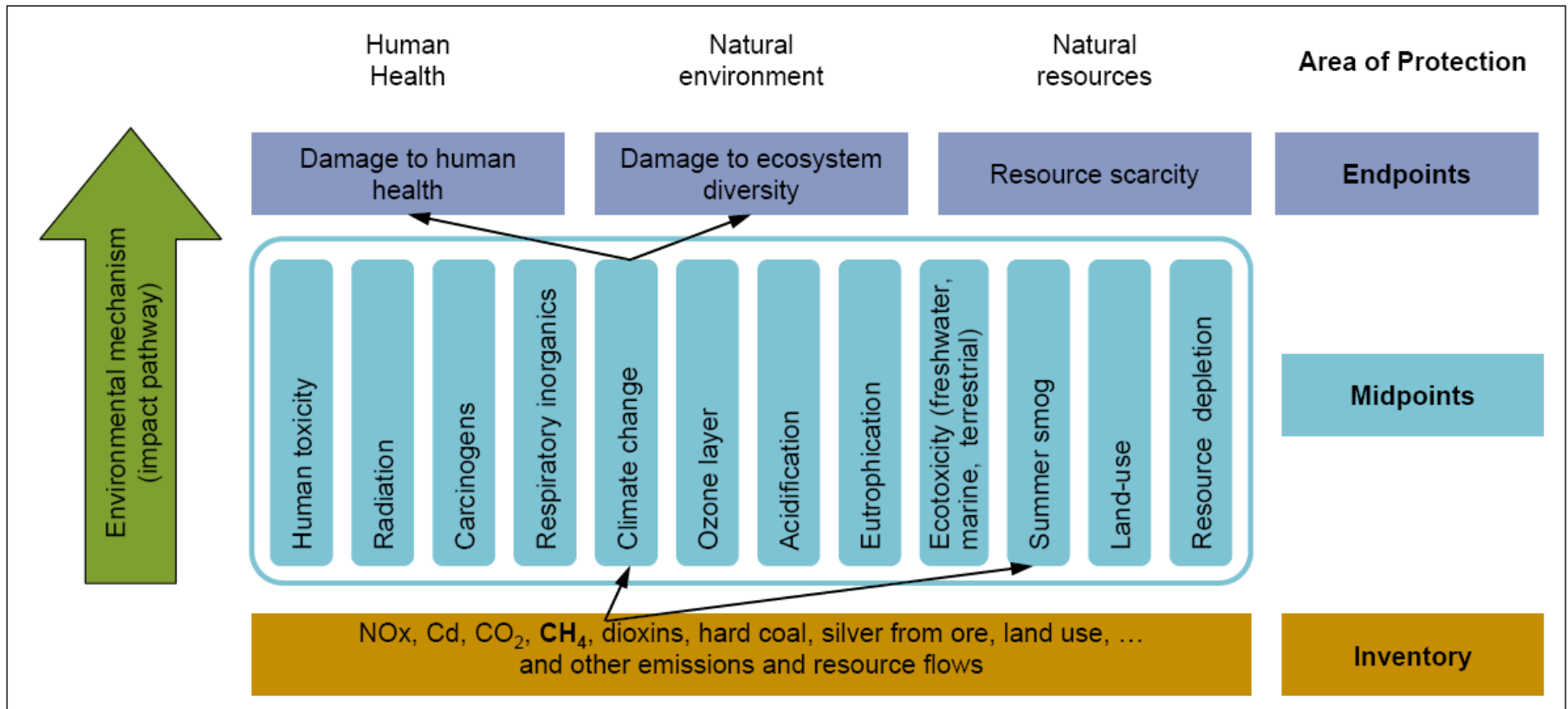
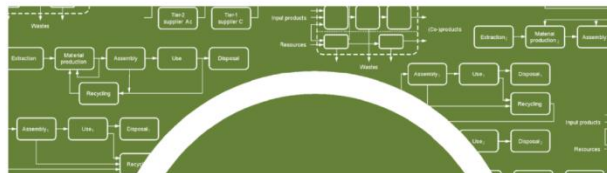
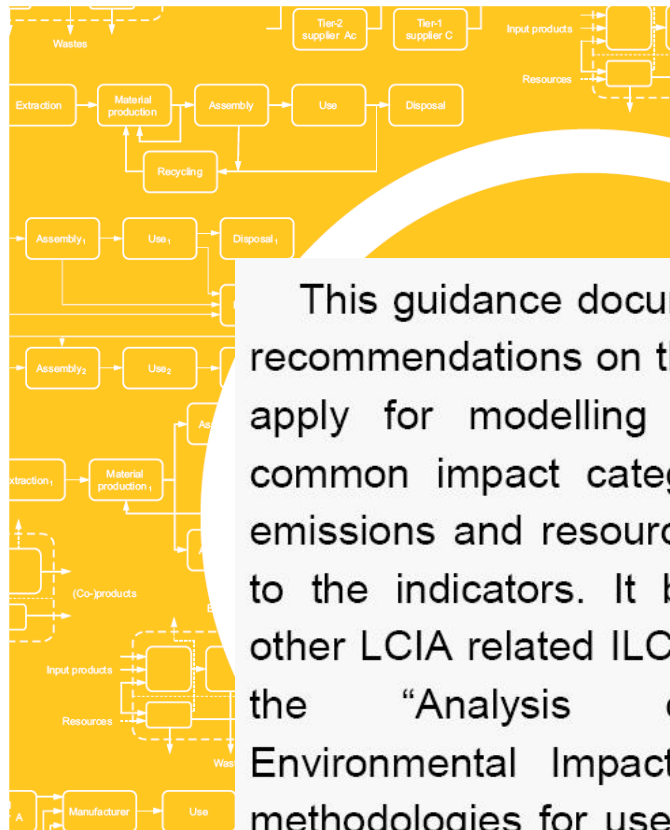


Figure 15 Life cycle impact assessment. Schematic steps from inventory to category endpoints. Note that normalisation and weighting are not shown and can start from either midpoints or endpoints.

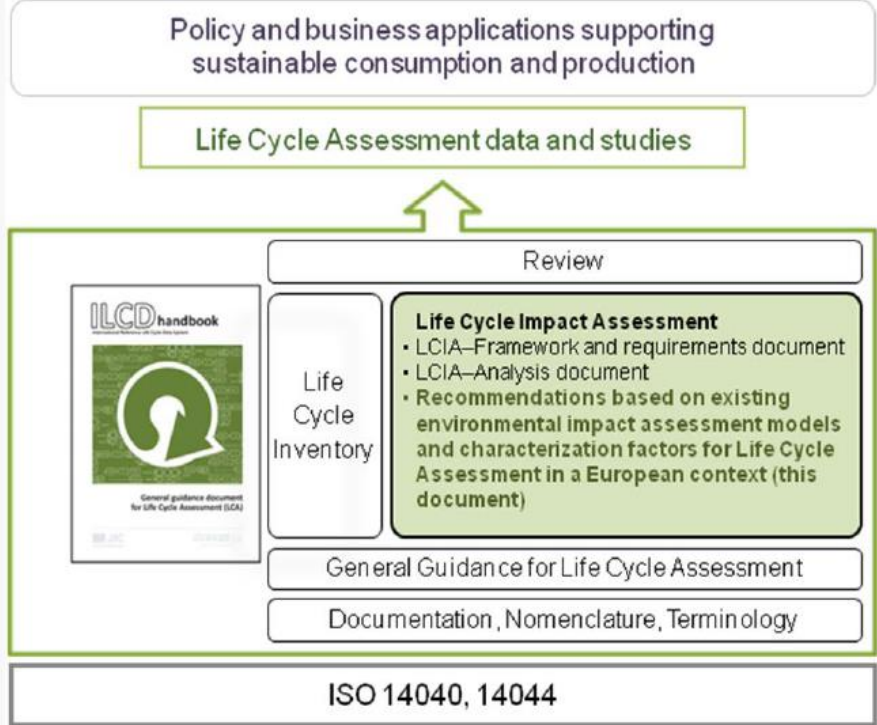
ILCD handbook

International Reference Life Cycle Data System

ILCD handbook
International Reference Life Cycle Data System



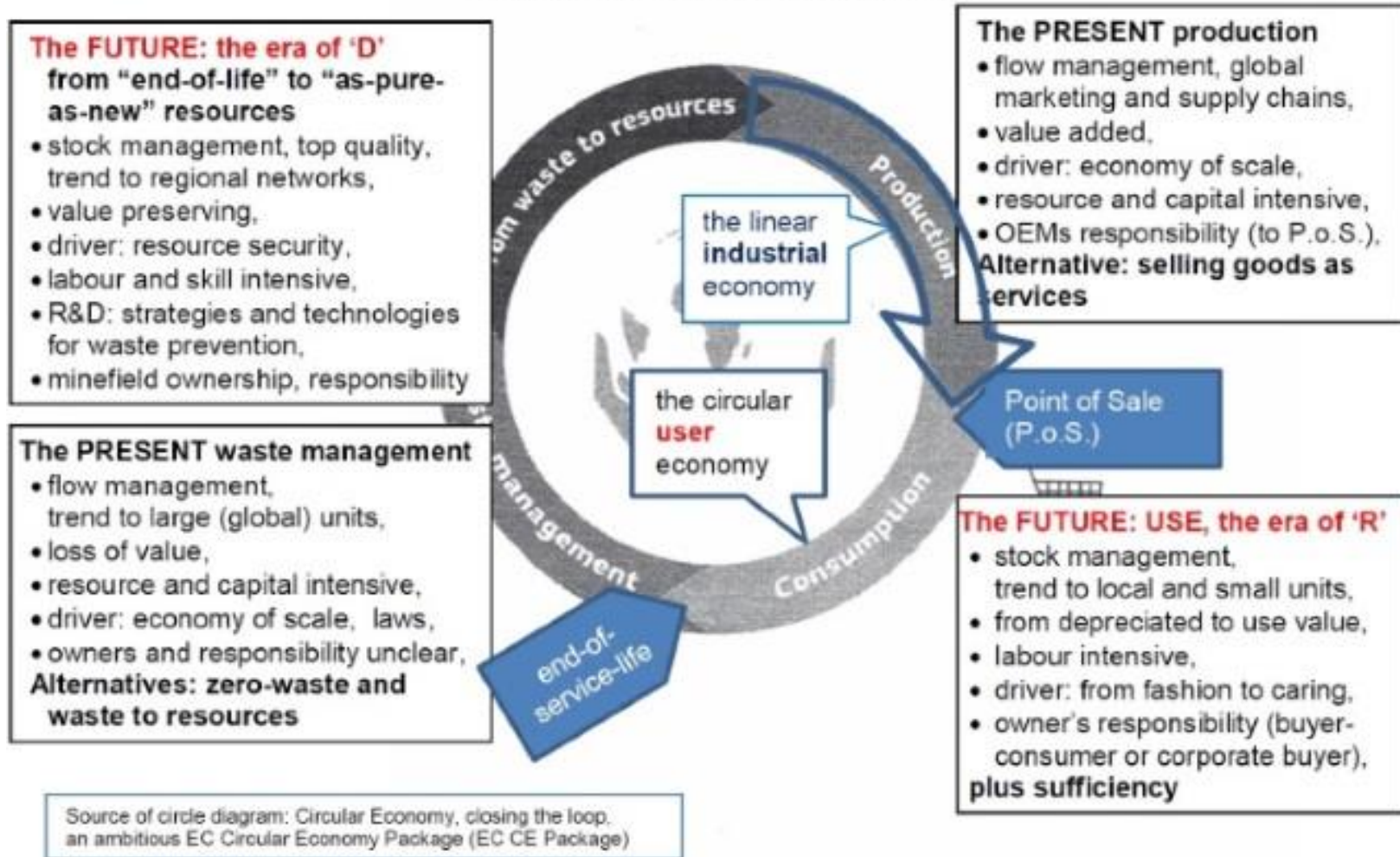
This guidance document presents recommendations on the methods to apply for modelling of the most common impact categories, linking emissions and resources consumed to the indicators. It builds on two other LCIA related ILCD documents, the “Analysis of existing Environmental Impact Assessment methodologies for use in LCA” (EC-JRC, 2010a) and the “Framework and Requirements for LCIA models and indicators” (EC-JRC, 2010b).



Riittävyys/säästävyys – kiertotalous - kestävyysajattelu

- **Reduce** – exploitation of resources,
- **Reuse** – commodities, infrastructure
- **Revive** – through consequent changes
- **Recycle** – materials, commodities
- **Redefine** – resource needs
- **Re-imagine** – potential uses
- **Redesign** – use flows, uses of materials and infra
- **Replace** -
- **Rebuild** -
- **Regenerate** -
- **Reform** -
- **Reorganize** -
- **Resilient:** adaptability, transformability, persistence, preparedness

WHAT IS THE CIRCULAR ECONOMY?





Jakamistaloutta peliin!

Quality high	<u>RENTAL ECONOMY</u> sale of fashion and function in a multi-option society for short time use (clothes, uniforms, equipment)	<u>PERFORMANCE ECONOMY</u> sale of performance and results in system solutions in the sense or of physical asset management (infrastructures, investment goods)
Quality low	<u>INDUSTRIAL ECONOMY</u> sale of (replacement) goods to keep the throughput economy (and GDP) going (clothes, cars, electronics)	<u>THIRD WORLD</u> the dilemma of a scarcity of resources, goods and money (equipment, vehicles)
	short product-life	long product-life

40

The Performance Economy

- At policy level: bridges the gap between the 2010 Lisbon Objectives of the European Union - **higher growth and more jobs** - and the **sustainability objective** to greatly reduce the resource consumption - energy and materials - especially of industrialised countries
- At practical level: **exploits sufficiency and prevention of external impacts as profit strategies**

Useful tool for tomorrow's functional service economy?

- introduces the business models that turn knowledge into better **performance**, more jobs and greater wealth,
- describes how to improve the **manufacturing** process, product **service** sales and **performance over time**,
- shows how innovations in traditional sectors can **preserve embodied resources and create both manual and skilled jobs**, resulting in **lower unemployment, lower energy consumption, less waste and greatly reduced resource** throughput – major ingredients for economic growth.
- Introduces new **decoupling metrics** to measure the **relation between value, jobs and resource** consumption

Producing Performance

- Circular economy: reduce, reuse, remanufacture, recycle
- new metric of the value-per-weight ratio (€-per-kg) to measure **wealth creation in relation to resource consumption – resource efficiency (rebound impact managed)**
- strategies how to significantly boost this ratio up to million a Euro per kg resource ratio through, for instance, science and knowledge workers

Selling Performance

- business models that enable entrepreneurs to achieve synergies by profitably exploiting the three objectives of **more value, more jobs and considerably less resource consumption**
- procurement strategy of **buying performance** instead of goods
- selling performance has a strong environmental component because it **internalises the costs of risk and of waste and rewards sufficiency solutions and systemic solutions**

Managing Performance over Time

- the new metric of the labour input-per-weight ratio (man hour-per-kg) **to measure job creation in relation to resource consumption** and highlights ways to radically increase this ratio by preserving value
- business models used focus on **extending the service-life of goods, components and infrastructure through reuse, remanufacturing and technological updating**
- Legitimacy from **EU waste directive and development of circular economy**



Example at machinery performance: PONSSE Performance Packages

- are designed for improved basic **servicing** or updating of forest machines. Performance Packages can be used to update larger systems on forest machines, such as the harvester head, crane or base machine, so that they are **as good as new**. This helps to maintain the machine's performance year in and year out.
- enable fast updates of older machines so they **comply with modern standards**. You get a more profitable and economical machine with a longer service life.
- include all the parts needed for basic servicing of a certain part of the machine. The packages are ready-made, enabling fast and money-saving machine updates. You can also avoid extra downtime by conducting **preventive servicing** using Performance Packages. The updates will be **proactively performed** in connection with improved basic servicing, for example, helping you to maximise the profitability of your machine.

Ideas and technologies changing the future

- Cradle to cradle – closed loop resource use
- **Industrial ecology** - to shape closed loop production processes so they perform as close to living systems as possible
- **Performance economy**
- **Biomimicry** – nature as model - emulate, nature as measure - judge, nature as mentor - teach
- **Blue economy** - using the resources available in cascading systems (Gunter Pauli)
- **Regenerative Design** John T. Lyle
- IoT
- 3D
- robotics

Kestävä ruokaketju ja kaskadiperiaate – mielenkiintoinen kaksijakoinen nykytilanne



Kiitos!



