2004	**BSc Chemistry,** University of Patra (Greece)
2005	**MSc Environmental Science,** Imperial College London
2005	**Environmental Consultant,** Capita Symonds Ltd.
2006-2008	**EPSRC Researcher** (SUE-MOT programme), University of Dundee
2008-2009	**Canon Foundation Fellow**, UNU-IAS
07/2009	**PhD in Ecological Economics,** University of Dundee *"Sustainability assessment with reductionist tools: Methodological issues and case studies".*
2009-2011	**JSPS-UNU Fellow**, UNU-IAS
2011-2013	**Marie Curie Fellow** and **James Martin Fellow**, Oxford University
2013-	**Associate Professor** in Sustainability Science

Focus and definitions

Focus of the presentation

- The comparison of different project/policy alternatives is a key component of sustainability assessments;
- Assessment tools are defined as the various analytical techniques that can be used to facilitate these comparisons;
- ….particular interest in assessment tools that collapse/aggregate all different measurable phenomena/issues/impacts/etc in a single unit of nature (e.g. money, embodied energy, etc).

Sustainability assessment tools as value-articulating institutions: Implications and possible ways to rationalize selection

Alexandros Gasparatos
Associate Professor, IFI, University of Tokyo
17 November 2020

Research questions

- can a single sustainability assessment tool (and essentially metric) capture all sustainability phenomena/issues/impacts/ etc?

- how to choose between them?

Defining sustainable development

Hundreds of definitions....

The most enduring was given by the Brundtland Commission Report in 1987:

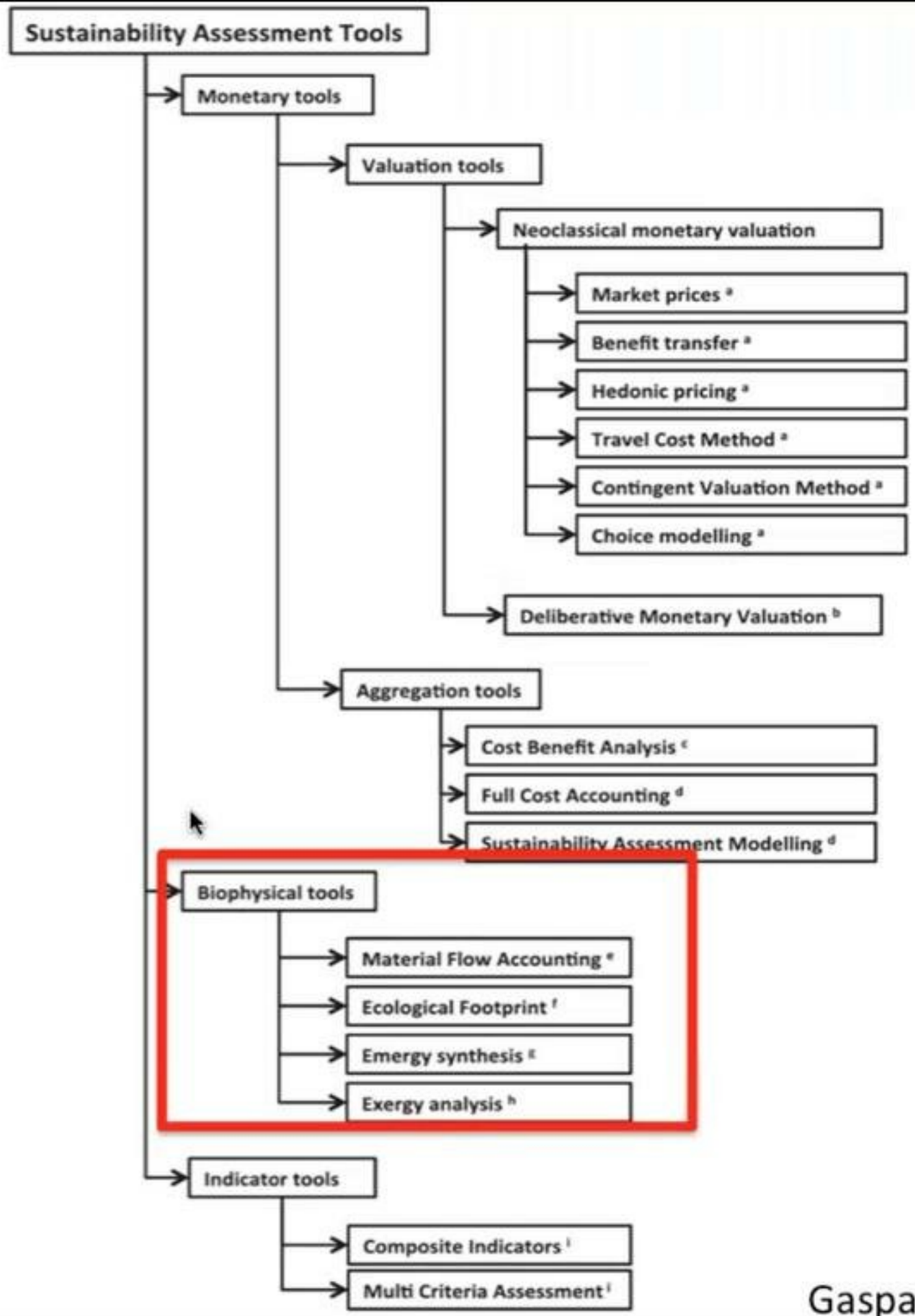
"*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*"

(WCED, 1987)

The actual elements

- **Multi-dimensionality**: importance to consider environmental, economic and social issues (three sustainability pillars)
  - Some would add more pillars such as institutional or cultural sustainability
- **Equity**: both within the same generation (inter-generational) but also between generations (intra-generational)
- **Precautionary**: Precautionary principle "When an activity raises threats of harm to human health or the environment, *precautionary* measures should be taken even if some cause and effect relationships are not fully established scientifically"
- **Inclusivity**: insights from multiple stakeholders need to be heard and considered in decisions (e.g. local communities, local/regional/national/etc government, private sector, civil society, academia)

The tools and their methods



Gasparatos and Scolobig, 2012

Emergy synthesis

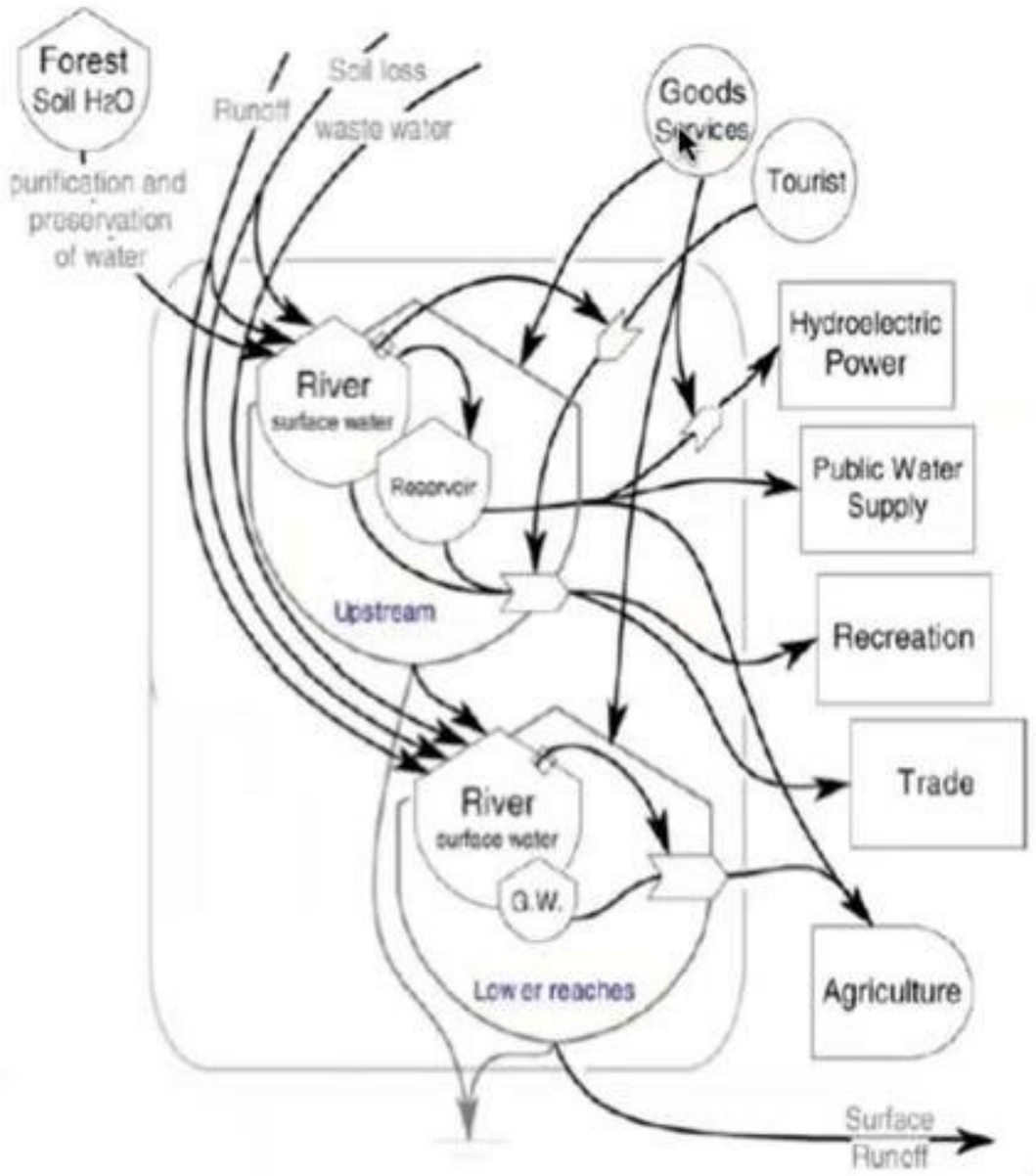


Fig. 8. Energy diagram of water resources in the greater Taipei area.

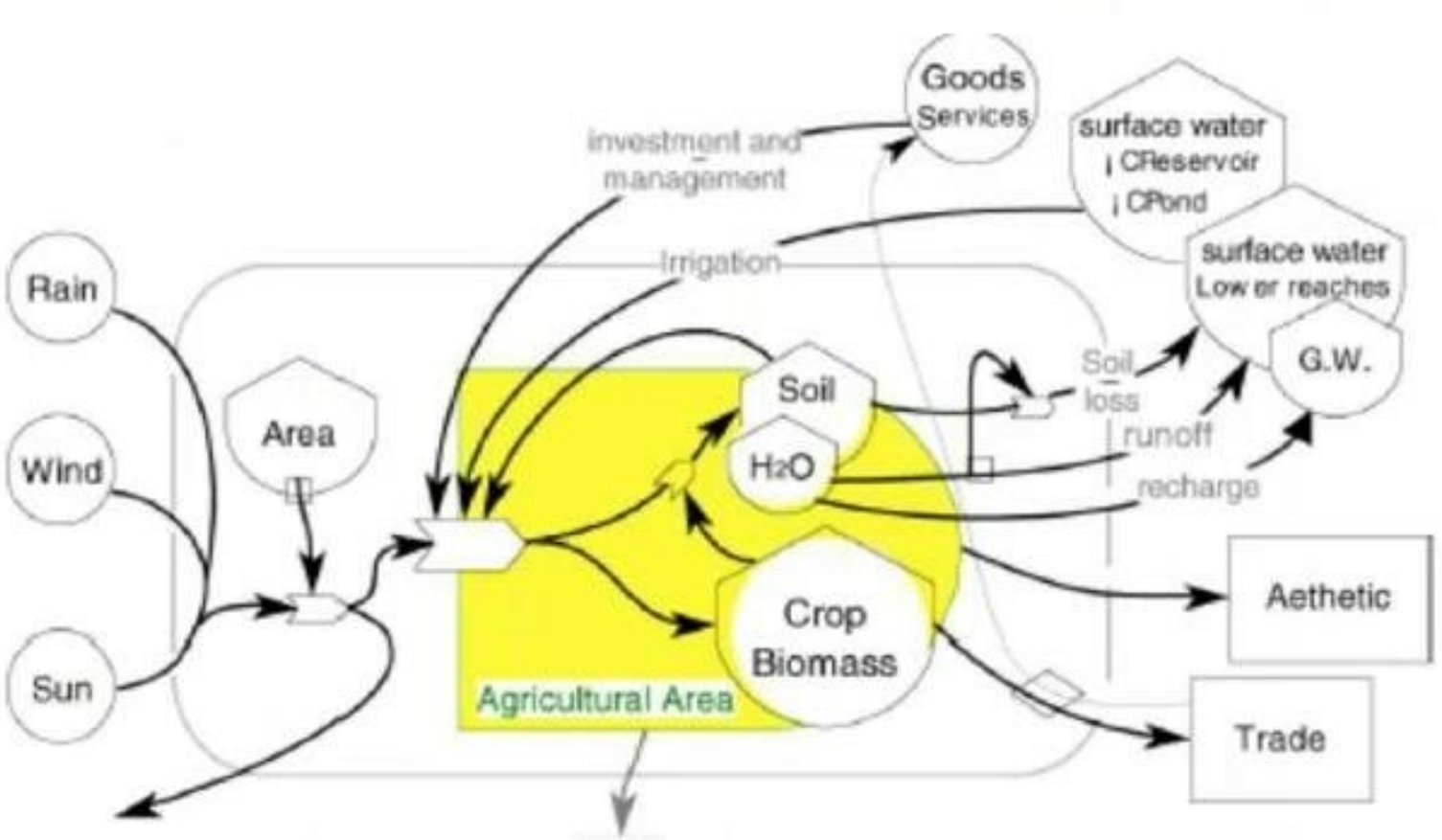


Fig. 7. Energy diagram of agricultural ecosystem.

Huang et al, 2011

The Ecological Footprint

MEASURES

how fast we consume resources and generate waste

Energy

Settlement

Timber & Paper

Food & Fiber

Seafood

COMPARED TO

how fast nature can absorb our waste and generate new resources.

Carbon Footprint

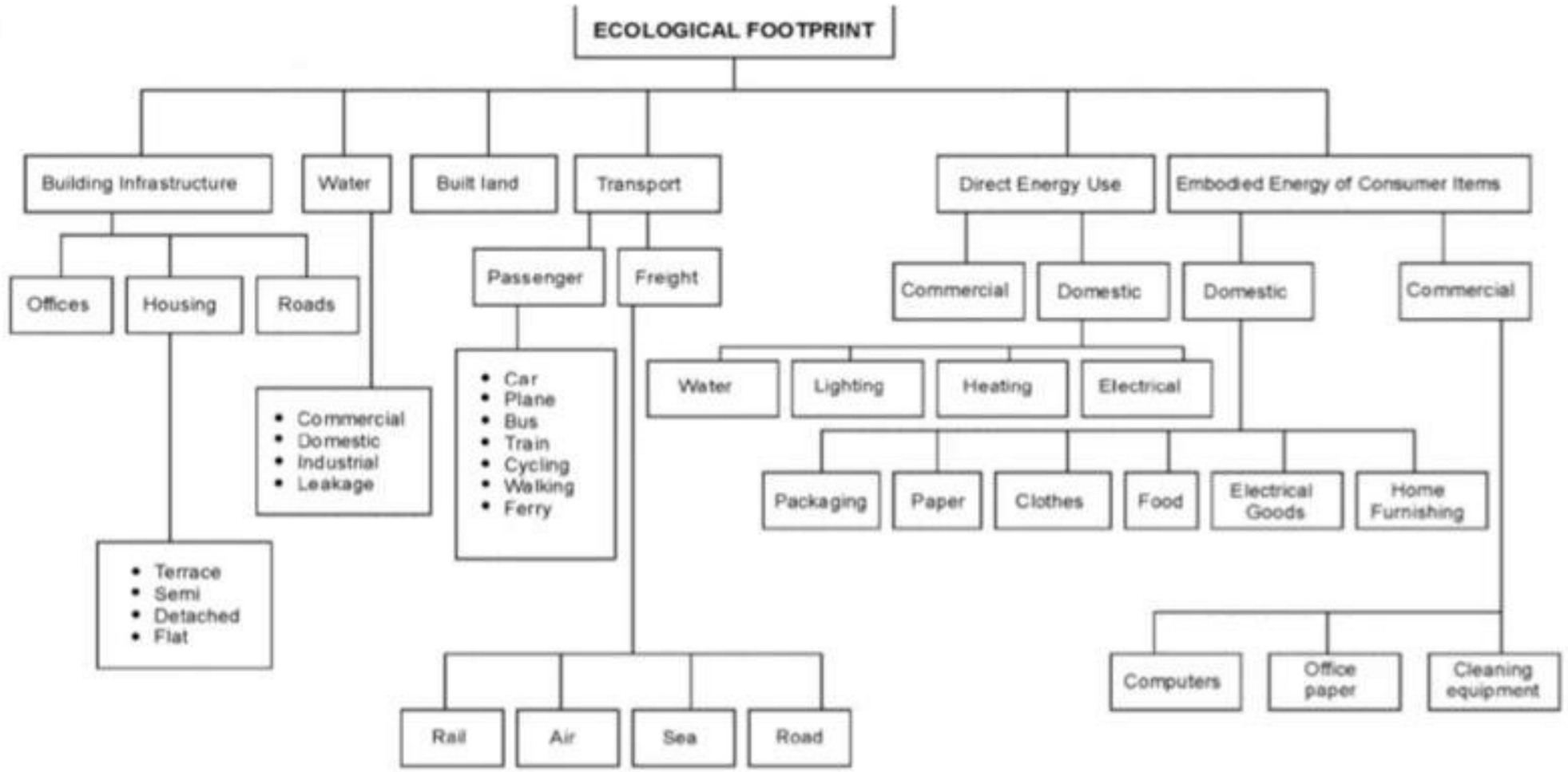
Built-up land

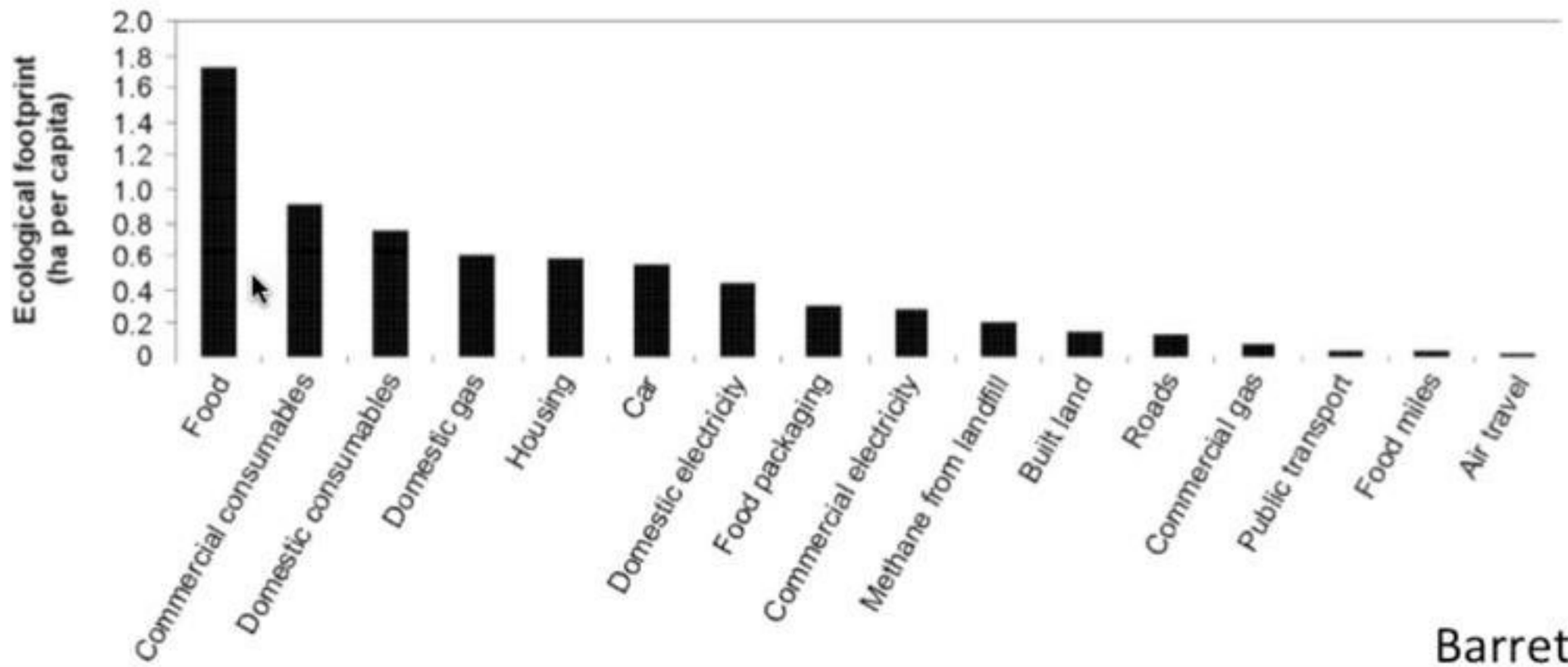
Forest

Cropland & Pasture

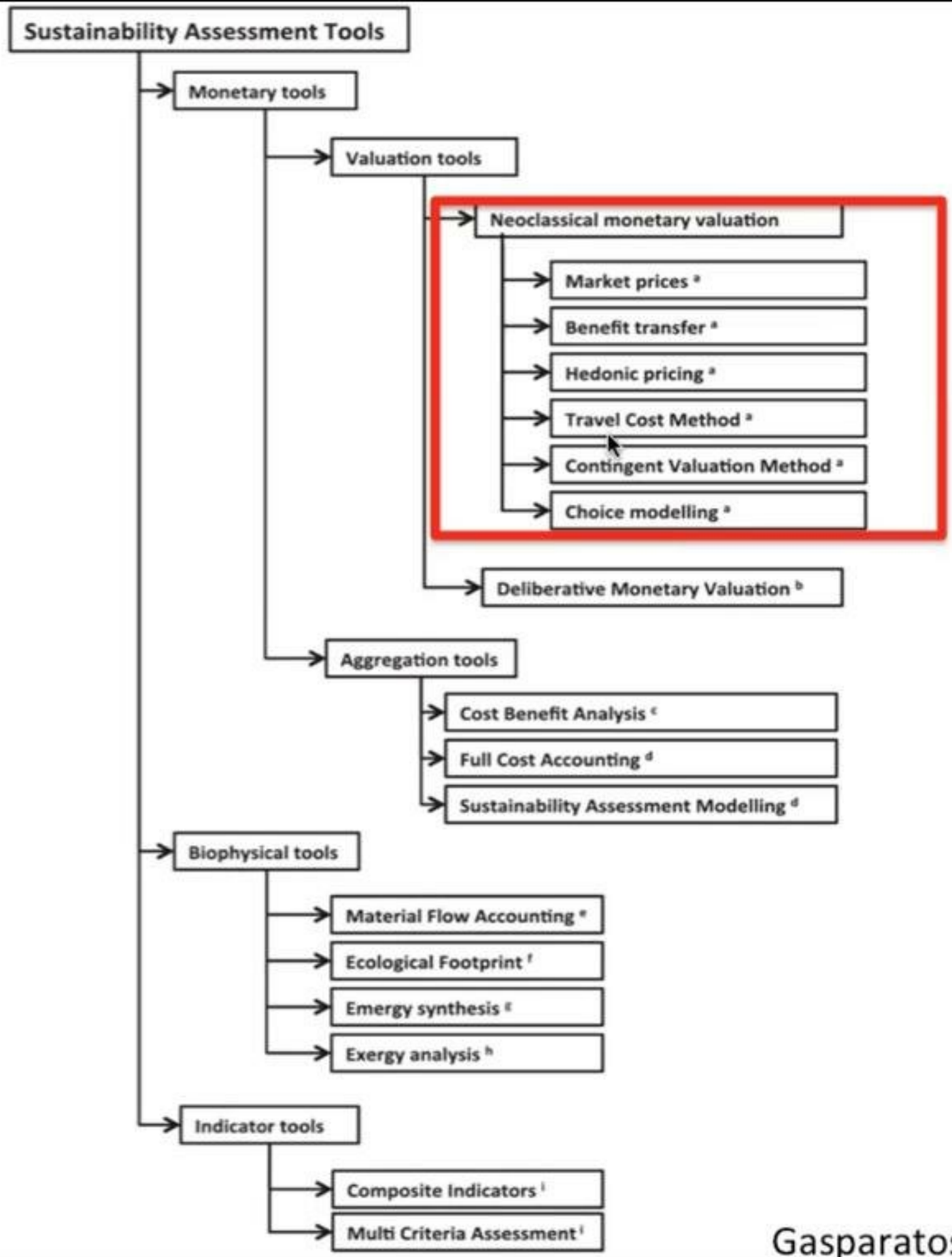
Fisheries

SEI approach to ecological footprinting





Barrett et al., 2002



Gasparatos and Scolobig, 2012

Approach		Method	Value
Market valuation	Price-based	Market prices	Direct and indirect use
	Cost-based	Avoided cost	Direct and indirect use
		Replacement cost	Direct and indirect use
		Mitigation / Restoration cost	Direct and indirect use
	Production-based	Production function approach	Indirect use
		Factor Income	Indirect use
Revealed preference		Travel cost method	Direct (indirect) use
		Hedonic pricing	Direct and indirect use
Stated preference		Contingent Valuation	Use and non-use
		Choice modelling/ Conjoint Analysis	Use and non-use
		Contingent ranking	Use and non-use
		Deliberative group valuation	Use and non-use

TEEB, 2010

Value type	Value sub-type	Meaning
Use values	Direct use value	Results from direct human use of biodiversity (consumptive or non consumptive).
	Indirect use value	Derived from the regulation services provided by species and ecosystems
	Option value	Relates to the importance that people give to the future availability of ecosystem services for personal benefit (option value in a strict sense).
Non-use values	Bequest value	Value attached by individuals to the fact that future generations will also have access to the benefits from species and ecosystems (intergenerational equity concerns).
	Altruist value	Value attached by individuals to the fact that other people of the present generation have access to the benefits provided by species and ecosystems (intragenerational equity concerns).
	Existence value	Value related to the satisfaction that individuals derive from the mere knowledge that species and ecosystems continue to exist.

TEEB, 2010

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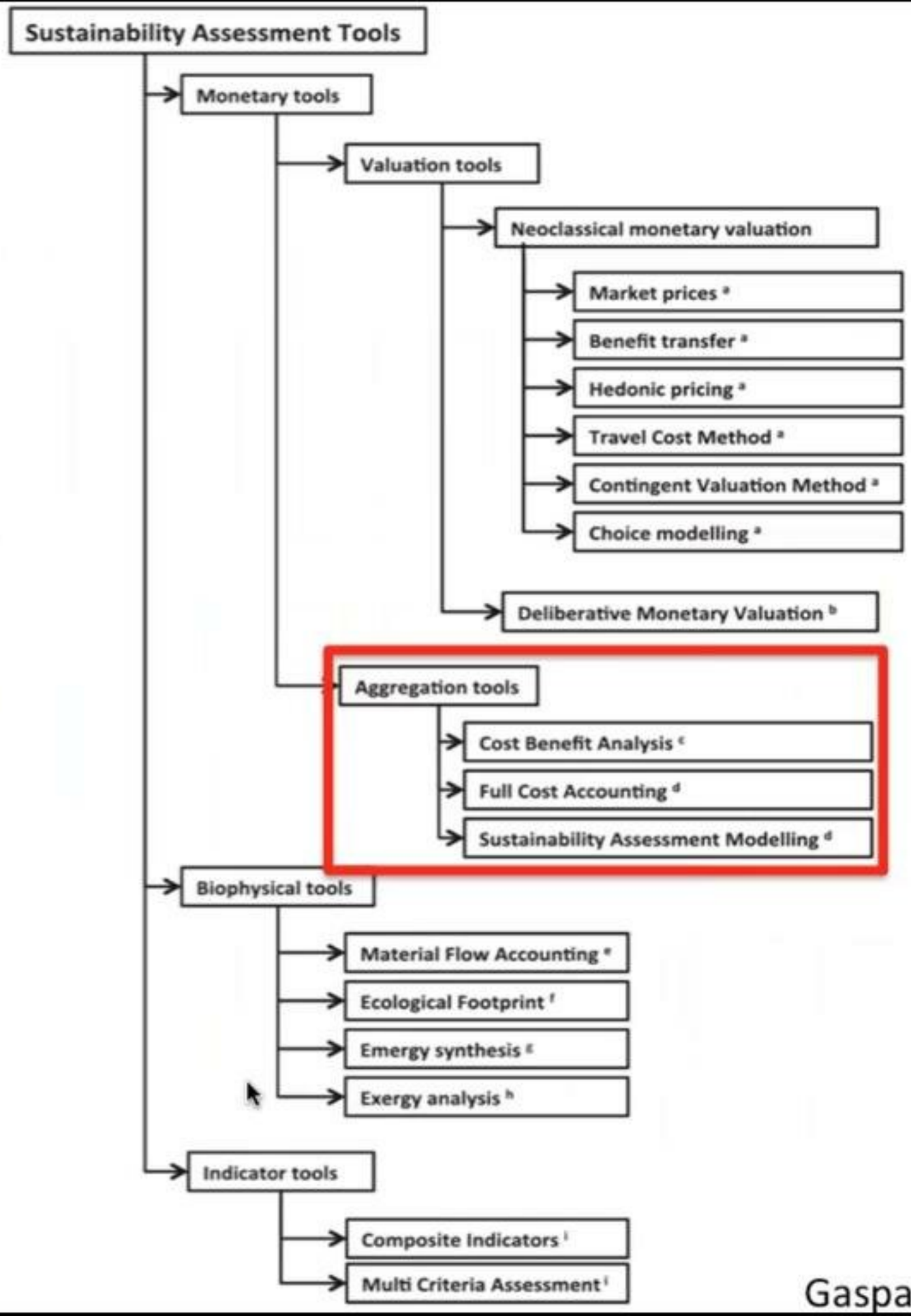
TEEB, 2010



Gasparatos and Scolobig, 2012

Environmental cost-benefit analysis

Costs
Reductions in human well-being

+

Benefits
Increases in human well-being

Aggregate environmental and social impacts
Across different people within a given geographical boundary

taking into account

Monetisation

+

Different points in time

OECD, 2018

Discounting

- **Discounting:** common practice to compare these future costs and benefits with current values

- **Assumption**: individuals in general would rather have something now than in the distant future (but not always)

- **Approach:** we should not use a single precise discount rate number to value everything from biodiversity loss to the effects of climate change decades or even centuries in the future.

Discounting

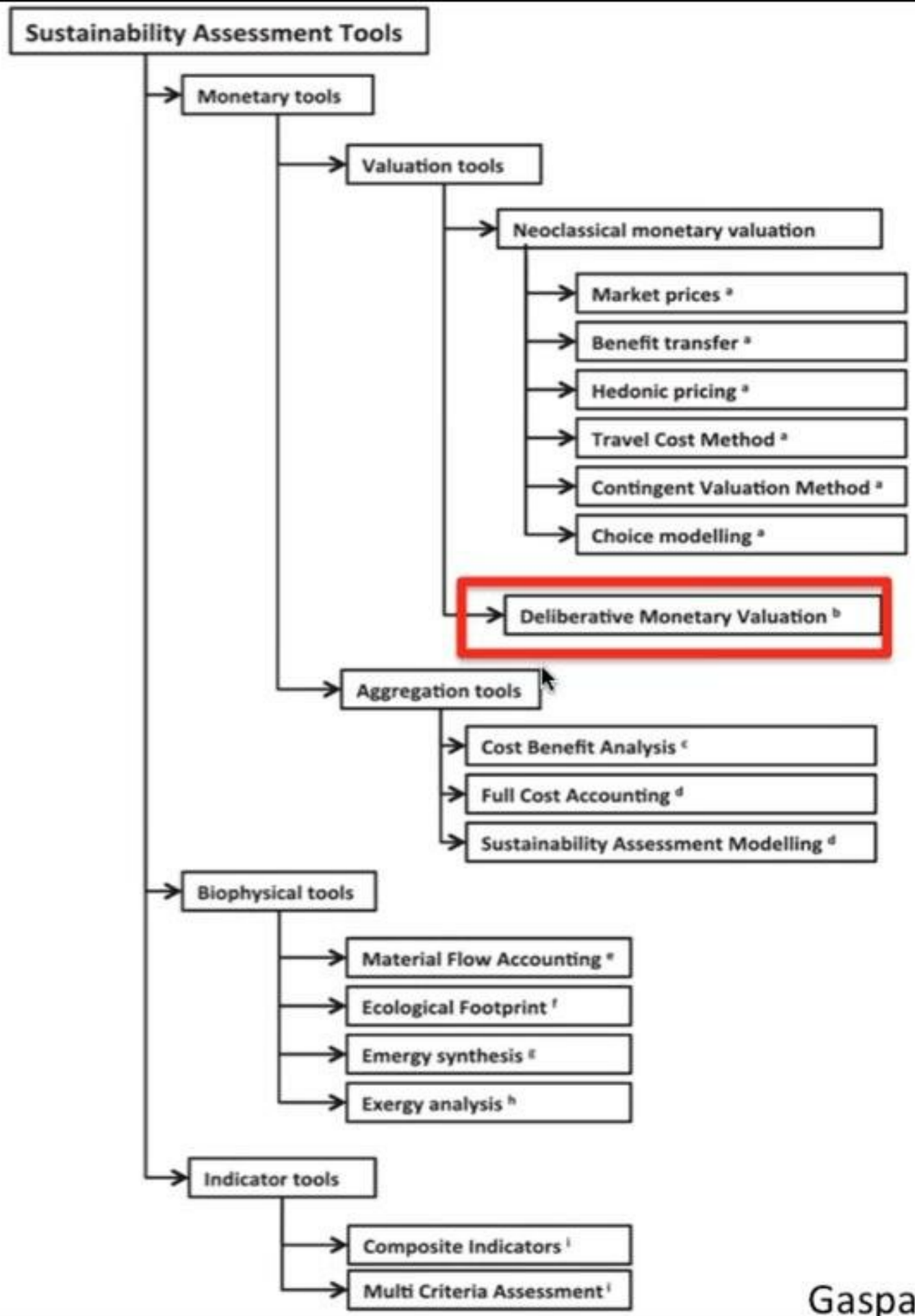
- **Approach:** context-specific discount rates, including zero and negative rates, should be used, depending on the time period involved, the degree of uncertainty, and the scope of project or policy being evaluated.

- **Approach:** in general, **a higher discount rate** applied in a specific context will lead to the long-term degradation of biodiversity and ecosystems. A 5% discount rate implies that biodiversity loss 50 years from now will be valued at only 1/7 of the same amount of biodiversity loss today.

- **Reality:** no purely economic guidelines for choosing a discount rate. Responsibility to future generations is a matter of ethics, best guesses about the well-being of those in future, and preserving life opportunities.

Discounting: issues not (usually) considered

- the irreversibility of some impacts (e.g. biodiversity loss)
- pure uncertainty as to the effects of such losses,
- the difference between private investment decisions and the responsibilities of citizens
- the implicit assumption that all forms of capital are in principle substitutable for one another on a yen-for-yen basis (***weak sustainability***)
- the assumption that reinvestment of natural capital is possible and that future returns on the reinvestment are certain
- the assumption that the change being evaluated is marginal, that is, it will not substantially alter existing economic conditions including relative prices



Gasparatos and Scolobig, 2012

Deliberative Monetary Valuation (DMV) establish a monetary value for the benefits of environmental goods.

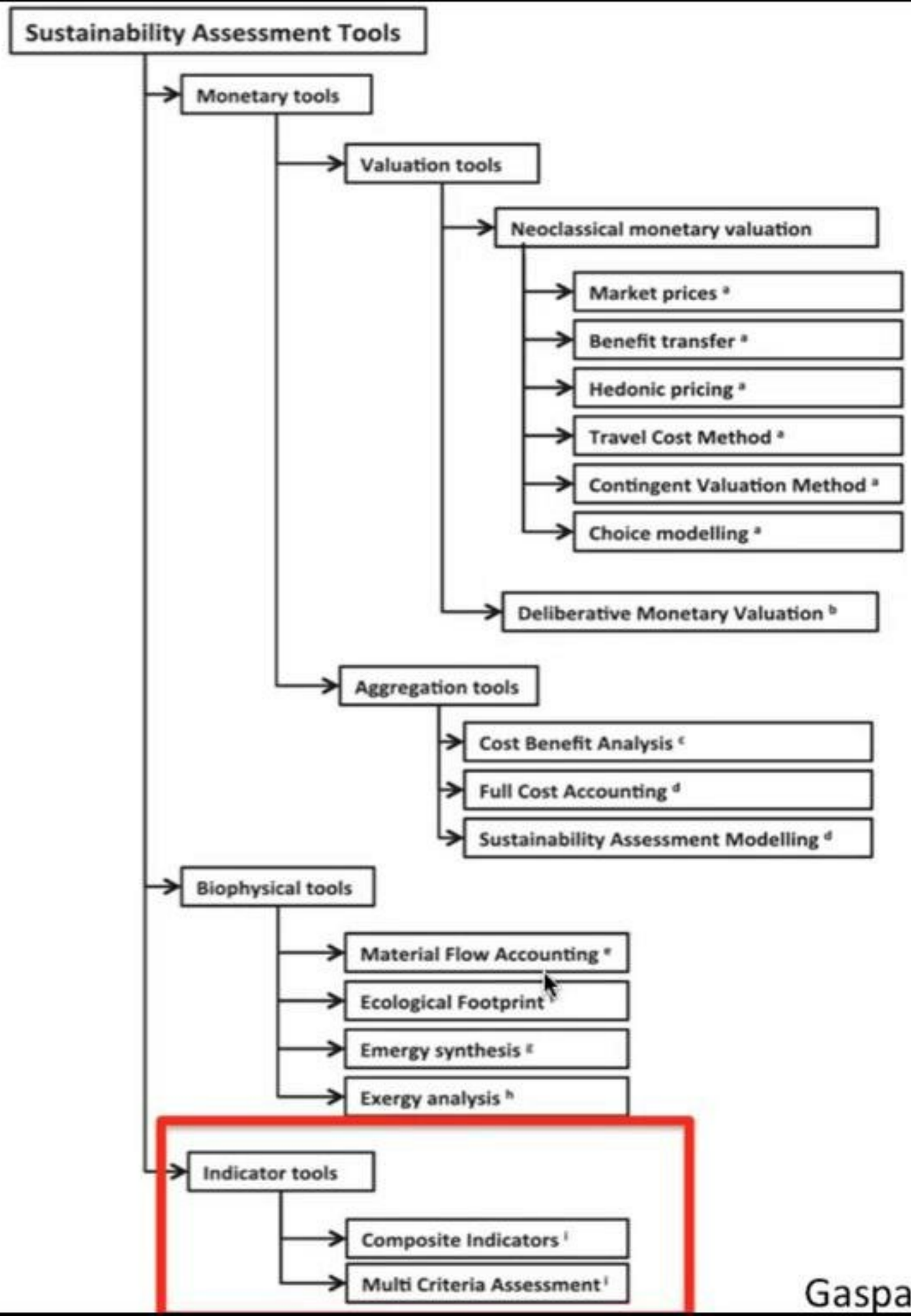
In contrast to standard economic valuation techniques DMVs incorporate participatory, deliberative, political and/or social-learning processes, to establish the monetary value.

In DMV, small groups of participants explore the values that should guide their group decisions through a process of reasoned discourse (Howarth & Wilson 2006).

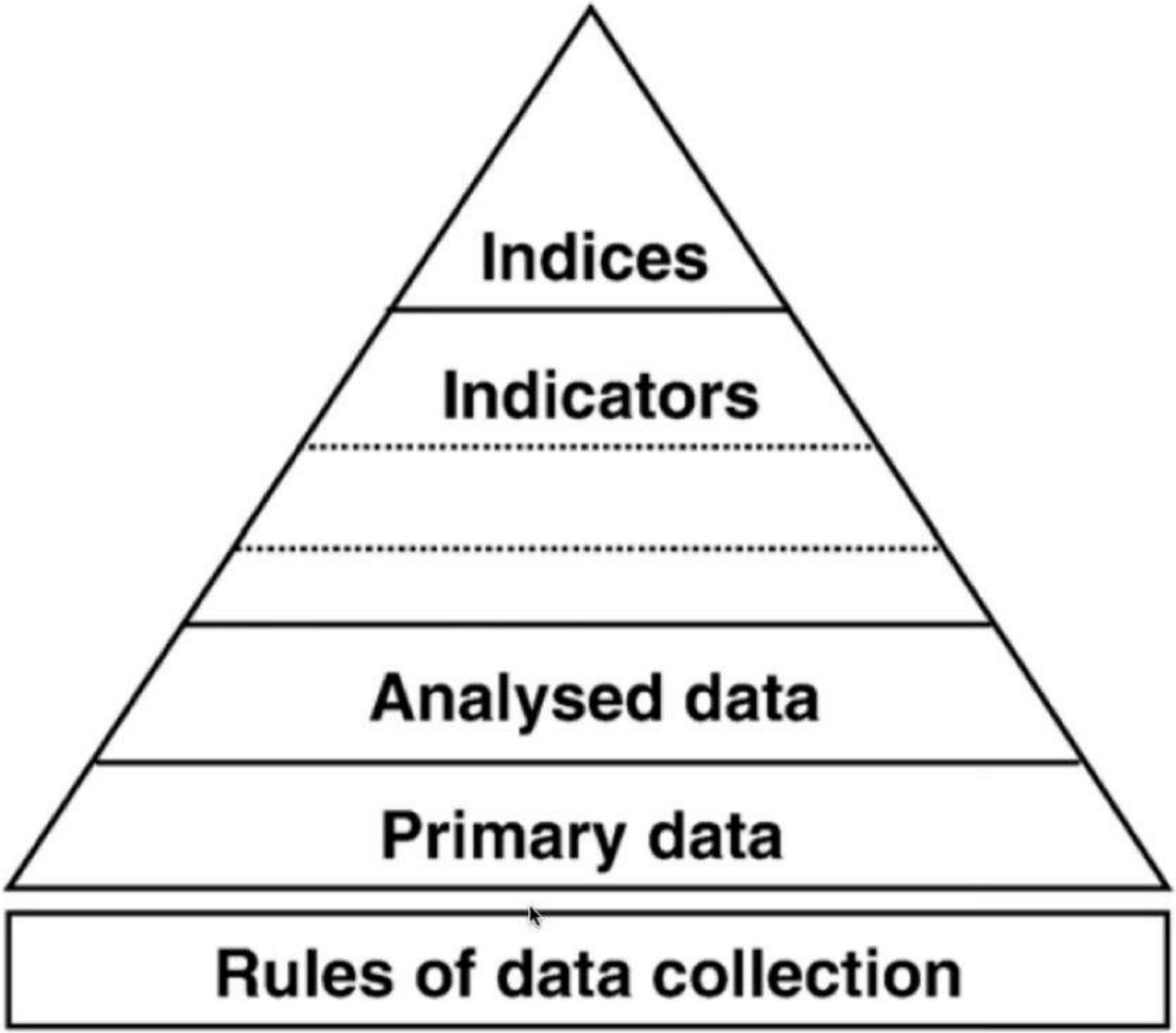
DMV has developed as a response to critique of more established valuation methods, particularly contingent valuation that:

- are not able to properly capture assessments of risk and uncertainty in the face of social-ecological complexity,
- are not able to capture the intricacies of human values,
- preference utilitarian assumptions are not always empirically or ethically justified,
- values cannot be assumed to be pre-formed

(Sagoff 1986; McCauley 2006; Spash 2007; 2008; Norgaard 2010; Kenter *et al.* 2011).

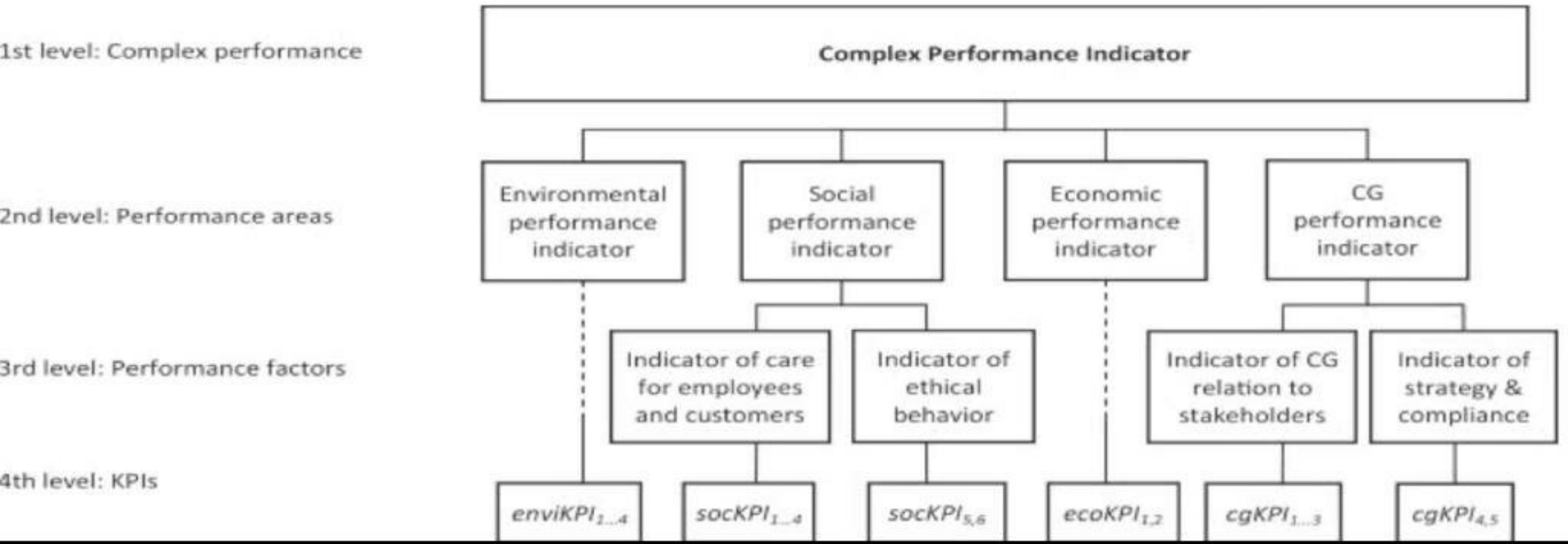


Gasparatos and Scolobig, 2012


Indices
Indicators
Analysed data
Primary data
Rules of data collection


ECOSYSTEM VITALITY
ENVIRONMENTAL HEALTH
2014 EPI
Ecosystem Vitality
Environmental Health
Climate & Energy
Biodiversity & Habitat
Fisheries
Forests
Agriculture
Water Resources
Sanitation & Drinking Water
Air Quality
Water & Sanitation
Child Mortality
Household Air Quality
Air Pollution Avg. Exp. to PM2.5
Air Pollution PM2.5 Exceedance
Access to Drinking Water
Access to Sanitation


GDS-Index 2020: What will we assess?
DESTINATION SUSTAINABILITY
Sustainability Strategy
Energy and Emissions
Resources
Air Quality
Transportation
Green Areas
Water
City Environmental Performance
SDGs
Social Progress
Corruption
Personal Safety
Access to Information
Health and Wellness
Inclusiveness
City Social Performance
Hotels
Airport
Agencies (PCOs & DMCs)
Restaurants
Venues
Academia
Supplier Performance
Destination Strategy
Policy and Certification
Governance
Capacity Building
Measurement and Reports
Marketing and Comms
Client Support
Accessibility
Generating Impact
Destination Management
One planet
travel with care
New and improved criteria for leisure tourism, climate change, resilience, health, crisis management, circular economy, measurement, impact and strategy development


1st level: Complex performance
2nd level: Performance areas
3rd level: Performance factors
4th level: KPIs
Complex Performance Indicator
Environmental performance indicator
Social performance indicator
Economic performance indicator
CG performance indicator
Indicator of care for employees and customers
Indicator of ethical behavior
Indicator of CG relation to stakeholders
Indicator of strategy & compliance
enviKPI1...4
socKPI1...4
socKPI5,6
ecoKPI1,2
cgKPI1...3
cgKPI4,5

Step 1: Theoretical framework

EU COIN, 2020

Step 2: Data selection

Step 3: Imputation of missing data

Step 4: Multivariate analysis

Step 5: Normalisation

Step 6: Weighting

Step 7: Aggregating indicators

Step 8: Sensitivity analysis

Step 9: Link to other measures

Step 10: Visualisation

Normalisation: bring indicators onto a common scale, which renders the variables comparable.

Weighing: assign weight to individual weights to allow for the effect or importance of each indicator to be adjusted according to the concept being measured. Weighting methods can be statistical, based on public/expert opinion, or both.

Aggregation: combine the values of a set of indicators into a single summary 'composite' or 'aggregate' measure. The most common approach is to simply take the average of the normalised scores, but other techniques can be used based on other types of averaging, or using ranks.

Implications

Tool assumptions

The assumptions made by each tool category are inmost cases highly value-laden.

Essentially these assumptions dictate:

- (a) the valuation perspective, of the overall assessment;
- (b) the adoption of a reductionist or a non-reductionist perspective during the assessment;
- (c) the acceptability of trade-offs between the different sustainability issues.

Tool assumptions

Biophysical tools - account for how much energy/matter etc has been invested in the production of a product/service.

They assume that the single most important yardstick when evaluating projects and policies is the amount of natural resources appropriated, as a proxy to environmental impact.

"cost of production" valuation system – ecocentric

Monetary tools - focus on consumer preferences.

Account for WTP/WTA which is a proxy for the utility (happiness) that a person is expected to gain from consuming

"…in a standard market setting individuals engage in selling their labour and buying consumer items and their own limit on obtaining happiness is their ability to pay" (Spash, 2007: 691)

"subjective preference" valuation system – anthropocentric

Tool assumptions

DMV – additional concerns to economic efficiency (e.g. fairness of distribution) are articulated but overall there is inconclusive evidence if this constitutes a distinct valuation system (Howarth and Wilson, 2006)

Composite indicators – very flexible but lose any sense of value after the normalisation of the indicators

Tools as value-articulating institutions

These tools exhibit the characteristics of value articulating institutions (TEEB, 2010; Vatn, 2009).

According to Vatn (2009) the defining characteristics of value articulating institutions is the explicit or implicit "statement" of the following:

- **who, in which role and how he/she should be considered in the decision making process;**
- **what are relevant data and how data are to be handled;**
- how is information provided to the participants, how conclusions are reached and how they are disseminated to decision-makers.

Tools as value-articulating institutions

"who and in which capacity, i.e. in which role, should be considered during the decision making process" **(Vatn, 2005: 211)**

- Neoclassical economic valuation tools view human as individual consumers that try to maximize their utility
  "...net utility from the consequences of an action determines whether that action is right or wrong" (Spash et al., 2009)
- Deliberative Monetary Valuations (DMV) view humans as citizens or parts of broader social groups which unequivocally affects their attitude including the valuation of the environment (Wilson and Howarth, 2002; Sagoff, 1998)
- In biophysical models the role of the human seems to become altogether obsolete as these tools seem to neglect human preferences (Cleveland et al., 2000)

Tools as value-articulating institutions

"what is considered relevant data and how data is to be handled"
(Vatn, 2005: 211)

- Different valuation systems
- Choice of indicators and methodology in composite indicators and multi criteria assessment
- Trade offs or no tradeoffs (strong vs. weak sustainability)

Tool	Concept of value (valuation system)	Valuation perspective	Role of participant	Relevant stakeholder value orientation
Biophysical	Cost of production [1]	Eco-centric	Participant becomes irrelevant	Biocentric
Traditional monetary valuation (e.g. CVM)	Subjective preference [1]	Anthropocentric	Individual consumer	Egoistic
Deliberative monetary valuation	Inconclusive evidence [2]	Anthropocentric	Citizen	Altruistic
Composite indicators	Lost during the normalisation/aggregation	Lost during the normalisation/aggregation	Lost during the normalisation/aggregation	NA
Multi-criteria analysis	Depends on methodological choices [3]	Depends on methodological choices [3]	Depends on methodological choices [3]	Depends on methodological choices [3]

Desired features	Neoclassical monetary valuation/aggregation tools[a]	Biophysical tools	Indicator-based tools
Integrated or triple-bottom line assessment	√[b]	X	√
Predictive or ex-ante assessment	√	√	√
Precautionary assessment	X	Debatable	Depends on methodological choices
Participatory assessment	Debatable	X	Depends on methodological choices
Distributional assessment	Debatable	Debatable	Depends on methodological choices

[a] DMV excluded.

[b] √ means that a tool can capture a specific desirable feature while an X that it cannot.

Gasparatos, 2010; Gasparatos and Scolobig, 2012

Value articulating institution	Normative and epistemological stance
Contingent valuation method	Cartesianism: Value is pre-existing and needs to be discovered. Separation between values and facts, human and nature. Substitutability between money and ecosystem goods and services. Values are revealed.
Deliberative or social process methods	Democracy stance: value is constructed in social processes. Previously unknown values evolve from deliberation and debate. Prioritizes each member of society to contribute to knowledge and judgment.
Multi-criteria methods	Complexity: Value understood in terms of ranked importance. Irreducible plurality of analytical perspectives for a stationary enquiry.

O'Connor, 1998

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Implications of tool selection

Ethical: by choosing a certain tool, the evaluator "subscribed" to and ultimately "enforces" a specific world view as the correct or most appropriate yardstick to evaluate a nature conservation/ management decision (project/policy) that most likely is not going to directly affect him/her

Practical: nature management/conservation option (project/ policy) is not necessarily measured in a way that mirrors the values of end-users

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Precautionary assessment	X	Debatable	Depends on methodological choices
Participatory assessment	Debatable	X	Depends on methodological choices
Distributional assessment	Debatable	Debatable	Depends on methodological choices

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Choosing the most appropriate tool

- According to the Desired Perspective(s) of the Assessment

- According to the Desirable Features of the Sustainability Assessment

- According to the Values of the Affected Stakeholders

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Thanks for your attention!!!

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17 November 2020

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