Footprint Family suite of indicators:
definition and added value

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Testing the Indicators: criteria

- *The search for operational indicators should be guided by a number of specific criteria that indicators or set of indicators should meet.*
- *This has been a guiding principle in analyzing the Ecological, Carbon and Water Footprint.*
- *Similarities and differences among the three indicators were highlighted to show how the indicators overlap, interact, and complement each other.*

- Research question
- Main message
- Scientific robustness
  - *Accounting methodology*
  - *Data and sources*
  - *Unit of measure*
- Policy Usefulness
- Strengths and Weaknesses

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Testing the Indicators: complementary and overlapping properties

- The three Footprint indicators complement one another in assessing human pressure on the planet
- Use a consumption-based perspective and are able to track both direct and indirect human demands, enabling for a clear understanding of the 'hidden/invisible' human-induced sources of pressure.
- However, only the **Ecological** and **Water Footprint** were found to be able to account for both the **source** (resource production) and **sink** (waste assimilation) capacity of the planet.

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Testing the Indicators: complementary and overlapping properties

- The **Ecological Footprint** was found to be the sole indicator able to provide a clear ecological **benchmark** (biocapacity) to test human pressure against.
- For communication purposes national Carbon Footprints can be benchmarked against 2050 targets for per capita GHG emissions to achieve the goal of limiting temperature increase limited to 2 C (3.6 F) above pre-industrial levels.
- Recent research suggests that it would be necessary to achieve stabilization below 400 ppm of carbon dioxide in the atmosphere to give a relatively high certainty of not exceeding 2 C.

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Testing the Indicators: complementary and overlapping properties

- Human-induced CO_2 emissions are tracked by both the **Ecological** and the **Carbon Footprint**.
- Both **EF** and **CF** go beyond the sole CO_2 investigation as the **Carbon Footprint** also tracks the release of additional greenhouse gases (CO_2, CH_4, N_2O, HFC, PFC, and SF_6) and the **Ecological Footprint** expands its area of investigation by looking at human demand for food, fibers, wood products, etc.
- All three indicators illustrate the unequal distribution of resource use and/or related impacts between the inhabitants of different world regions and could thus be linked to policy debates in the development policy area.

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Towards the "Footprint Family"

- The three indicators can be regarded as **complementary in the sustainability debate** as enable representing multiple aspects of the environmental consequences of human activities:
- By looking at the amount of bioproductive area people demand because of resource consumption and CO_2 emission, the **Ecological Footprint** can be used to inform on the impact placed on the ***biosphere***.
- By quantifying the effect of resource use on climate, the **Carbon Footprint** informs on the impact humanity places on the ***atmosphere***.
- By tracking real and hidden water flows, **Water Footprint** can be used to inform on the impact humans place on the ***hydrosphere***.

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The "Footprint Family": definition

- The **Footprint Family** is defined as a set of accounting tool - characterized by a consumption approach - able to track human ***pressure*** on the surrounding environment, where ***pressure*** is defined as appropriation of biological natural resources and CO_2 uptake, emissions of GHGs and consumption and pollution of global freshwater resources.
- Three key ecosystem compartments are monitored, namely the ***biosphere***, ***atmosphere***, and ***hydrosphere***.

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The "Footprint Family": scope

- It helps to more comprehensively monitor the environmental pillar of sustainability (**extend the scope of assessments**).
- It has a wide range of research and policy applications as it can be applied to single products, processes, sectors, up to individuals, cities, nations and the whole world.
- It can support decision makers in discussing and developing answers on issues such as limits to natural resource and freshwater consumption, and **sustainable use of natural capital** across the globe.
- The Footprint Family **is not yet** a full measure of sustainability as several environmental issues (e.g., toxicity, soil quality and land degradation, nuclear wastes, etc) are not tracked.

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The "Footprint Family": added value

- Each of the three Footprint Indicators and the Footprint Family were compared against the various European (and international) policy objectives
- This was done to identify which indicator can best address specific EU environmental issues as well as the value added of addressing such issues with the whole Footprint Family.
- However, this does not imply that the policies could sufficiently be informed by these indicators or that the indicators could model the impacts of these policies

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The "Footprint Family": added value

The main policies considered were:

- EU Sustainable Development Strategy – EU SDS
- EU Sixth Environmental Action Programme – EU 6EAP and its seven Thematic Strategies (TS)
- 2005 Lisbon Strategy
- Europe 2020 Strategy
- Directive on renewable energy - (Directive 2009/28/EC)
- Water Framework Directive - WFD
- Common Agricultural Policy - CAP
- Common Fisheries Policy - CFP
- EU Climate Objectives
- EU Climate Adaptation Objectives
- Convention on Biological Diversity - CBD
- UN Millennium Development Goals – MDGs
- International Panel for Sustainable Resource Management – IPSRM
- Marrakesh Process
- Habitats Directive - (Directive 92/43/EEC)
- Birds Directive - (Directive 2009/147/EC)

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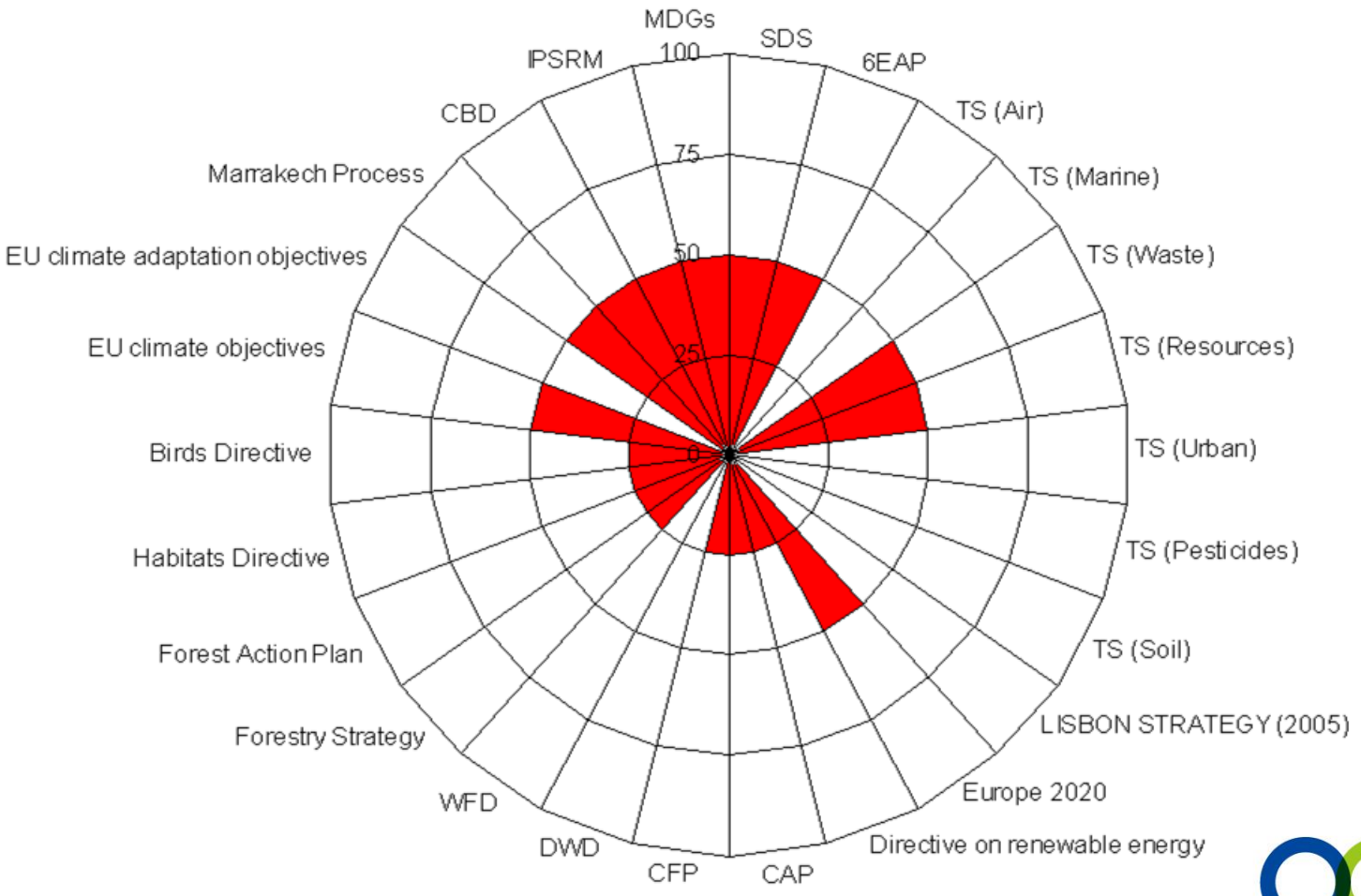
Ecological Footprint



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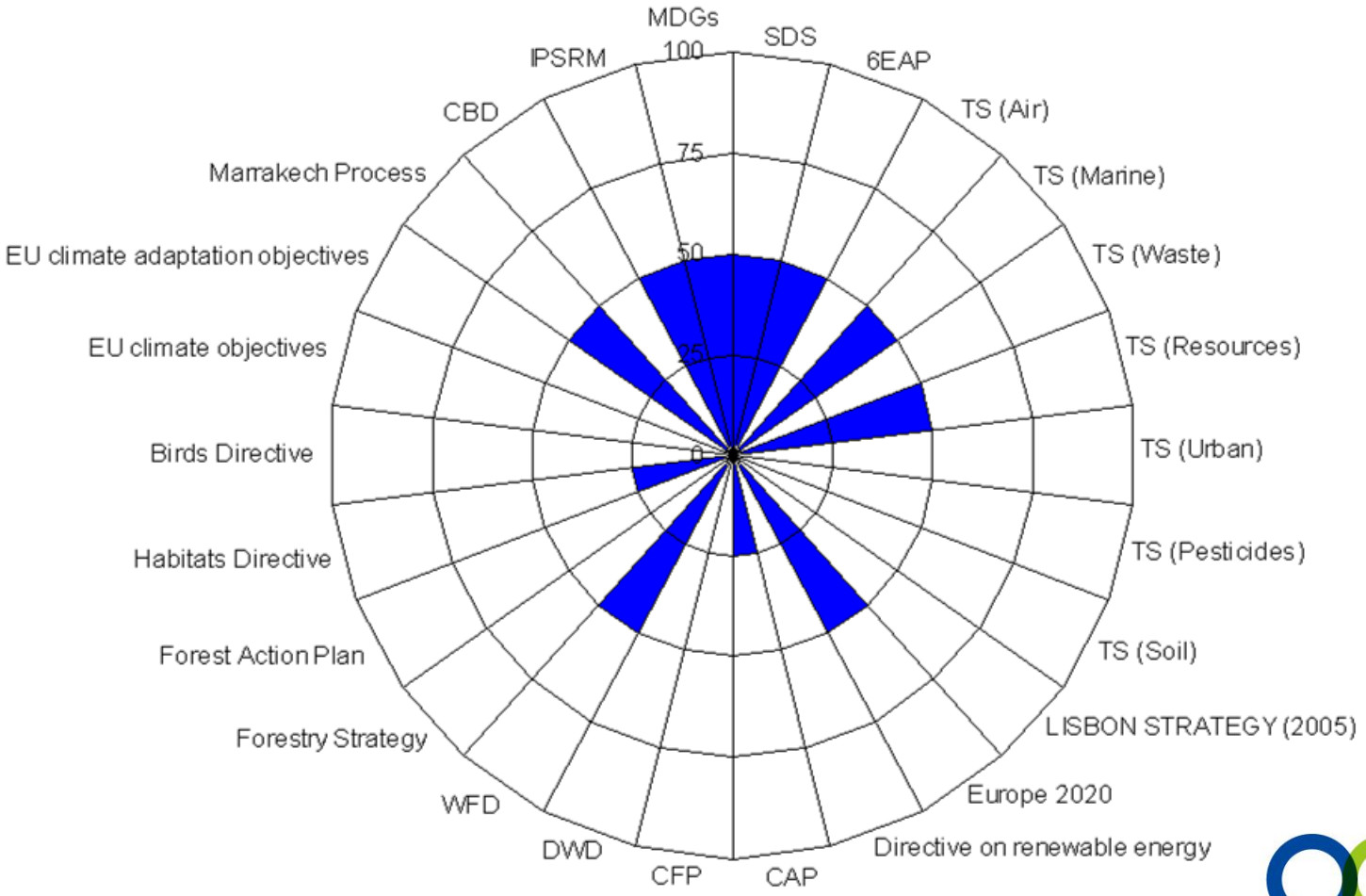
Water Footprint



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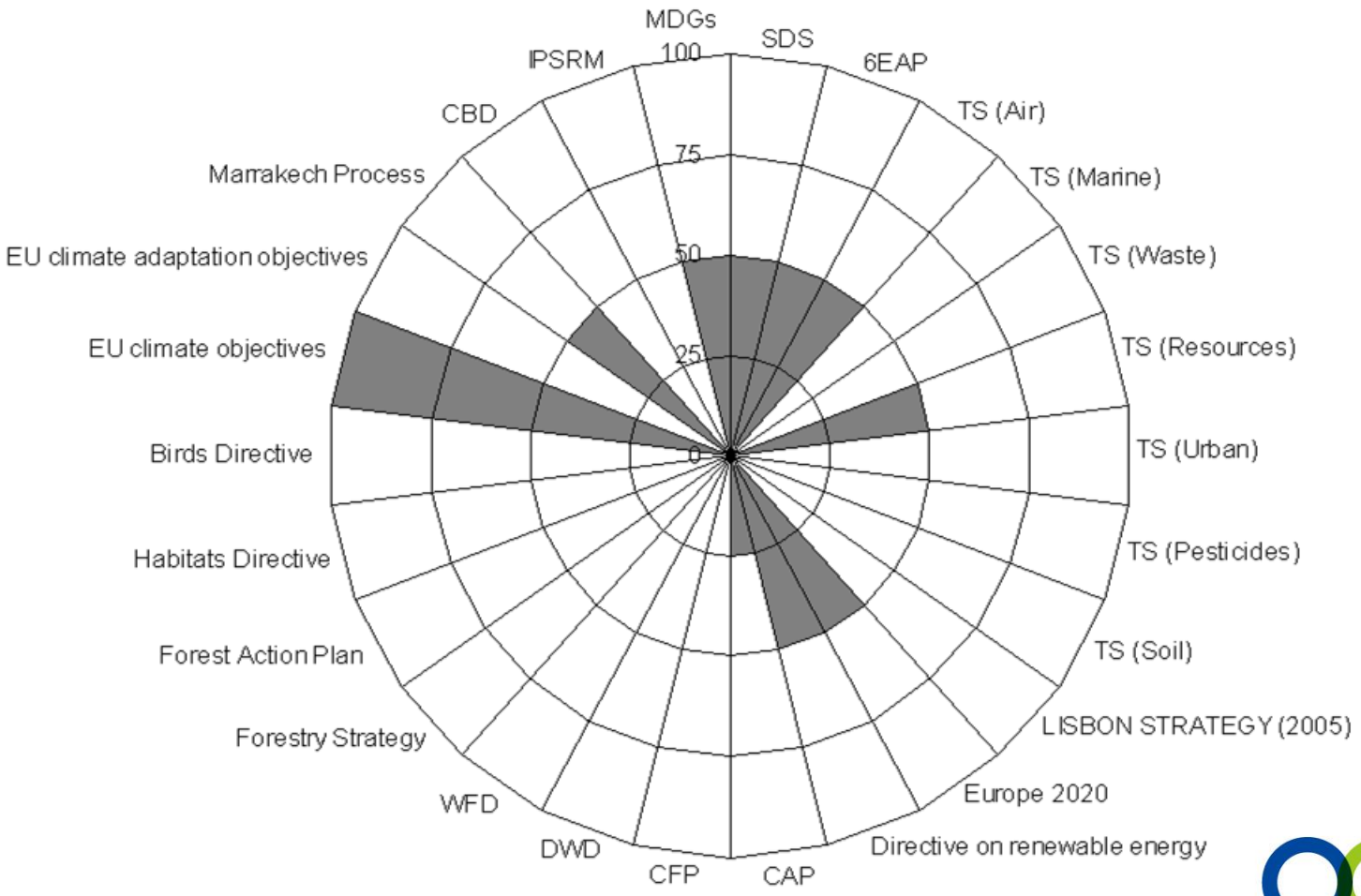
Carbon Footprint



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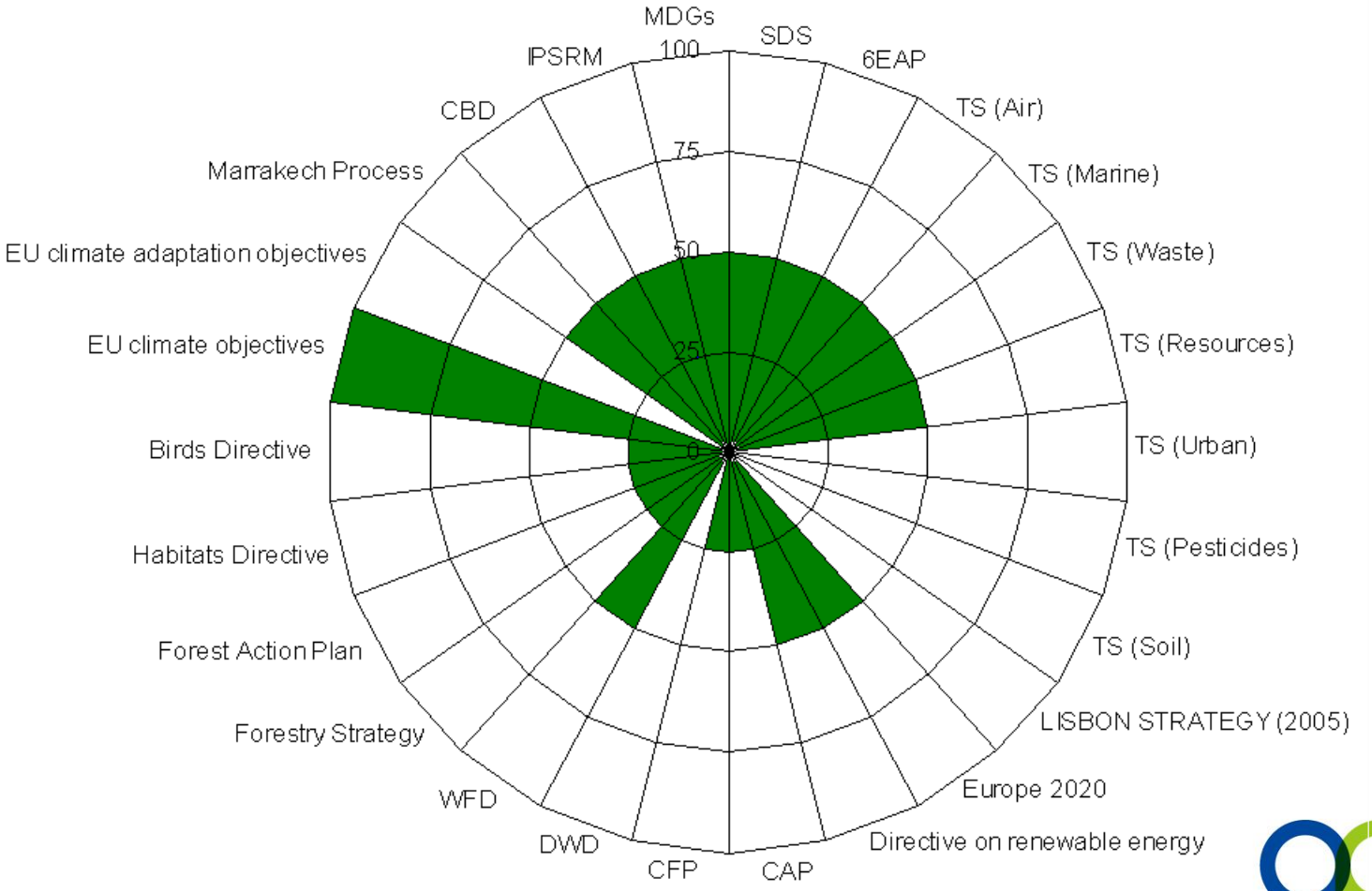
Footprint Family



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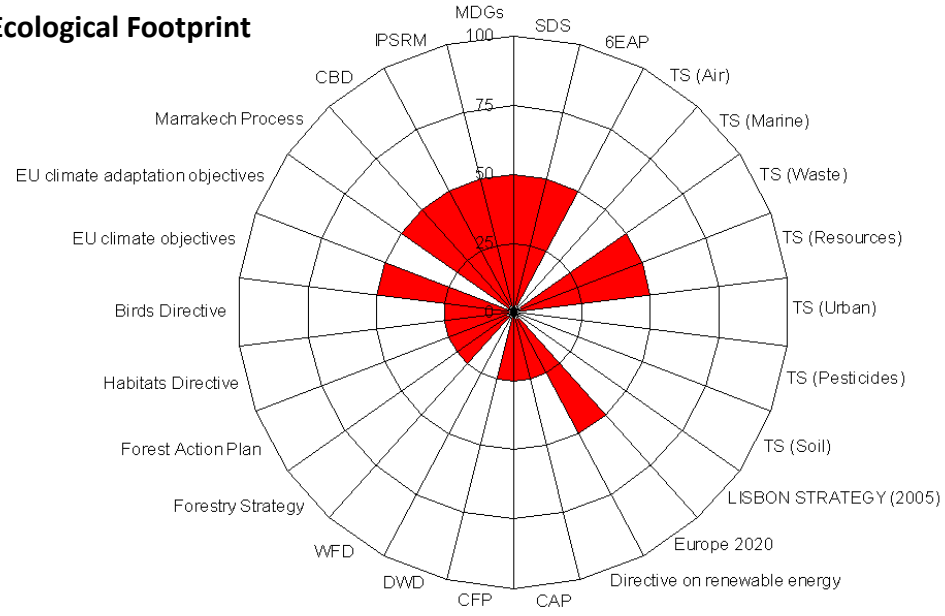
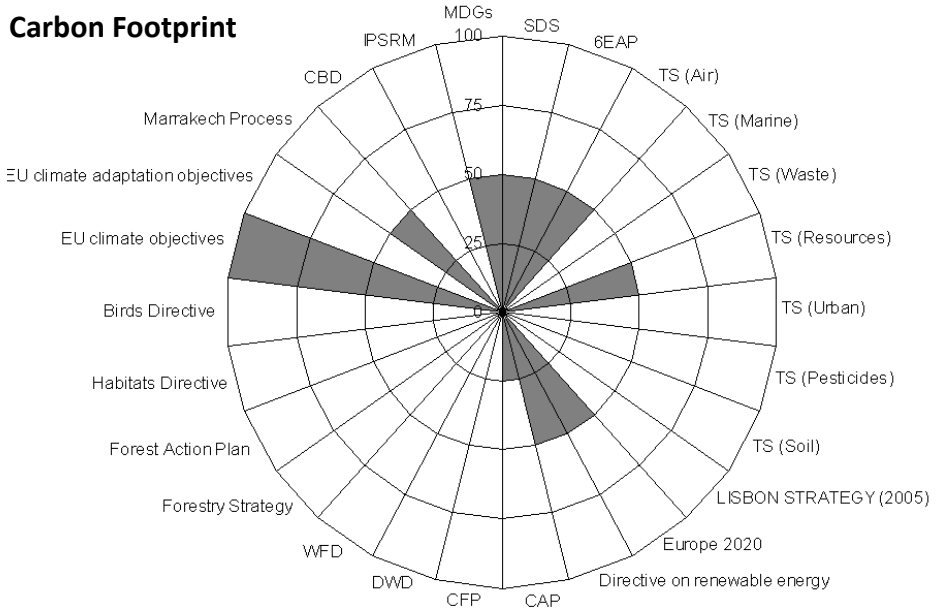
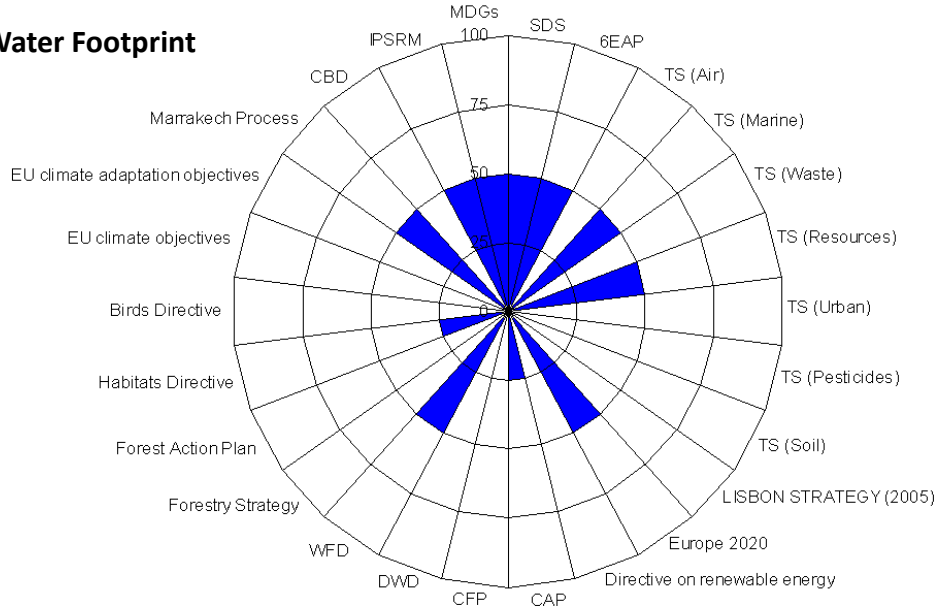
Ecological Footprint



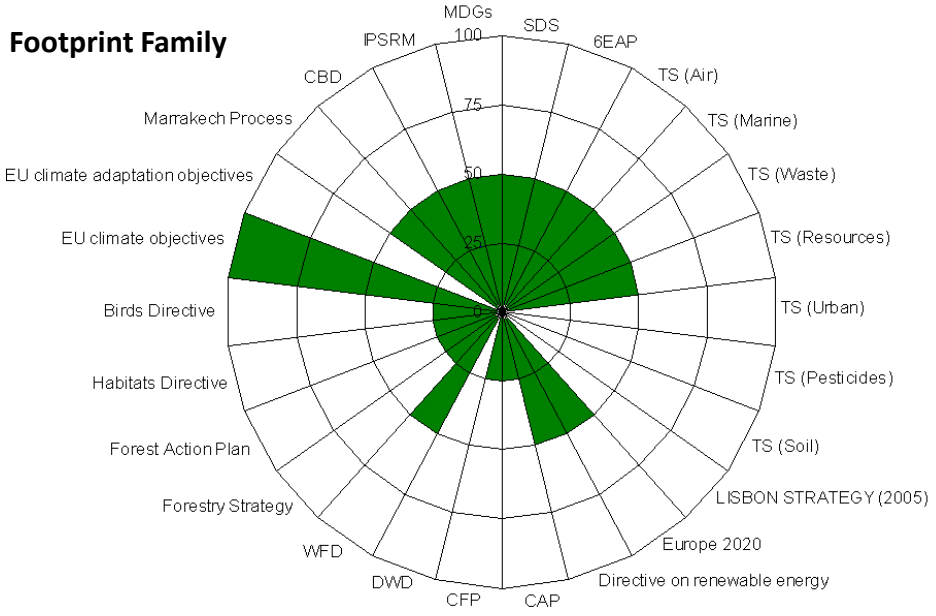
Carbon Footprint



Water Footprint



Footprint Family



"Footprint Family": MRIO integration

- An environmentally – extended multi-regional input-output (MRIO) model was developed to group the "Footprint Family" indicators under a streamlined ecological-economic modelling framework.
- All three indicators benefit in terms of comparability from being calculated and presented in a consistent framework.
- This will allow for more intuitive examination of the relationship between their respective subject areas, and will help understand trade-offs between them (rather than just pressure shift).

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"Footprint Family": MRIO integration

Historically **EF** and **WF** use process-based LCA-type of approach while **CF** uses an IO-based approach

Merits:

- Economic data easily available
- Trade in services included
- Complete assessment of the full supply chain
- Enables an inter-industry analysis of the linkages across multiple economies (who produces and who consumes what)
- Overall increase in methodological robustness

Drawbacks:

- Product resolution higher in LCA-type of approach
- Monetary flows as proxy for physical flows
- Decreased resolution: from detailed product-level to aggregated sectoral-level assessments
- Decreased temporal and geographical coverage

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Conclusions

- By introducing the Footprint Family concept, the **OPEN:EU** project aims to provide policy makers and practitioners with a set of tools that can embrace a wider range of topics as opposed to those addressed by the single indicators.
- However, achieving sustainability depends on a number of critical issues that cannot be addressed by the sole Footprint Family.
- The use of the **Footprint Family** of indicators goes in the direction of **multidisciplinary sustainability assessments**. This does not mean that the Footprint Family is a fully inclusive and comprehensive basket of indicators nor that it should be considered as the sole tool decision makers should rely on.

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Conclusions

- However, if Europe, or any other region, is to truly address sustainable development then decision makers will need different tools and sets of indicators, one of which could be the **Footprint Family**.
- This suite of indicators could also be included in larger comprehensive sets of indicators on sustainable development or sustainable consumption and production, for example the set being developed by the European Environment Agency (ETC/SCP 2010).

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