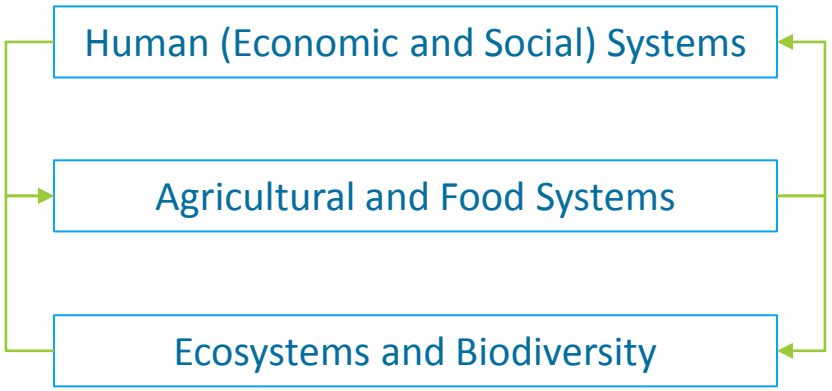
Measurement & Valuation Framework

TEEB FOR AGRICULTURE AND FOOD

General approach

TEEB Framework



Assessments

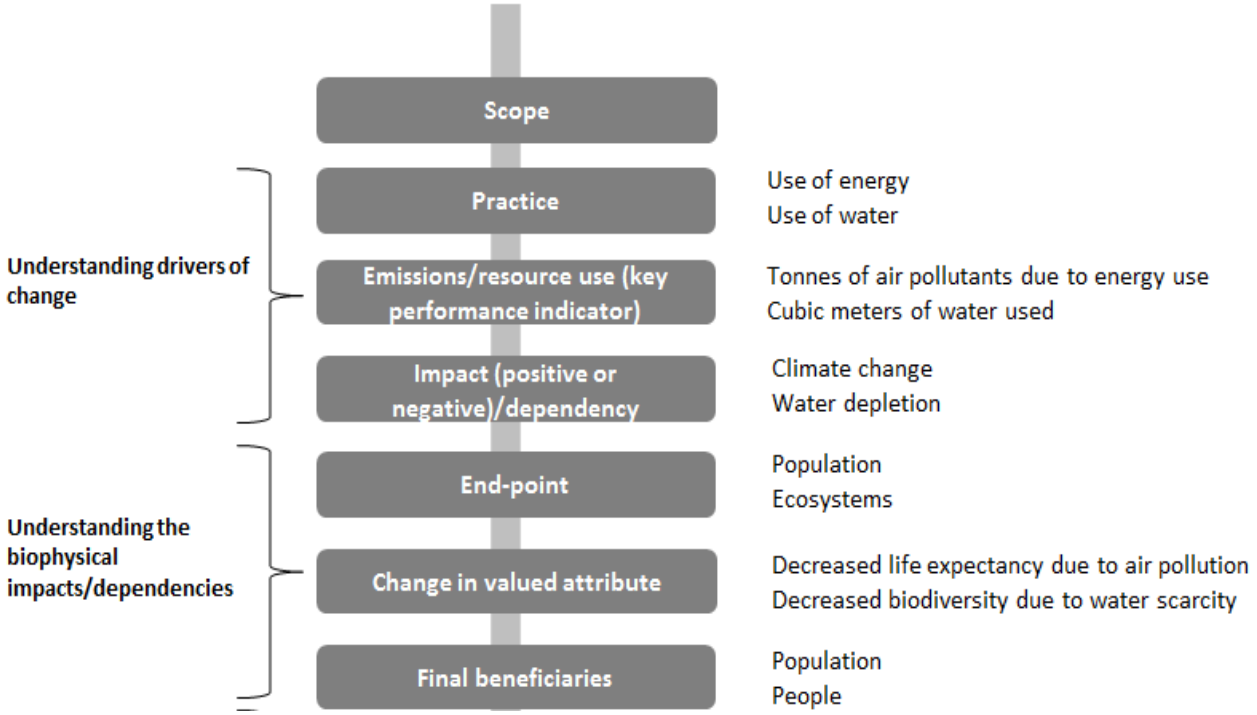
1. Top down *[Livestock]*
   - **Goal**: Identify 'hotspots' and key impact areas
   - **Biophysical data**: Use of global or country-specific data
   - **Valuation data**: Global or country-specific valuations
   - **Key strengths:** Broad coverage

2. Hybrid *[Rice, Palm oil]*
   - **Goal**: Wide scope of analysis using a 'systems based' approach
   - **Biophysical data**: Mix of local and modelled data
   - **Valuation data**: Global, country-specific, or local valuations
   - **Key strengths:** Contextualization of local data

3. Bottom-up *[Livestock]*
   - **Goal**: Analysis of farming systems /regional contexts
   - **Biophysical data**: Local quantitative and qualitative datapoints
   - **Valuation data**: Global, country-specific, or local valuations
   - **Key strengths:** Robustness for decision making

Increasing geographic specificity

Measurement framework



- Biophysical units
- Life cycle assessment, Input-Output or hybrid approach
- Comparison of alternative production systems with a common functional unit

Valuation framework

- Purpose of valuation
- Why value
- What to value

Value addition to humans. Hence, the framework follows a welfare-approach.

"In order that better management decisions are made, there is a need to **evaluate all significant externalities of eco-agri-food systems, to better inform decision-makers** in governments, businesses and farms. Furthermore, there is a need to **evaluate the eco-agri-food systems complex as a whole**, and not as a set of silos."

Pavan Sukhdev, Kavita Sharma.
Framework for TEEBAgFood Draft

Example: Livestock

- Beef, milk and poultry

- 190 countries assessed

- Farming operations and supply chain

Monetary Valuation

- Natural capital costs of:
  - GHG emissions
  - Air pollutants
  - Land pollutants
  - Water pollutants
  - Water consumptions
  - Land use change

- Qualitative review of the benefits provided by livestock

1. Top down: Measurement

- **Quantification**
  - Trucost's environmentally extended input output model
    - Incorporates a wide range of data - LCA, FAO, IEA, government, industry data...
  - Broad range of 'invisible' impacts
    - Emissions to air, land, and water
    - Land use change
    - Water use
  - Broad geographic coverage
    - Quantification of impacts of farming operations is *country-specific* where possible
  - Identify target areas and material impacts for specified stakeholders
  - Frames the context and justifies next steps
- **Limitations**
  - Not specific to particular production systems or practices
  - Data will cover different production systems present within a country
  - Quantification of farming supply chain impacts uses global average factors

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1. Top down: Valuation

- **Valuation**
  - Integrated biophysical and economic model
    - Impacts on human health – morbidity and mortality
    - Impacts on ecosystems – pressure on biodiversity and ecosystem services
  - Allows comparability of impacts
  - Understand the effect of the drivers of those impacts
  - Granular valuation results
    - Identify stakeholders

- **Limitations**
  - Does not take into account intra-national differences
  - Does not include impacts such as:
    - More fulfilling employment
    - Increasing incomes of the poor

Example: Rice

- 5 countries and 28 practices assessed
- Farming operations only

Monetary Valuation

- Natural capital costs:
  - GHG emissions
  - Air pollutants
  - Land pollutants
  - Water pollutants
  - Eutrophication
  - Water consumptions
- Natural capital benefits
  - Rice, rice straw, rice husks
  - Water recharge
  - Biological control

2. Hybrid: Measurement

- **Quantification**
  - Data from peer reviewed literature
    - Large range of impacts covered
    - Can be applied in any location
  - Data gaps supplemented with rice-specific biophysical modelling
    - Peer reviewed literature
    - LCA models
  - Site-level analysis - specific to a particular production system
  - Takes a ‘systems based’ view
  - Provides more accurate and targeted information on impacts and endpoints for policy makers and researchers
- **Limitations**
  - Quantification of impacts not always site specific
  - Academic research and literature missing on some key processes
  - Reliant on primary data in the study country

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Monetary Valuation

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2. Hybrid: Valuation

- **Valuation**
  - Integrated biophysical and economic model
    - Impacts on human health – morbidity and mortality
    - Impacts on ecosystems – pressure on biodiversity and ecosystem services
  - Comparability between impacts
  - Identify specific stakeholder groups
  - Greater understanding of drivers of change
- **Limitations**
  - Peer reviewed literature typically only analyses trade-offs between two factors. E.g. Food production vs. fertiliser application
  - Use of some country or global average to fill data gaps
  - Valuation approach does not take into account all local characteristics
    - Dispersion of pollutants…

Example: Livestock (Supply chain)

Quantification

- Farming operations and supply chain (at least production of feed) for 5 countries and 10 practices
- LCA approach to supply chain; modelling of local systems
- Data from peer-reviewed literature, GLEAM, FAOSTAT amongst others

Non-monetary valuation

- Land occupation
- Impact on biodiversity

Monetary Valuation

- Natural capital costs of GHG, water pollution
- Natural capital dependency on water

3. Bottom-up: Measurement Approach

- **Quantification**
  - Data from experts, peer reviewed literature and databases
  - Biophysical models of farming systems
  - Site-level, specific to a particular production system
- **Limitations**
  - High data requirements, limited data availability
  - Comparability is determined by scope
  - Results are situation specific and contextualisation is necessary for interpreting

Example: Livestock regional study - Masaai Steppe

Decision problem

- There is trend to convert land from semi-natural to agricultural use
- Policy on land conversion?
- What use of ecosystem delivers most economic value to local and global stakeholders?

Impact measurement

- Analysis of scenarios of land conversion and ecosystem change

Valuation

- Internal value of natural capital assets in the region
- Use market prices as proxies for shadow prices where possible

3. Bottom-up: Valuation Approach

- **1. Starting point is decision problem**
  - What is the choice set of alternatives?
  - Who are the decision makers and affected stakeholders?
  - Decision-theoretic perspective based on *Principles on Impact Assessment and Valuation*
- **2.Impact measurement**
  - Characterization of system
    - Follow UN SEEA (2012, 2014abc)
    - Adapt for purposes TEEB
- **3. Valuation**
  - Determine impact of choices on value of Natural Capital Assets
  - Valuation of assets based on discounted welfare flows
  - Based on UNEP Inclusive Wealth (2012,2013)
  - Valuation of asset factorized into two parts
    - The marginal product of each natural good the asset provides
    - The shadow price of each natural good in terms of its contribution to final consumption

Lessons and challenges

LESSONS LEARNT

- Comparing results across studies requires contextualization
- Complementarity of top-down and bottom-up

CHALLENGES

- Consistent valuation framework & methods
- Local data
- Integration with other capitals
- Incorporation of equity considerations
- Ensure both completeness and comparability in scoping
- Communicating results