Data collection for agricultural soils
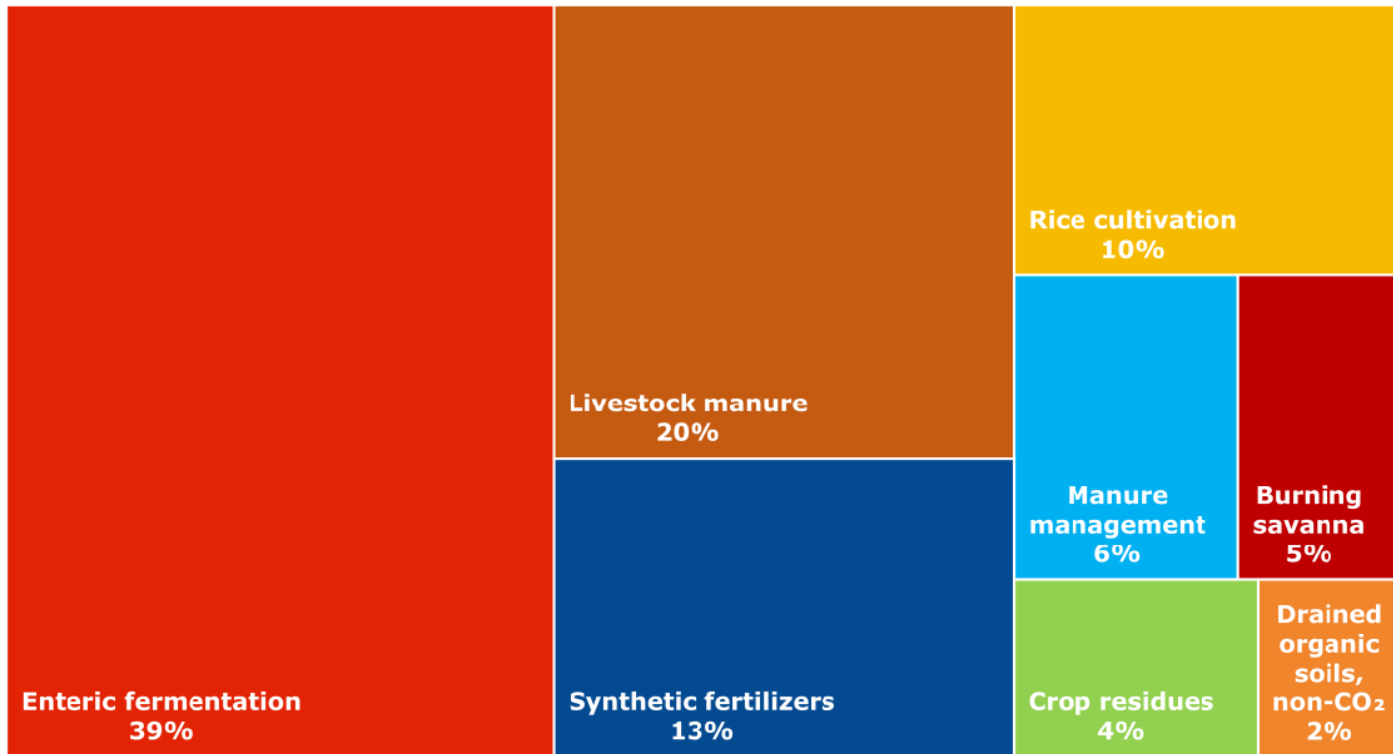## Challenges in developing countries

14 June 2022

Luanne Stevens

Presentation content

- Importance of agriculture soil emissions
- Current data sources and data collection processes
- Data collection challenges
- Way forward

Contribution to non-CO$_2$ emissions

Rice cultivation
10%

Livestock manure
20%

Manure
management
6%

Burning
savanna
5%

Enteric fermentation
39%

Synthetic fertilizers
13%

Crop residues
4%

Drained
organic
soils,
non-CO$_2$
2%

FAOSTAT Analytical brief 18, 2020

Source: FAOSTAT 2020.

Contribution of crops and livestock activities to total global non-CO$_2$ emissions from agriculture in 2018 (5.3 Gt CO$_2$eq)

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Importance of agricultural soils data
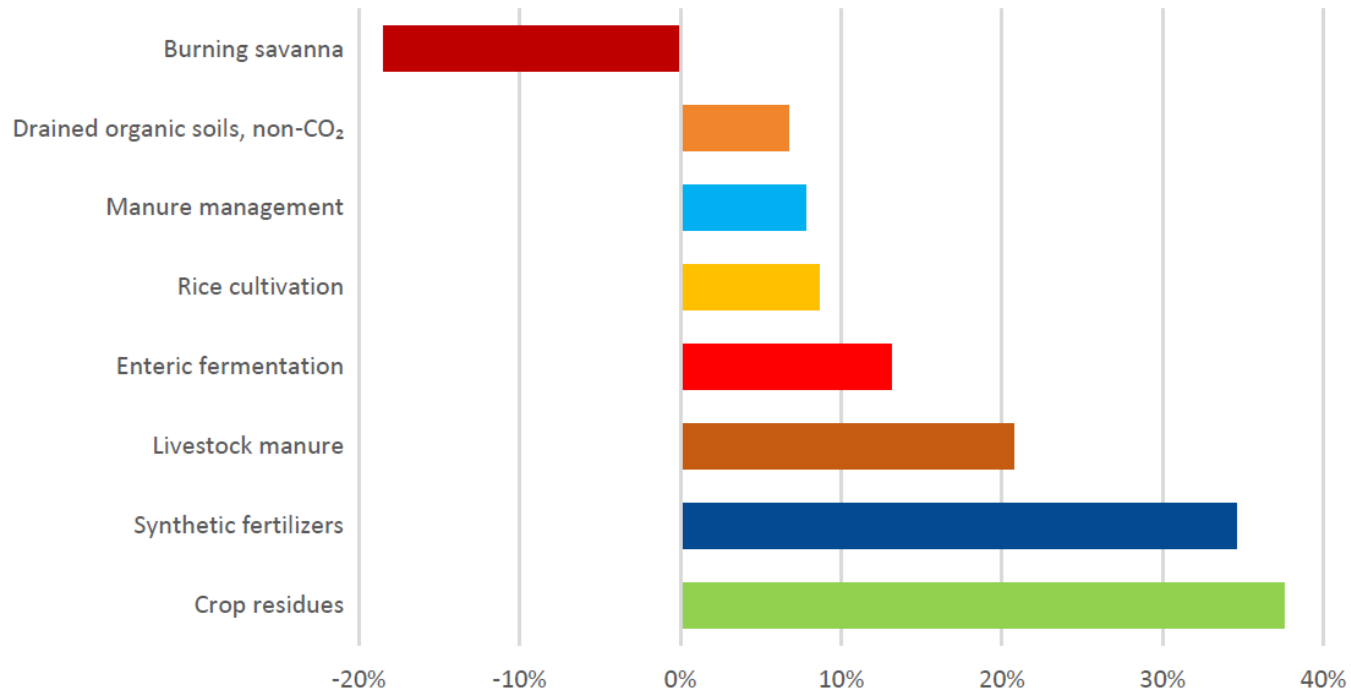
FAOSTAT Analytical brief 18, 2020

Source: FAOSTAT 2020.

Changes in non-CO_2 emissions from crops and livestock activities between 2000–2018 show a >35% increase from synthetic fertilizers and crop residue incorporation.

Synthetic fertilizers

The Bahamas	CD
Belize	FAO
Dominica	FAO
Haiti	CD
St Vincent & The Grenadines	SD
St Kitt's & Nevis	FAO
St Lucia	CD
Suriname	FAO
Eswatini	CD
South Africa	Model

- Activity data: Amount of fertilizer applied
- Common data sources:
  - *FAO*
  - *Survey data (SD)*
  - *Customs data (CD)*
- Data collection process:
  - *Agriculture extension offices*
  - *Customs departments*
  - *No formal arrangements*
- Alternate data sources and methods:
  - *Umbrella organisations*
  - *Example: Fertilizer Association of South Africa*
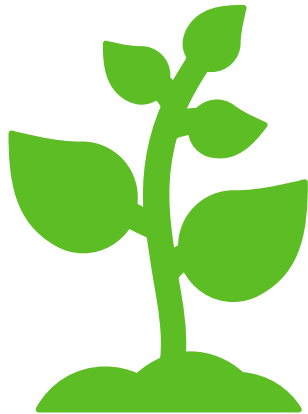 - *Modelling and forecasting*
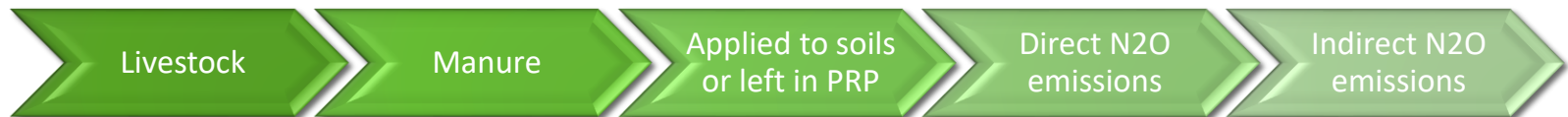
Organic fertilizers

- Activity data: Amount of fertilizer applied
- Usually only animal manure inputs are included here due to lack of data on other organic inputs
- Amount of manure applied is based on data from livestock section
- Challenge is the collection of manure management data.

Urine and dung inputs

- Activity data: Amount of urine and dung deposited in fields
- As with organic fertilizers this is based on data from livestock section

- Improved livestock data can lead to improved agriculture soil emission estimates

| Livestock | Manure | Applied to soils or left in PRP | Direct N2O emissions | Indirect N2O emissions |

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Crop residues

The Bahamas	**NI**
Belize	**CS**
Dominica	**NI**
Haiti	**EO**
St Kitt's & Nevis	**NI**
St Lucia	**FAO**
Suriname	**CS**
Trinidad & Tobago	**FAO**
Eswatini	**CS**
South Africa	**CS**

- Activity data: Amount of crop residues applied

- Data is either not included (NI) or is estimated from crop area/harvest/yield data from:
  - *FAO*
  - *Country specific data (CS) – agricultural statistics, remote sensing*

- Challenge is ***crop residue management data*** which is either obtained from:
  - *Expert opinion (EO)*
  - *Surveys/Research studies*

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Mineral and drained organic soils
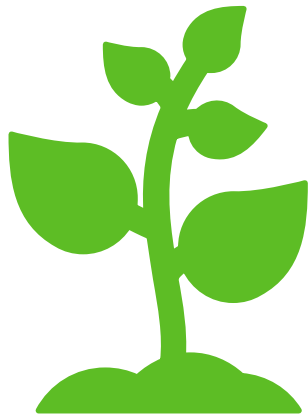
- Activity data: Soil carbon loss due to land use change and extent of organic soils

- Many developing countries do not include these emissions due to lack of data

- Relies on data from the LULUCF component of the inventory

- Data challenges are:
  - ***Land management data***
  - *Land use change data*

- Improved land use change data through Collect Earth

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Agricultural soils data collection challenges
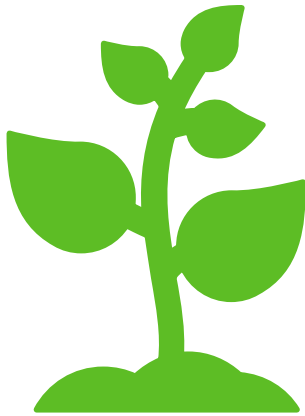
- Subsistence farmers don't keep records
- Extension officers/data providers are not aware of the data requirements
- No formalised data collection processes
- Infrequent agriculture census
- Time-series data gaps
- Lack of land use change and management data
- Lack of capacity and resources

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Agricultural soils data collection: Moving forward

- Awareness and capacity building for agriculture extension officers and data providers on data requirements
- Build relationships with data providers - highlight benefits and consider incentives
- Incorporate inventory relevant data into surveys and census – consider existing systems
- Setup formalised data collection systems - consider regulations
- Partner with research organisations to undertake project based studies
- Make use of data from umbrella organisations
- Make use of technology (software or Apps)
- Capacity building

Take-away messages

- Build awareness around data requirements

- Need good quality, annual activity data, particularly for:
  - *Synthetic fertilizers*
  - *Crop residues*

- Improve ways to collect management data

- Get creative and make use of technology