

GRA Inventory and Monitoring Cross Cutting Group Initiatives

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Inventory and Monitoring Cross-Cutting Group
Cropland Research Group Meeting, Brasilia, July 12

Inventory & Monitoring Cross-Cutting Group

GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

19 countries are members of the I&M CC Group (6 continents)
Co-chaired by Canada and The Netherlands



Group Vision is to:

- **Work with GRA Research Groups to improve TACCC (transparency, accuracy, completeness, comparability, and consistency) of:**
 - **Inventory** (Upscaled estimates of GHG; Not only UNFCCC inventory)
 - **Monitoring** (Assessment of state and trends of emissions, mitigation, and adaptation);
- **Better account for inter-relationships among GHG within agricultural systems;**
- **Improve GHG quantification and adaptation assessment for future scenarios of farming systems;**
- **Share and develop knowledge and expertise to build increased capability.**

Five existing work areas

A. Inventories:

- 1) To share knowledge and facilitate collaboration on application of remote sensing for inventory and monitoring.
- 2) To improve the capability to quantify mitigation strategies in inventories and to address synergies and trade-offs with adaptation strategies (“farming system”).
- 3) To produce guidance for determining emission intensity. (“sustainable intensification”)
- 4) To share knowledge and facilitate collaboration on improving national inventories

B. Monitoring

- 5) To produce best practice guidance on monitoring SOC stocks over space and time.
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Work Area 1

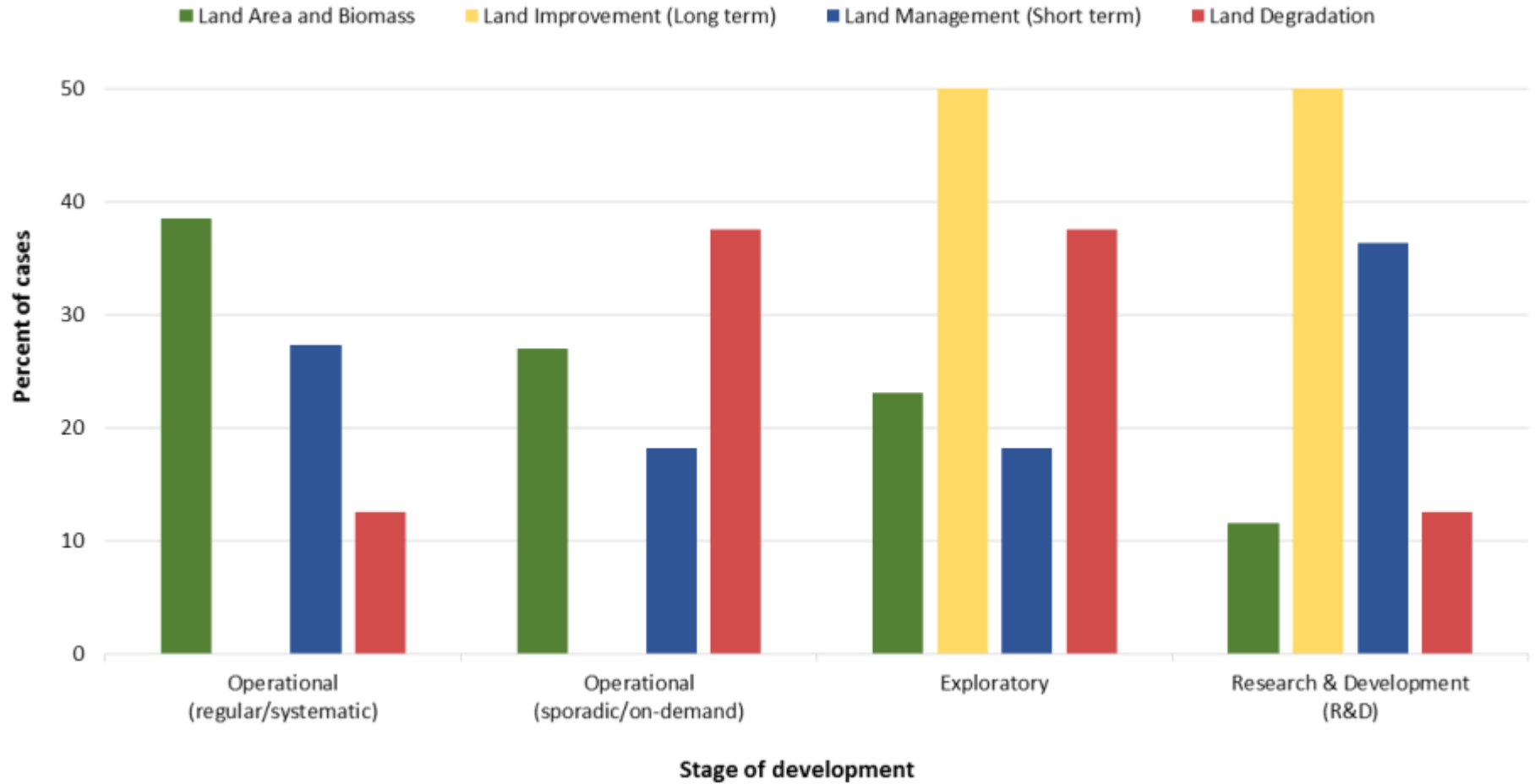
To share methods and lessons learned on application of remote sensing for inventory and monitoring.

- Stocktaking of applications
- Workshop opportunity
- Interest in establishing a scientific network
- UK is coordinating

Output:

- Evaluation of ability and feasibility of EO in inventory of activity data (2014)
 - Opportunities: Network and project work team(s), mesh with other GRA Groups
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What is the stage of development in the use of Earth Observation?



LIVE TRAFFIC

MAP

SATELLITE

 Show Labels

Advantages

- Real world
- Geographic Scope
- Global
- Repeatable
- Multiple modes

Limitations

- Resolution?
- Cloud cover
- Data volumes
- Complexity
- Cost?
- Skills/Experience

Solutions

- Data integration
- Modelling and data assimilation
- Cloud computing
- Free access to data (eg. Landsat, Copernicus)
- Collaboration and networking – GRA!

Work area 2

To improve the capability to quantify mitigation strategies in inventories and to address synergies and trade-offs with adaptation strategies.

- Improve knowledge sharing based on farming system similarities
- Describe activity data for national inventories that enables better analysis of system-level synergies and trade-offs among gases and practices
- Build on existing work
- Netherlands is coordinating

Outputs:

- Workshop on Farming systems (February 2015)
 - GRA-CCAFS side-event (Climate Smart Agriculture Science Conference, March 2015)
 - Opportunities: Develop network and/or project work teams, mesh with other GRA Groups
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Regional network on farming systems

- **Co-hosted by the Ministry of Agriculture and Cooperatives (MoAC) of Thailand and the GRA.**
 - **Location Bangkok**
 - **11 – 13 February 2015**
 - **Participants**
 - Indonesia, Korea, Malaysia, Myanmar, Philippines, Vietnam and Thailand.
 - With the support from Agriterra, farmer representatives from the Philippines and Indonesia
 - The Netherlands, UK
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Farming systems networks

Focus on mitigation & adaptation

- **Mixed farming systems**
- **Development of information systems for tools and technologies**
- **Knowledge transfer/adoption of technologies**
- **Increased collaboration between policy makers, researchers and farmers**

CCAFS meeting during the CSA conference

1. Collaboration is growing.
2. Potential collaboration point is to extend models to include complex systems in developing countries.
3. Alignment is needed about protocols and measurements. There is potential to write a paper.
4. Exchange of names, no formal structures needed.

Work Area 3

To produce guidance for determining emission intensity to support policy

- Reduction of emission intensity is an important goal of the GRA
- Guidance development on estimating emission intensity (sustainable intensification)
- Netherlands and Canada are coordinating

Output:

- Presentation on Greenhouse gas emission intensity and sustainable intensification (2014)
 - Needs new countries to move forward
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Work Area 4

To share knowledge and facilitate collaboration on improving national inventories

- Stock take of national inventory improvements under way and planned
- Canada is coordinating

Output:

- Summary from stock take on inventory improvements
- Opportunity: Develop network(s) to further work, mesh with other Groups

Inventory Stock Take Results

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- **All countries were improving both activity data and emission factors**
 - Most improving across a broad range of categories and sub-categories of emissions
 - **No countries stated they improving inter-relationships among GHG emissions or removals for integrated production systems**
 - Divided into standard inventory categories and subcategories
 - Activity data improvements will be important to capture systems
 - GHG Researchers need to consider the activity data that is important to how their research will be applied to national policy and national GHG emissions

Inventory Improvements

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- **Soil N₂O**
 - All countries, modelling, more agricultural system
 - **Livestock CH₄ (enteric fermentation and manure)**
 - 6 countries, more accurate, modelling
 - **C stock change including land use and/or land-use change**
 - 6 countries, methods, modelling
 - **Uncertainty Analysis**
 - 5 countries
 - **Improving use of inventory methods for mitigation analysis**
 - 4 countries
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Inventory Collaboration

Opportunity	Number of Times Identified
Networking and Collaboration	66
Networking only	18
Learning/skill development	16
Collaboration of specific project	13

- **Many GRA initiatives clearly support inventory improvement**
- **Potentially more networking and collaboration opportunities with inventory focus**
 - Sharing improvement project outline or ideas and inviting collaboration?
 - Physical or virtual meetings on inventory improvement themes to network including time for training/experience sharing from willing participants with desired expertise?

Work Area 5

To produce best practice guidance on monitoring SOC stocks over space and time

- Initial focus on grassland due to opportunity to add most scientific value
- Develop practical, scientific guidance to increase consistency and comparability of monitoring strategies
- Canada is coordinating

Outputs: modules/reports (2014-2015) on:

- Post-doctoral fellow doing meta-analysis of global literature on C measurement for grasslands
 - Opportunity: Develop network(s) to further work, mesh with other GRA Groups
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Soil Organic Carbon Monitoring Guidance

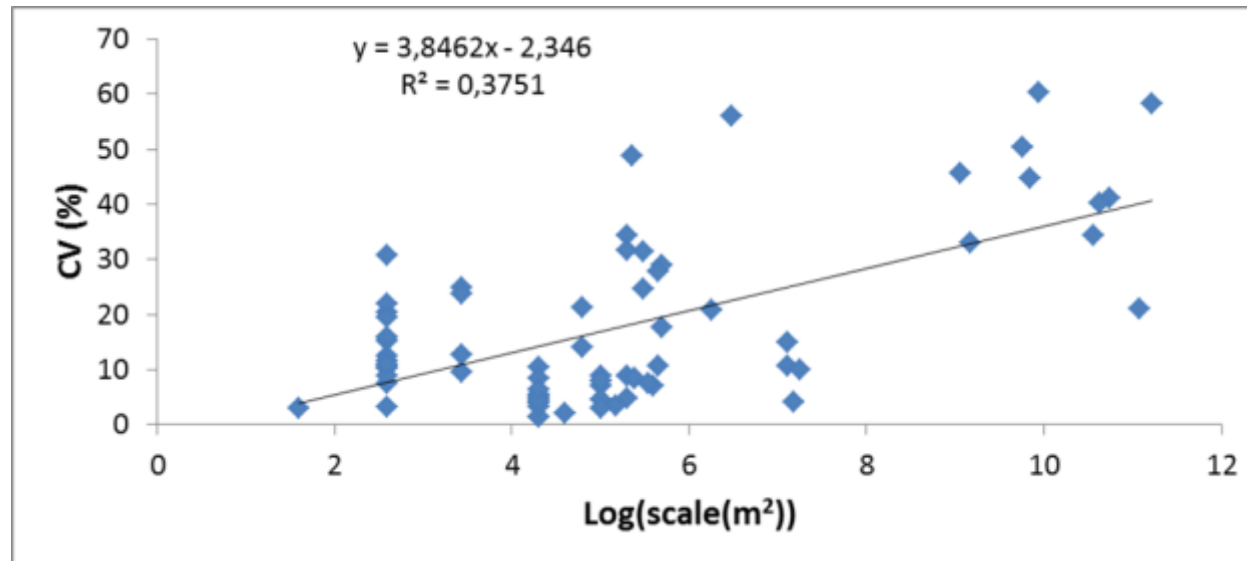
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- **Available guidance was judged too general for design of measurements systems to detect SOC amount and to detect SOC changes over time and/or SOC differences between areas.**
 - where to measure, spatial arrangement of measurements, how many measurements, and timing of measurements?

Canada contributing the initial literature review

- 2000 publications in worldwide literature identified
 - 795 deal with quantifying heterogeneity of C stocks
 - 270 specifically deal with measurement of C stocks of grassland
 - From 27 countries
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Effect of sampling scale

Strong effect of surface area. SD and CV increases with size of scale considered (from 10m² to 1000km²).



I&M Major Challenges

- **Linking scientists with those who need science to do their policy and national monitoring, reporting, and verification**
- **Country investment into Group activities**
- **Working with Research Groups on projects where mixing of expertise and perspective will produce more**
 - Realize the GRA advantage: Accomplish more working together than the sum of what we can accomplish working independently
 - Applies to Countries and Groups

MOVING FORWARD WITH CROPLANDS RG

July 11 I&M meeting

1. Cross-cutting at higher level: linking crop – livestock via food systems

- E.g. Sharing experience to quantify inter-related GHG emissions and removals in upscaled estimates having tradeoffs and/or synergies

2. Moving up tiers and create links between inventories and mitigation options (synergies & trade offs)

- E.g, wetlands
- E.g. Share experiences/developing guidance on Application of Tier 3 models for inventory and policy
- E.g. sharing experiences/developing guidance on prioritisation of measurements

3. The metrics of adaptation and mitigation: what to monitor in which (farming/cropping systems)

- E.g. Uncertainties of upscaled estimates

4. Case studies and benchmarking
